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# A Further Exploration of Bank Capital Requirements: Effects of Competition from Other Financial Sectors and Effects of Size of Bank or Borrower and of Loan Type

There is a strong consensus among policymakers that there need to be higher minimum capital requirements for banks in order to foster a more stable financial system and to help avoid the recurrence of a financial crisis of the magnitude of the recent one. However, higher capital requirements are not free – banks are likely to lend less, charge more for loans, and pay less on deposits as part of their actions to restore an acceptable return on the larger capital base they will need to employ. Determining the right minimum capital requirements therefore necessitates a careful balancing of the stability benefits against the economic costs of less attractive lending conditions[1].

Quantifying the likely effects on bank lending of different potential hikes in capital is a key step towards determining that balance. My previous paper, "Quantifying the effects of higher capital requirements on bank lending", used a straightforward model of loan pricing behavior by banks in order to estimate the effects, which it found to be relatively small. This paper expands on those findings by examining a set of questions that were not fully addressed in the original paper due to time constraints.

I would like to gratefully acknowledge the support of the Pew Financial Reform Project and note that the views expressed are my own and do not necessarily represent those of the Pew Financial Reform Project.

## Summary of findings from the first paper

The earlier analysis strongly suggests that the U.S. banking industry could adjust to higher capital requirements through a combination of actions that should have a relatively mild impact on lending. Not surprisingly, the adjustments would need to come from a set of actions, since the rebalancing appears tough to achieve realistically with any single move. Fortunately, the banks do have a variety of levers to pull which should allow them to make the transition without excessive difficulty.

As a result, there would likely be relatively small changes in loan volumes at U.S. banks caused by higher capital requirements on loans retained on the banks' balance sheets. Further, the various actions required to restore an acceptable return on common equity appear unlikely to be large enough, even in the aggregate, to significantly discourage customers from borrowing or to cause them to switch to other credit suppliers in a major way.

[1] Both academic theory and historical practice have demonstrated that increases in capital requirements need to be coupled with other regulatory safeguards in order to avoid inadvertently encouraging greater risk-taking. These other reforms are outside the scope of the paper, but the author wishes to acknowledge their importance.

This may seem counterintuitive given the potentially large percentage increase in required common equity devoted to lending. After all, bank managements already focus strongly on rationing their common equity. Why would they not react drastically to major changes in required capital levels? Three points may help clarify the results. First, banks are highly levered institutions -- the great bulk of the funding for a loan comes from deposits and debt. Even though common equity is expensive, it accounts for less than a fifth of the cost of a typical loan. Second, higher equity levels reduce the risk of a bank and therefore lower the returns demanded by debt and equity investors, reducing the cost of each dollar of debt or equity supporting the loans. Third, as shown in detail in the paper, reasonable actions by the banks could restore returns on equity to levels that are attractive to investors. Thus, banks should be able over time to raise new equity sufficient to maintain their loan volumes. It is true that large amounts of capital would need to be raised, but this appears quite feasible given a reasonable phase-in of the new rules. A four percentage point increase in the level of common equity as a percentage of the roughly $7.5 trillion of loans in the U.S. banking system would require about $300 billion of new equity. This would represent approximately a 20% increase in the existing $1.4 trillion of equity.[2] Put another way, this could be obtained by retaining roughly two years worth of the system's earnings, assuming even a 10% return on equity (ROE) for the banks as a whole. In practice, a mixture of capital raising and earnings retention would likely provide the needed capital.

## Scope of this paper

This paper expands the analysis in two directions. First, it examines the constraints on the banking system's actions imposed by the existence of competing types of financial institutions and markets. These competitors place some limits on the ability of banks to raise lending rates or lower deposit rates, but it appears unlikely that these limits will be very restrictive given the relatively small magnitude of actions that the banking system is likely to take. Second, the numerical analysis of the banking system's probable responses to higher capital requirements is expanded to look at subsectors of the industry, its products, and its customers. For example, the effects are likely to differ to some extent between small, regional, and money center banks. Similarly, small businesses may suffer a modestly greater impact than larger businesses.

## Summary of conclusions

The additional analysis presented here provides further support for the conclusions of the earlier paper that bank capital levels could be raised quite substantially without a large effect on bank loan pricing or availability. In theory, there are many competing financial institutions and capital markets investors who could displace the banks as credit providers or as takers of quasi-deposit money. However, it appears that the banks would have to be challenged by much more than these illustrated changes in capital requirements before the competitive landscape would become hostile enough for them to lose significant business.

[2] The banking system in the U.S. has approximately $1.4 trillion of common equity according to the FDIC, of which roughly $1.0 trillion is tangible common equity. For reference, a 10% return on common equity would therefore be about a 14% return on tangible common equity.

There may be modestly greater effects in certain segments of the banking market, but these still do not appear to rise to a level that would cause substantial disruptions to banking business. Part 2 of this paper discusses the differences in detail, but the overall conclusion is of a fairly striking uniformity of effect across the different segments by bank size, customer type, and loan type. In all cases, successful adaptation appears quite feasible without major increases in loan prices or decreases in loan availability.

## Part 1: Effects of competition from competing financial institutions and markets

Banks will be constrained to some extent by competitive pressures from other types of financial institutions and from investors in the capital markets. The competition could occur on at least three dimensions:

- Competition to offer loans and other forms of credit
- Competition for deposits and deposit substitutes
- Competition for sources of equity and debt investments

### Previous research

There has been a vast amount of research on bank deposit and lending activity, but very little of it has provided guidance on the degree to which an increase in bank lending rates would cause a shift by borrowers to other credit providers. Similarly, there is little written about how much deposit business would decline if banks paid less on those deposits. Macroeconomists, of course, have modeled the extent to which an increase in interest rates in the economy as a whole reduces economic activity. However, it is safe to say that even if the full 20 basis points[3] (bp) of increase in bank lending rates illustrated in the earlier paper were to translate through to the overall economy, the effect would be relatively small. 20 bps on the volume of bank lending would probably translate to 5 or 10 bps for credit provision to the economy as a whole. If the Fed were to increase short-term rates by that amount, it would be regarded as an extremely small move.

The literature on banking does have a great deal to say about why banks exist as financial intermediaries that use deposits as their principle method for funding loans and when and why this is a superior intermediation approach to capital markets activities or lending by institutions that are not funded through deposits. Related questions are also addressed, such as the implications of deposit insurance or minimum capital requirements on financial intermediation. Strahan (2009) and Allen and Carletti (2008) provide excellent reviews of this literature, including references to classic earlier reviews such as Bhattacharya and Thakor (1993) and Boot (2000).

Analysts generally view banks as providing several important economic services:

**Pooling depositor dollars.** Banks perform a role common to most financial intermediaries by pooling smaller amounts of money from a wide range of depositors in order to assemble large enough sums to invest with reasonable economies of scale.

**Providing time-intermediation.** There is a disparity between the desire of most depositors to have ready access to their funds and the investment needs of companies and individuals who need to borrow for longer periods. Banks are able to transform seemingly short-term deposits into longer-term

[3] A basis point (bp) is one one-hundredths of a percentage point. Thus 100 bps equals 1%.

investments, significantly increasing economic efficiency by creating more funds available for valuable longer-term projects. They are able to do this because deposit money is "sticky." Although depositors want to know they can get the money quickly at any time, they in fact tend to leave most of the funds for much longer periods. Thus banks can aid both borrowers and savers. Borrowers gain from access to large sums of longer-term money at cheaper rates than otherwise would be possible. Similarly, depositors gain higher rates than they could otherwise earn on very short-term investments.

This time-intermediation is valuable to the economy, but brings with it the risk of "bank runs" where deposits stop being sticky and flood out of the bank at an inopportune time. This risk is a prime reason for the existence of deposit insurance, as well as a number of other government measures such as the ability of banks to borrow at the Federal Reserve System's discount window in the event they need liquidity unexpectedly.

**Providing liquidity.** Banks are also the major providers of credit-related liquidity for businesses and individuals. They do this by entering into contingent lending arrangements, such as revolving loans or lines of credit, that allow the borrower to choose when and how much to borrow, within limits, and to repay as desired. Banks' superior ability to do this is closely related to the time-intermediation function, including the reliance on deposits and the various safeguards that the system provides to guard against bank runs that could interrupt the ability of banks to make good on their liquidity promises.

Kashyap, Rajan, and Stein (2002) provides theoretical arguments as to why banks are superior liquidity providers. In brief, the authors argue that both the taking of demand deposits and the offering of lines of credit require the maintenance of an expensive liquidity buffer usually obtained by holding lower-return liquid securities. If the liquidity requirements of the two services are not perfectly correlated, an assumption supported by the historical evidence, then a lower liquidity buffer can be held than the total required by the two services separately, effectively allowing a sharing of the cost between the two services. Gatev and Strahan (2006) show empirical evidence that banks are in fact in a better position than others to provide liquidity at times that the overall financial system is liquidity-constrained.[4] They argue that "[d]eposit inflows provide a natural hedge for loan demand shocks that follow declines in market liquidity" and go on to give evidence from the commercial paper, lending, and deposit markets to back this up. This goes beyond the assumption of a less than 100% correlation to suggest that there is even a negative correlation between the net liquidity requirements of deposit-taking and the funding needs of credit lines.

**Delegating monitoring and mitigation of information asymmetries**. Potential borrowers usually know substantially more about their prospects than do potential lenders. Much of the structure of finance is built around mitigating this difference in information, whether in regard to markets or in the design and functioning of financial institutions like banks. Banks overcome the problem by gathering and analyzing extensive information initially, benefitting from economies of scale, and by periodically monitoring the

[4] I am indebted to Amir Sufi for underlining the importance of the liquidity production issue as an underlying competitive strength of banks in the lending market.

activities of borrowers. (This can be viewed as a delegation by banks' depositors of the role of monitoring the borrower.)

All of these activities are aided by the development of longer-term relationships. There is evidence in the literature[5] that rates and lending terms improve as relationships lengthen, in part because the information gap shrinks. In addition, borrowers are more likely to be open and fair with their banks when there is a real relationship of some duration. Banks also benefit from the information available through providing transaction services. Strahan (2009) references two case studies finding that "changes in checking account balances help banks monitor small businesses."[6] Cook and Spellman (2007) finds that bank loan rates are lower than public market debt pricing as a rule and that this "negative lending rent" is larger for borrowers with lower credit ratings. The authors attribute these facts to the ability of banks to obtain and process private information from the borrowers which reduces the banks' risk compared to those borne by investors in the public debt markets.

**Intervention in troubled companies.** Banks are often also in a position to intervene when a borrower gets into trouble, either through explicit contractual rights provided when a covenant in a lending contract is broken or by virtue of the borrower's need for the longer-term relationship with the bank. Banks may have a better view of the financial or business situation, especially compared to some owners of small businesses, or may benefit from being outside a dysfunctional organization that finds it difficult to take appropriate measures. Sufi, Nini, and Smith (2008) finds that companies who have violated their financial covenants, and therefore are subject to intervention by their banks, typically do substantially better in subsequent periods than otherwise similar firms. The figures are quite striking. There is an abnormal return "of 10-12% per year beginning within a month of the report of the violation and continuing for at least five years." The authors attribute this to "increased [bank] monitoring and reduced management discretion." They note that these firms "tend to shrink in size following the violation and experience improvement in operating performance beyond that expected by firms with similar pre-event performance."

Despite a diligent literature review and approaches to some of the great banking experts in academia, I have not been able to find academic research directly addressing the question of how much business would shift to other types of institutions if loan prices increased or deposit rates fell. Fortunately, there are a few pieces of research that do shed light on some of the factors affecting the competitiveness of bank loans which I refer to in later sections, notably Sufi (2009) which underlines the prevalence of banks loans and provide details of their structure.

This paper therefore takes a pragmatic approach to estimating the competitive impacts by examining the sources of potential competition, their size, their limitations, and their motivations.

[5] The excellent survey in Boot (1999) states: "[f]irst, the duration of the bank-borrower relationship positively affects the availability of credit (Petersen and Rajan, 1994; Berger and Udell, 1995). Second, contract terms generally improve for the borrower over the life of the relationship: interest rates and collateral requirements fall."

[6] The two case studies are Mester, Nakamura and Renault (2006) and Norden and Weber (2007)

## Summary

The previous paper found that the banking system should be able to accommodate even a 4 percentage point increase in its ratio of tangible common equity to total assets through a relatively modest 20 bp increase in bank lending rates combined with a 20 bp decrease in average debt and deposit costs and certain other actions to reduce costs or gain further revenues. It further concluded that these small changes are very unlikely to produce significant competitive problems for the banking system. The overview of competitive financial institutions and markets shown in Part I of this paper provides further support for this conclusion, although, as noted, no empirical studies or economic models exist to prove or disprove this contention.

## Competition for loans

There are several relevant forms of competition for bank lending business. First, other types of financial institutions, such as insurers and finance companies, directly offer loans to businesses and individuals. Second, many types of debt securities are similar enough to loans to be at least partial substitutes for some borrowers. Third, the ability to securitize loans serves both to provide banks with a way of reducing their capital requirements and to enhance the ability of non-bank competitors to indirectly lend funds.

### Lending by other financial institutions

Banks are not the only major lenders. Insurers have historically played a prominent role in certain loan categories, particularly commercial mortgages. Finance companies, such as CIT or GE Capital, have also been large lenders. The federal government, as well, has played a major role for many years in certain major segments, such as mortgage loans.

The Federal Reserve Board (Fed) provides a "Flow of Funds Accounts of the United States" every quarter that provides excellent aggregate data on total credit provision, including loans, securities purchases, and all other forms of credit provision. Table 1 shows the levels of credit assets held by the major financial sectors as of the second quarter of 2009.

Banks and savings institutions ("banks," for short) are the largest single provider of credit, closely followed by government-related entities[7]. Within the purely private financial sector, banks provide about 35% of the nation's credit, with insurers, at 13%, as the next largest single category. Thus, banks are the most important private credit providers by a significant margin, but only provide a bit over one-third of credit.

[7] The great bulk of these activities are from the government-sponsored enterprises (GSE's), principally Fannie Mae and Freddie Mac. I also included federal and state retirement funds in order to group together all of the government-related activities that are included in the Fed's "financial sector" categories. Significant amounts of other government financial activity are included in "domestic non-financial."

**Table 1: Credit assets held, Q2/2009 by major financial sectors ($ billions)**

| | Credit assets held | % of total | % of non-govt |
|---|---|---|---|
| **Banks and savings institutions** | 10,491 | 27 | 35 |
| **Insurers** | 3,851 | 10 | 13 |
| **Finance companies** | 1,651 | 4 | 6 |
| **Mutual funds** | 2,434 | 6 | 8 |
| **Money market funds** | 2,481 | 6 | 8 |
| **GSE's and govt. retirement funds** | 8,970 | 23 | NA |
| **Other financial sectors** | 8,759 | 23 | 30 |
| **Total** | 38,574 | 100 | 100 |

The role of banks as lenders is proportionally much larger than their role as credit providers in general, since banks specialize in supplying credit through loans while many of the other sectors principally take credit exposure through purchases of bonds or other securities. Table 2 shows estimated loan volumes for the main financial sectors. The table focuses on ownership of "whole loans" rather than securities that represent an interest in a portion of a pool of loans, therefore the "other financial sectors" category is excluded, since loan ownership by institutions in this category is very heavily weighted towards loans that are pooled together and then securitized. The data does not provide a clear way to tease out the whole loans that are held for investment and not securitized and sold to other parties.

**Table 2: Estimated loan assets, Q2/2009 by selected financial sectors ($ billions)**

| | Credit assets held | % |
|---|---|---|
| **Banks and savings institutions** | 7,500 | 74 |
| **Insurers** | 508 | 5 |
| **Finance companies** | 1,447 | 14 |
| **Mutual funds** | 90 | 1 |
| **Money market funds** | 0 | 0 |
| **GSE's and govt. retirement funds** | 538 | 5 |
| **Total** | 10,083 | 100 |

Clearly, banks are the dominant holders of whole loans, with almost three-quarters of the total for the financial system. Finance companies hold about one-fifth as much, at 14% of the total, with none of the other types of financial institutions holding more than 5%.

**Debt securities as a substitute for loans**

The U.S. moved many years ago from a system dominated by bank lending to one in which the issuance of debt securities is the predominant mode of borrowing by businesses, measured by dollar volume[8].

[8] It seems appropriate to compare systems based on total volumes of credit activity, but it is worth noting that the number of businesses reliant on bank lending is considerably higher proportionally, since small businesses tend not to have access to the capital markets.

These securities have the advantage of tapping into the widest pool of potential investors, including many that do not have minimum capital and other regulatory requirements that burden the banks. Table 3 shows the distribution of borrowing through loans and securities by the non-financial business sector in the U.S. The column showing the percentage of non-mortgage borrowing is probably the most relevant, since we do not have a breakdown of mortgages by type of provider and many of these mortgages would be securitized and sold on to capital markets investors anyway. Excluding mortgages, banks provided only 21% of credit to businesses, a much lower figure than for other parts of the world.

**Table 3: Credit instruments for non-financial businesses, Q2/2009 by ($ billions)**

| | Amount owed | % of total | % of non-mortgage |
|---|---|---|---|
| **Bonds** | 4,201 | 38 | 56 |
| **Commercial paper** | 86 | 1 | 1 |
| **Mortgages** | 3,730 | 33 | NA |
| **Other bank loans** | 1,573 | 14 | 21 |
| **Other non-bank loans** | 1,588 | 14 | 21 |
| **Total** | 11,178 | 100 | 100 |

Ironically, the historic shift is actually good news for banks in terms of preserving their competitive position as lenders in the face of higher capital requirements. The borrowing that could most easily move to the capital markets or to other financial institutions has already shifted away from the banks. Debt securities are usually not a good substitute for the remaining bank loans and therefore present competition for banks only at the margin. First, individuals do not realistically have the option of issuing a security instead of taking out a loan. Second, small businesses are rarely sufficiently large and strong for a securities issuance to make sense. The realistic minimum borrowing level through a securities offering is generally at least $10 million and can be significantly higher. Below those levels the legal and marketing costs of an issuance would be too high as a percentage of the funds raised.[9] Third, larger corporations have generally already moved to the securities markets for those borrowings where this would make sense. The remaining use of bank credit for these businesses is tied to the unique aspects of bank lending, including:

**Contingent lending.** Banks are willing to commit to future lending on a much more flexible basis than the capital markets or most other financial institutions will provide, which can be quite valuable to companies. (See the earlier discussion of liquidity provision for some theoretical and practical reasons why banks are best positioned to provide this service.) Banks often provide revolving loan commitments, typically for three years at a time, that allow firms to borrow anything from zero to a stated limit and to pay down all or part of any outstanding loans at any time. In fact, the Federal Reserve has indicated that 78% of all commercial and industrial loans made by banks were made pursuant to a line of credit, as of February 2009[10]. Letters of credit are also available, which commit the bank to

[9] A series of smaller offerings can work if they add up to more than this minimum. Multiple offerings add some costs, but parts of the expense load can be shared across offerings over time.
[10] See James (2009).

lending money when called upon to do so. Traditional debt securities rarely have any flexibility on amount, except sometimes in regard to prepayments.

Strahan (2009) shows that lines of credit to consumers and to businesses have both grown substantially as a percentage of GDP since the 1990's. He concludes "while the composition of banks' provision of funding liquidity has changed, it remains as important as ever."

Consistent with this, Sufi (2009) found that about three quarters of public companies had a bank line of credit. Further, these lines of credit were of substantial size. The portion that was drawn down represented almost 30% of all debt at these companies and the remaining unused portion was equal to about 50% of the existing debt levels. By contrast, only 5% of public companies in his sample even had a commercial paper program. (Minimum sizes for commercial paper issuance are generally too large for medium-sized enterprises.) The large size of these lines of credit, both used and unused, strongly suggests that the large majority of bank credit to public corporations is supplied in this manner, consistent with the Fed's recent findings.

Considerable research has demonstrated that bank lines of credit are a theoretically good way of handling liquidity needs and that corporations in practice place considerable value on the flexibility provided by them. See, for example, Acharya, Almeida, and Campello (2009) which provides a brief literature review and states that a "line of credit can thus be seen as an insurance contract. Provided that the bank can offer this insurance at 'actuarially fair' terms, lines of credit will strictly dominate cash holdings in corporate liquidity management." (They earlier discuss the literature that shows why a pre-committed source of funds, through cash holdings or a line of credit, is considered vital by many companies.) The rest of that paper then explores situations in which a bank line of credit is inferior to cash holdings because the potential for covenant violations by a risky borrower is too high, given that such violations would allow the bank not to lend despite the existence of the line of credit. Again, however, the more typical situation is that a line of credit, almost always from a bank, is considered a key part of liquidity management by most corporations.

**Tougher covenants.** Loans and debt securities often require the borrower to make covenants providing that they will maintain certain key elements of the current situation. For example, a borrower may commit to hold its debt to no more than 50% of the value of its assets. Violation of a covenant gives the creditors the right to force early repayment, although it is much more common that the lender uses the negotiating power of this position to wring out other concessions, such as a higher rate on the loan and changes to the business' strategy. The advantage of covenants for a borrower is that they allow the creditor to lend more cheaply, because the lender knows that if the company deteriorates significantly they can renegotiate to obtain better terms. This renegotiation process is much more difficult when the borrowing is in the form of a security that is widely held, quite possibly by holders who were not original purchasers. The lack of an ongoing relationship, and the need to persuade a wide group, significantly raises the risk of a forced repayment, which can sometimes lead to bankruptcy. In consequence, debt securities generally have light covenants or none at all, since tougher covenants represent an unacceptable risk to the borrower. On the surface this is good for the borrower, but it means that

weaker companies either have to pay significantly higher rates or may not be able to sell securities on reasonable terms.

Various academic papers have demonstrated the theoretical and practical value of active monitoring by banks of the actions of their borrowers[11]. This discipline appears to reduce the destruction of value from self-serving, ill-informed, or misguided actions by company managements. Covenants give banks a way of monitoring, since quarterly reports must usually be provided to show that financial covenants have not been breached. They also give banks the ability to enforce necessary corrections when companies hit trouble.

**Relationship banking.** A bank loan is often part of a wider relationship between a bank and a company or individual. This ties in with the flexibility of many bank lending arrangements and the establishment of loan covenants that create an active monitoring role for the banks. Banks usually provide other services to borrowers such as taking deposits, or giving investment or strategic advice, or providing a range of administrative services. In contrast, a debt security is virtually always a stand-alone transaction from the point of view of the purchaser of the debt.

Taken together, the limited ability of many bank borrowers to issue securities and the strong incentives for companies to maintain substantial levels of bank borrowing severely limit the potential competition from capital markets. That is not to say that there is no issue. Some companies are of a size where a bank borrowing is competitive with securities issuance under today's conditions, but only by a small margin. Higher loan rates or tougher conditions could push the borrower into moving into the capital markets. Similarly, large corporations could partially reduce their use of revolving loan commitments and other contingent sources if borrowing the money up-front from the securities markets became relatively more attractive or companies simply chose to take their chances on obtaining funds when needed. However, it does not appear that these effects would be significant for the level of changes in bank lending conditions illustrated in the previous paper.

**Securitization**

Securitization is a very important part of modern credit markets. It allows an originator of loans to pool together a group of loans that they have issued and to sell to investors the right to receive portions of the principal and interest payments on these loans. Generally the originator ends up holding a small portion of the promised cash flows representing the riskiest part of the loans, but transfers the rest on to external investors.

Securitized loans have a mixed effect on banks. Either a bank or a non-bank financial institution ("non-bank") may originate the loan and may keep a substantial relationship with the borrower, but the end-investors are most commonly non-banks. This creates a tool for banks to continue lending on attractive terms despite higher capital requirements, but also fuels potential competition from other financial sectors. On the positive side, banks can effectively take advantage of the ability of many non-bank

[11] See the earlier referenced literature reviews by Strahan and others.

investors to allocate little or no capital against the loans. Investors take some of the expected profits, but the remaining benefit can be very attractive to the originating bank, given the small portion of capital that would need to be put up by the bank itself. On the other side, non-bank competitors are also capable of accessing the securitization market, giving ammunition to other types of financial institutions that are looking to originate loans.

The securitization alternative is not likely to have a major influence on the effect of higher capital requirements for banks, in the range of the modest loan price increases considered in the earlier paper. Even should the required increase in rates be enough to trigger a large increase in securitization, the securitization alternative may well help the banks more than it hurts them, by allowing them to continue originating loans, while avoiding the worst effects of the capital increase.

### Competition for deposits

Banks also face serious competition from other financial institutions for deposit funds[12]. Here, money market mutual funds represent the most serious challenge. Money market funds in the U.S. are organized as standard mutual funds that choose to invest in short term corporate or public debt and strive strongly to keep the market value, and hence book value, of their assets at exactly one dollar a share. This entails trying to avoid capital losses altogether by sticking with the safest short-term debt. The historical ability of funds to maintain the "buck" valuation, except for a small number of exceptions, has led a large number of consumers and businesses to treat money market funds as a completely safe store of value that also has excellent liquidity. Money market funds generally allow withdrawals each day and provide check-writing capabilities. Thus, for most people, for most purposes, a money market fund is a substitute for a bank deposit.

If money market funds were a perfect substitute for deposits, it would make it very difficult for banks to reduce rates further or to add significant fees in response to their increased capital requirements. However, it is clear that they are not perfect substitutes, as illustrated in the following two figures taken from the "Report of the Money Market Working Group" sponsored by the Investment Company Institute. As Figure 1 shows quite vividly, rates on money market funds can be quite substantially higher for prolonged periods than the rates banks offer on money market deposit accounts. Figure 2 shows that, despite this, bank deposit levels have remained very substantial even at times when one would have expected a mass exodus to money market funds. Figure 2 shows money market fund levels as a percentage of total liquid cash balances, defined as various types of bank deposits plus money market fund holdings. There is clearly a correlation between the spread on money market fund rates over bank deposit rates and the proportion of liquid cash balances held in money market funds, but there is a surprising stickiness of bank deposits even when money market rates are substantially higher than bank rates. One should be careful not to over interpret these specific figures, but it is clear that money market funds are a quite imperfect substitute for bank deposits, particularly for retail investors.

[12] For convenience, this paper will refer to checking and demand deposit accounts, as well as certificates of deposit, as "deposits," unless otherwise specified.

Figure 1: Rate comparison from Report of Money Market Working Group

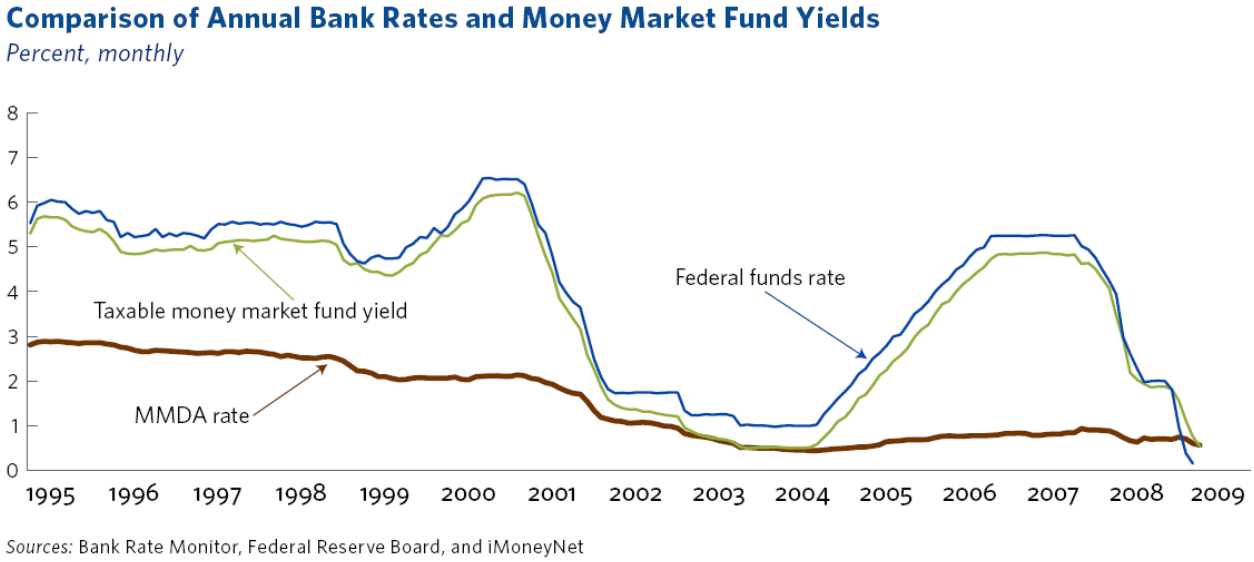
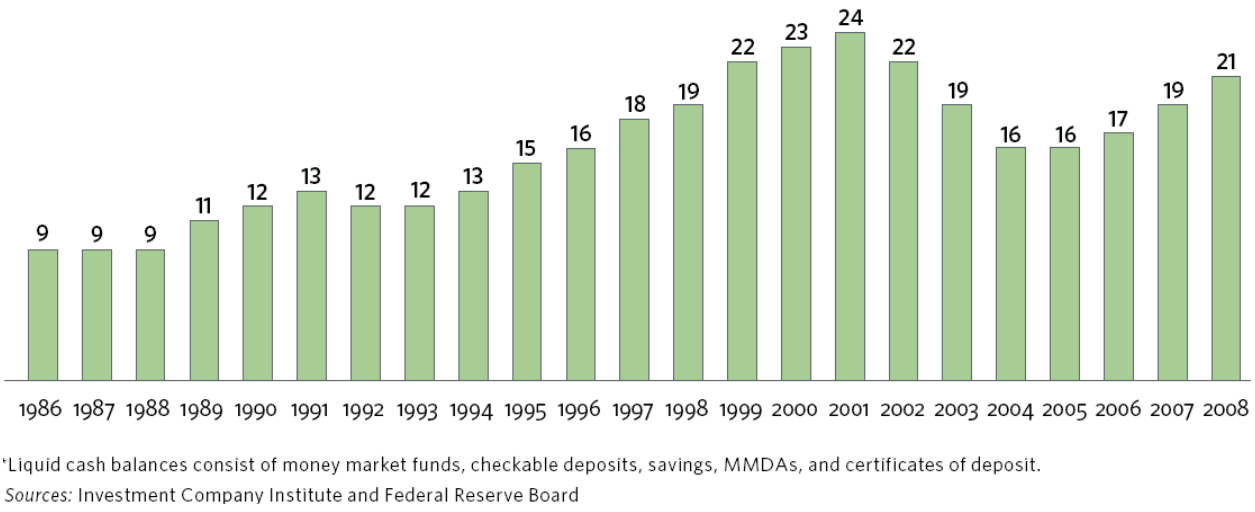



Figure 2: Holdings of money market funds from Report of Money Market Working Group




There are a number of reasons why bank deposits are used differently than money market funds:

**Deposit insurance**. Some depositors place significant value on the FDIC guarantee of bank deposits, which is effectively equivalent to a federal guarantee. (The FDIC could theoretically become insolvent or illiquid, but, in practice, the government would intervene since it would be political suicide not to do so.) Money market funds are normally unguaranteed, although several funds have been rescued by the funds' management companies, who have not wanted to face the business consequences of their money market fund "breaking the buck." That said, the federal government did have to step in with a

temporary insurance program during the recent financial crisis. The problems at a few money market funds, and the potential for much wider problems, could significantly hurt the competitive position of money market funds that are not invested principally in U.S. Treasury securities. However, this may be partially counteracted by a sense that a government rescue would occur in any future crisis.

**Transactional needs.** Banks provide a number of services associated with their deposit accounts that are difficult for money market funds to emulate. Banks often provide overdraft protection, a backstop line of credit in case a check would otherwise bounce. Customers sometimes need certified checks or other services that require money to already be in a bank account. Businesses, for their part, often have more complex administrative needs that mandate having a deposit account with the bank. Offsetting this, those customers with the most money usually have considerably more available for deposit than is needed to ensure the transactional services are available. Those extra funds could be placed in money market accounts.

**Bank relationships.** Banks make an effort to cross-sell their products, giving customers a better deal if they have multiple transactional relationships with the bank. Deposit accounts are a basic part of this cross-selling.

**Branch networks.** Many customers care about the ability to transact business at a physical branch. Money market funds are able to give better rates in part because they do not invest much in bricks and mortar.

**Inertia.** Many individual bank customers and some smaller businesses simply do not find it worth the bother to add a money market account to the bank account they would need for transactional services. Of course, these customers tend to be the ones with the least money available for deposit, since the incentive to shop for a better rate rises with the amount of funds.

Fixed rate annuities offered by insurers are also a potential substitute for bank certificates of deposit. They are not, however, competitive with demand deposits because of annuities' fees for premature redemption and related commission expenses. These fees are also an obstacle to competing with relatively short-term certificates of deposit, but this disadvantage is offset by tax advantages for annuities, advantages which compound and become significant the longer the money is likely to stay in the annuity. Some investors in certificates of deposit have an inclination to keep rolling the deposits over, in which case they may be willing to switch to an annuity for the tax advantages. At times there is a significant marketing effort by the insurance industry to grow fixed annuities by persuading investors to move out of certificates of deposit.

Individuals have approximately $1.6 trillion[13] invested in annuities of all kinds, as of 2007, and invested an additional $193 billion, on a gross basis, that year. If half of all annuities are fixed rate, rather than

[13] These figures are taken from the Life Insurers' Fact Book of the American Council of Life Insurers, available at www.acli.org

invested in the equivalent of mutual funds, this would imply an $800 billion market size for the sector that competes with bank deposits. This relatively small size, compared to over $8 trillion of deposits at commercial banks, suggests that fixed rate annuities are not a strong competitor for bank deposit money. In addition, it seems likely that the great bulk of this $800 billion of fixed rate annuity funds are held by investors who did not view certificates of deposit as a serious alternative because they were attracted to the tax advantages of annuities and were comfortable committing funds for long periods. Under those circumstances, it has always been difficult for CD's to compete. On the other side, many more savers do not consider fixed annuities as an alternative to bank deposits, since they are not willing to accept the illiquidity of fixed rate annuities and the significant commissions that are often charged, or do not place a strong value on the tax advantages.

Mutual funds may also be a competitor for deposit funds, particularly certificates of deposit. Sometimes the return on one- and two-year corporate bonds is high enough to lure money out of CD's and money market funds into short-term bond funds. These are still relatively low risk and the funds sometimes provide the ability to write checks, although there is no expectation that the share price will stay precisely fixed. Figures are not readily available for the current total size of short-term bond funds, but they represent only a fraction of the $1.6 trillion[14] of mutual funds focused on taxable bonds. (Tax-exempt bond funds are virtually always long-term in orientation[15].) If 20% of this money were in short-term funds, it would represent about $300 billion, quite small in relation to the more than $8 trillion of bank deposits. Further, most of the $300 billion is presumably from investors with a different set of objectives than held by those investing in CD's or other bank deposits. Thus, there is the theoretical possibility that short-term bond funds would become a significant threat to bank's deposit gathering, but it seems unlikely and is not yet evident in the data.

Institutions and wealthy individuals also view commercial paper and sometimes short-term bonds as partial substitutes for bank deposits, for the funds they have in excess of pure transactional balances. However, the commercial paper market is currently under $100 billion in size, seriously limiting its potential to compete with deposit funding. Even at its peak it was only in the range of $200 billion in size.

These other alternatives do create constraints on how low banks can reduce deposit rates. However, the historical evidence is that there is room for very substantial disparities with money market funds before banks suffer an excessive loss of deposits and that other sources of competition presented only a limited threat. It does not appear likely that the rate reductions of 10-20 basis points illustrated in my earlier paper would run into serious competition from deposit substitutes.

[14] Taken from Trends in Mutual Fund Investing, September 2009, from the Investment Company Institute, available at www.ici.org.

[15] There are also tax-exempt money market funds. Tax-exempt investors using funds as a vehicle seem to want either very short-term or quite long-term underlying investments.

**Competition for sources of debt and equity investment**

A portion of a bank's funding for loans generally comes from debt, rather than deposits. Much of this will be accessed through the Federal Funds (Fed Funds) market or by borrowing directly from the Federal Reserve (Fed), both of which are sources generally only available to banks and bank affiliates. However, some of the borrowing is through the conventional securities markets for short- or long-term debt.

For completeness, this sub-section briefly discusses the competition for debt and equity investment, but it is generally not that useful to single out any particular types of competitors for bank borrowing, since they are in a meaningful sense competing with every other debt issuer. However, it is true that some debt investors have limits on the amount they will commit to the financial sector, so the level of competition is modestly stronger with other financial institutions, such as insurers or non-bank lenders. That said, there are no clear implications of this closer competition. The key point is that banks would find it difficult to lower the rates they pay on their new debt issuances, except through the straightforward action of reducing their riskiness, such as by increasing their capital levels. In the previous paper, I assumed a decline of 10-20 basis points in the total cost of debt and deposits to reflect this lower risk at higher capital levels, as well as cuts to the administrative costs of gathering deposits.

Bank equity capital, for its part, is either raised internally through retention of a portion of profits or is raised externally by the sale of stock or conversion of existing convertible securities or options. As with debt, bank equity offerings effectively compete with all other potential equity offerings, although there is a meaningful sense in which the competition is modestly closer with other financial institutions offering equity. Either way, the main method by which banks can improve the terms of their offerings is by presenting investors with either a higher potential for future profits or a lower risk level. Again, the riskiness of a bank, or of the system as a whole, is substantially reduced by a significant increase in the levels of equity capital. In my earlier paper, I assumed that the expected return on equity demanded by investors would drop by 50-100 basis points, from a starting level of 15%. This continues to appear to be a very reasonable assumption, given the risk reduction benefits of greater capital.

## Competing financial sectors

The first portion of Part 1 has focused on the instruments that compete with bank loans and deposits. I now review the specific financial sectors that offer these competing loan or deposit products, including:

- Life insurers
- Finance companies
- Money market funds
- Mutual funds
- Capital markets investors: pension funds, individuals, insurers, etc.
- Hedge funds

**Life insurers**

The insurance industry is a major financial intermediary in the U.S., holding 13% of non-government financial sector assets, as shown in Table 1 above. Within the industry, it is the life insurance sector that represents the most serious competition with banks. The property/casualty sector has only about a fifth of the industry's assets and focuses very heavily on short-term, low-risk investments, since the threat of hurricanes or other catastrophes creates a need for high liquidity. Life insurers, however, have much longer-term liabilities and compete for customers in large part based on the return on assets that they can provide. Thus, they are significantly closer in function to banks than are the property/casualty insurers.

Life insurers own about $3 trillion of loans and securities. About a sixth of this consists of loans, with $336 billion of mortgages held directly and $167 billion of loans held directly. They also own a considerable amount of asset-backed securities, especially mortgage-backed ones. The most significant competition to banks is in the area of commercial mortgages, since the great bulk of the mortgages directly owned by insurers are for businesses. That said, they are a considerably smaller competitor in this area than banks are. Since businesses in the U.S. have borrowed about $3.7 trillion through mortgages, life insurers provide at most 9% of these mortgages and presumably somewhat less once one factors in residential mortgages owned directly. This is much lower than the level of commercial mortgages held by banks of approximately $1.8 trillion or roughly half of all those mortgages. Life insurers do make direct loans of other kinds, but these are primarily loans directly to their policyholders, secured by the value of the underlying life insurance policies.

Life insurers are also a major buyer of corporate debt and of asset-backed securities, which puts them in indirect competition with banks as credit providers. However, in this capacity they act much as other capital market investors do, as discussed later in the paper.

There is the possibility that life insurers could choose to switch funds from their capital market activities into direct loan provision, if they saw a good opportunity to take business from banks. This could theoretically occur if the new bank capital requirements were too onerous, leading to excessive loan price increases or sharply reduced availability. Although the magnitude of the changes produced by higher bank capital requirements does not appear large enough to trigger any major movement by life insurers, it is worth exploring the factors that would affect a decision by the insurers.

First, life insurers would need an origination network for new loans. They have existing relationships with their policyholders and agents, which would provide some opportunities. Beyond that, many of them have established relationships with commercial mortgage borrowers and brokers. It is unclear whether those sets of relationships would be sufficient for them to expand in significant scale, so there could be a need to find new outlets. This is a large task, but not an impossible one over time and could be aided by joint ventures with banks that were more interested in origination than in holding loans.

Second, the insurers would need to make their regulators comfortable if they expanded outside of policy loans and commercial mortgages. Policy loans are an inherent part of the life insurance business

and therefore have always been accepted. Commercial mortgages have been viewed as part of their wholesale investment business. However, regulators could be significantly less comfortable if insurers appeared to be mimicking the lending business of banks using their operating insurance entities. (Use of a bank affiliate would put them under the same capital constraints under which other banks operate.)

Third, insurers, and their customers, would need to have a reasonable assurance that there would be sufficient liquidity[16]. This might appear to be a trivial issue during normal market conditions, since life insurers tend to have large quantities of cash and liquid investments. However, any financial institution that makes illiquid loans faces the possibility of a "run." Banks are protected by deposit insurance, the existence of the Fed Funds market, and access to the Fed's discount window. Life insurers do not have these benefits, but do have the advantage of a liability structure that is significantly longer-term in nature than bank deposits. However, much of its funding can still be withdrawn, albeit with penalties, if customers become concerned. The most likely cause of a run would be concerns about the financial state of an insurer when financial markets are in turmoil, but one could also envision a problem if a pandemic developed that appeared likely to cost life insurers large sums.

Fourth, insurers would need to develop credit expertise outside of their traditional lending and investment activities. As noted at length earlier in the paper, banks are much more involved in analyzing and interacting with their borrowers than other investors, including insurers, typically are.

Fifth, it is unclear whether life insurers would indeed have a capital advantage over banks, even if capital requirements for banks were increased. Much of the term lending done by banks is to firms that are unrated or have credit ratings below investment grade. The risk-based capital guidelines promulgated by regulators require considerable capital to be employed for such credits. The rules are very complex and lead to differing results depending on the particular circumstances of the insurer, but it appears that a typical sub-investment grade loan owned by a life insurer might, in practice, require equity capital in the ballpark of 8% of the size of the loan[17]. This range is not that different from the likely capital requirements for banks. In addition, the capital commitment would be much higher for somewhat weaker credits, which might make it difficult to service the full range of businesses or to continue to

[16] See the earlier discussions of liquidity provision and contingent lending for a fuller treatment of the reasons why liquidity provision is a strong competitive advantage for banks in the loan market.

[17] Capital requirements on credit risk taken by life insurers are calculated in quite a complex manner. First, there is a base factor whose value varies by the type of asset, its credit rating, and sometimes by additional factors. For mortgages the additional factors include delinquency rates and the insurer's historical experience with mortgage losses. Once the base factor is determined, it is then reduced by a tax factor and increased or decreased by an asset concentration factor. Finally, the provisional credit risk capital requirements are then fed into a formula to reflect the diversification benefits of the less than 100% correlation between credit risk and the other risks taken by insurers, such as mortality risk. This covariance effect can reduce the capital requirement by up to about 30%. For illustration, let us assume that the base factor for life insurer loans equals the flat 5% rate used for property/casualty capital calculations for loans. (For comparison, the highest rated category of sub-investment grade bonds held by life insurers has a quite similar level of 4.6%.) The tax, concentration, and covariance effects might reduce the level to 2.6%. If the life insurer chose to keep a minimum capital level of 3 times the regulatory RBC calculation, which would be broadly typical for a highly rated life insurer, this would result in a 7.8% capital requirement.

lend to a business which weakens, which is not an issue that banks generally face with their capital formulas.

If insurers wished to avoid the potentially high capital charges on sub-investment grade credits by expanding into lending to more firms with investment grade ratings, they would need to move into the kind of contingent lending in which banks specialize. This is likely to be less appealing to insurers and their regulators since it is considerably different than their traditional investment business and runs into the liquidity issues described earlier.

Sixth, the credit rating agencies could be a barrier. Large life insurers are much more dependent on their ratings than are banks, given the absence of a solid equivalent to deposit insurance for life insurers.[18] Most customers, and the agents that play a key role in distributing life insurance and annuities, demand high credit ratings. This has two major implications. First, insurers would have to convince the credit rating agencies of the wisdom of expanding into the lending business. Failure to convince the agencies would create too large a burden on the overall ratings of the insurers, since there is a substantial subjective element of the rating process which takes into account views on overall corporate strategy. Second, the agencies require minimum capital several times larger than the regulatory minimums for those insurers that want high ratings. The most highly rated insurers tend to have capital three or more times larger than the regulators would require. This effect, which was already factored into the 8% figure given above, substantially adds to the capital burden that would be imposed by loans that are unrated or rated below investment grade.

In sum, there are many obstacles to discourage insurers from becoming major direct lenders. It is unlikely that higher bank capital requirements in the range discussed in the earlier paper would shift the competitive landscape enough to seriously interest the life insurers. However, a large enough burden on the banks, translated to substantially higher loan rates, would open up the theoretical possibility of major competition from insurers.

**Finance companies**

Finance companies, a term which broadly covers all direct lenders who are not banks and not insurers, have played a major role in lending for many years. Table 2 shows that finance companies held an estimated 14% of the loans by the financial sector at the end of the second quarter of 2009. However, they have been struck hard by the financial crisis, since their business model was to borrow relatively short-term in the capital markets and to make illiquid medium- to long-term loans. Thus, their lending business was quite similar to banking, but their funding sources were capital markets rather than deposits. This model looks very difficult to execute going forward. Key parties, such as investors, rating agencies, and potential customers are generally no longer comfortable with a model that relies on funding from a source that clearly has a risk of freezing up, as it just did.

[18] Policies sold by life insurers are guaranteed up to certain limits by guarantee funds in all or virtually all of the states. However, these entities are not pre-funded, there are legal limits on the annual assessments that can be placed on the state's insurance industry to fund ex post facto, and there are serious doubts that any state fund could effectively cover the losses from one of the largest insurers failing.

Many of the key finance companies have converted into bank affiliates, which will put them under the same capital rules as apply to other groups with bank affiliates. The Fed imposes capital requirements on bank holding companies, which effectively means capital requirements on the entire consolidated group, including the finance companies. Some other finance companies have run into serious financial distress, reducing their influence in the market going forward. Even those that have survived and chosen not to become bank affiliates are facing, and should continue to face, significantly higher borrowing costs.

Thus, it is unlikely that finance companies will prove to be a major constraint on the ability of banks to raise loan rates, tighten lending terms, or lower deposit rates. If anything, reduced competition from finance companies should ease the transition to tougher capital rules.

**Money market funds**

Money market funds compete with banks on only one dimension, as potential substitutes for bank deposits. As discussed earlier, these funds are serious competitive threats to banks, but it does not appear that modest decreases in bank deposit rates would produce a substantial shift into money market funds.

**Mutual funds**

Mutual funds compete with banks at three levels. First, they are an important part of the capital markets in general, investing in debt securities that are potential substitutes for bank borrowing by large corporations. That role will be discussed in the next sub-section in conjunction with other capital markets investors. Second, short-term bond funds sometimes are attractive to some investors as a substitute for bank deposits. However, a move of 10-20 basis points in bank deposit rates is unlikely to produce much of a shift into short-term bond funds since they are not viewed as a very close substitute.

Finally, some mutual funds specialize in purchasing bank loans. They are not currently major competitors with banks, since the Fed estimates that all loans held by all mutual funds amounted to only $90 billion at the end of the second quarter of 2009. They could, however, be serious competitors in the future for banks, since mutual funds do not have any minimum capital requirements, nor do the large majority of their investors, which tend to be individuals and sometimes pension funds. These mutual funds do not have the ability to originate loans, but they could be a tool for an aggressive bank to originate a substantially increased volume of loans, knowing they could place them with one or more mutual funds. Thus, they could have a significant impact on the banking system as a whole, even without their own origination capability.

However, that all said, it seems unlikely that an increase in bank loan rates of 10-20 basis points would spur substantially greater activity by these mutual funds. The recent turmoil resulting from the financial crisis is likely to have a considerably greater impact, although the net result is unclear. The losses incurred on bank loans may lessen the attractiveness of these funds, but this could be more than offset

by the greater attractiveness of credit spreads on new loans. All of this would need to be judged relative to the effects of the crisis on competing uses of investors' funds.

**Capital market investors**

Capital market investors compete with banks as credit providers to businesses. They do so by purchasing debt securities. However, as noted under "debt securities as a substitute for loans", securities issuances do not appear likely to act as a major constraint on bank lending activities, within the likely range of adjustments triggered by the illustrated tightening of capital requirements.

**Hedge funds**

The potential competition from hedge funds is similar in nature to three of the other potential competitive threats. Like mutual funds, they can purchase bank loans. They can also act like other capital market investors, providing credit through securities purchases. Finally, like an insurer or finance company, they could also directly lend to a company.

At one level, hedge funds could be more of a threat than some of the other potential competitors. They face essentially no capital regulations and are aggressive in their pursuit of market opportunities. However, they have three major disadvantages that may render them close to irrelevant for the banking system as a whole, in terms of lending competition. First, they generally have quite high return targets, which can be difficult to achieve with the kind of loans that banks mostly originate. This is particularly true now that excessively cheap leverage is no longer available to them to boost their returns. Second, they do not have a good source of funds that would allow them to borrow cheaply and consistently, whereas banks have their deposit bases, bolstered by deposit insurance, and the support of the Fed when things become troubled. Third, hedge funds do not have origination networks that let them develop economies of scale in bank lending. They may find certain credit situations where they can step into opportunities that others are missing, but these will represent a relatively small portion of system wide lending.

## Conclusions

In theory, there are many competing financial institutions and capital markets investors who could displace the banks as credit providers or as takers of quasi-deposit money. However, it appears that the banks would have to be challenged by much more than the postulated changes in capital requirements before the competitive landscape would become hostile enough for them to lose significant business.

A key conclusion from the theoretical literature, empirical analyses, and the author's own experience as a financial institutions investment banker is that bank loans in today's economy largely play a role quite different from other forms of lending. For large borrowers, the key difference is the strong willingness of banks to enter into contingent lending commitments, such as lines of credit, which now account for almost four-fifths of bank lending to businesses. This distinction is relevant for smaller businesses as well. In addition, banks are rare among institutions in being willing and able to commit the resources to small business lending to overcome the problems of information asymmetry through close analysis and

monitoring of the borrowers. This is partly aided by close transactional relationships that provide banks a flow of ongoing information.

For individuals as borrowers, banks also benefit to some extent from wider relationships and transactional information flows associated with those relationships, as well as the marketing advantage of their branch networks. Bank's advantages may be less in larger ticket items such as mortgages, but it appears that regulations going forward are likely to impose relatively similar burdens on all retail lenders to those borne by banks. If so, it may be difficult for finance companies, insurers, and others to overcome the banks' low and stable funding costs backed by governmental support such as deposit insurance and access to the Fed's discount window.

As a result, although higher capital requirements would make it more difficult for banks to compete than under current rules, they would remain in a very good competitive position for the large majority of what they do. Therefore, they should be able to increase loan rates by the illustrated 20 bps and decrease deposit rates by 10-20 bps without triggering a significant movement of business to competing types of financial institutions.

## Part 2: Sectoral analysis of effects of capital requirements on bank lending

My previous paper examined the likely responses of the banking system as a whole to increases in minimum capital requirements. This part of the paper breaks that down to look at how the responses are likely to differ across various segments of the banking system, customer types, and loan types.

### Summary of the analytical methodology

The core of any lending decision boils down to a fairly simple mathematical formulation to determine whether a requested credit provides sufficient return to merit making the loan:

Is $L*(1-t) >= (E*r_e)+((D*r_d)+C+A-O)*(1-t)$, where

L = Effective interest rate on the loan, including the annualized effect of fees
t = Marginal tax rate for the bank
E = Proportion of equity backing the loan
$r_e$ = Required rate of return on the marginal equity
D = Proportion of debt and deposits funding the loan, assumed to be the amount of the loan minus E
$R_d$ = Effective marginal interest rate on D, including indirect costs of raising funds, such as from running a branch network
C = The credit spread, equal to the probability-weighted expected loss
A = Administrative and other expenses related to the loan
O = Other offsetting benefits to the bank of making the loan

In simple terms, the rate on the loan needs to cover the cost of funds, any expected credit losses, plus administrative expenses. This preliminary hurdle rate may be reduced by other benefits to the bank

from making the loan. For example, many of the largest commercial banks have built their investment banking arms in part on the propensity of corporations to direct their investment banking business, which is generally lucrative, to those banking groups that also supply them with loans. As a result, loans to large companies prior to the crisis were often underpriced on a stand-alone basis, in recognition of the relationship benefits.

The first paper established a base case that was reasonable for all loans in the aggregate for the banking system as a whole, including an assumed starting ratio of tangible common equity to total assets of 6%, without risk-weighting. It then examined the level of change necessary for any single variable, such as loan price, if that variable were to take the entire burden of adjustment to a capital ratio that was increased by 2 points or 4 points. Not surprisingly, the changes required for any single variable were too high to be realistically achievable.

However, one would not expect the banking system to respond to such an important change by altering only a single variable. Therefore, the earlier paper went further and looked at a plausible case where the banking system responded with changes to each of the variables under its control. The combined set of actions appears quite feasible with only modest negative effects on bank lending. The table below shows that combined case.

**Table 4: Adjustment through multiple variables**

| | **Equity as a % of the loan** | | |
|---|---|---|---|
| | **6%** | **8%** | **10%** |
| **Loan rate** | 5.17% | 5.26% | 5.37% |
| **Return on equity** | 15.00% | 14.50% | 14.00% |
| **Return on debt** | 2.00% | 1.90% | 1.80% |
| **Credit spread** | 1.00% | 0.95% | 0.95% |
| **Administrative costs** | 1.50% | 1.45% | 1.40% |
| **Other benefits** | 0.50% | 0.55% | 0.60% |

This analysis was at the level of the banking system in aggregate. It is possible that the effects might be unacceptably large for a segment of the banking system, or for certain types of loans, or certain classes of customers. Therefore, the remainder of this paper examines some of these possibilities in more detail. For ease of illustration, the tables will only show the base case and the effects of increasing by the full four percentage points on the capital ratio, skipping the intermediate case of a two percentage point change.

## Variation by size of bank

Large and small banks differ in many ways, so it is natural to examine whether the effects of capital changes might also vary significantly by size of bank. As this section shows, the impact of higher capital requirements is likely to vary somewhat by size, but not by enough to suggest that any of the size segments would be unable to adjust to changes of the magnitude examined here.

An important way in which large and small banks differ is in their mixes of business. For example, large banks with national scope dominate the credit card business, which responds to economies of scale and brand advertising. On the other hand, small banks tend to have a disproportionate share of the commercial real estate business, where local knowledge and connections are often more important. Customer profiles often differ by size of bank as well. For example, customers who value relationships and prefer to transact their business at a bank branch are more likely to go with a smaller bank. Customers who are more focused on access to a wider range of services or the very best financial deal may be more inclined to bank with a national firm.

Large and small banks also have quite different expense structures, partially as a result of the differing mixes of business and partially because of the greater economies of scale and scope possible in a larger institution.

Table 5 shows the author's estimates for the values of the key independent variables in the loan pricing equation for the overall system and for the average commercial bank in three different size ranges. This table retains the original base case assumption that banks under current rules would maintain tangible common equity to asset ratios of 6% in the near future.

**Table 5: Values of key variables in loan pricing equation, by bank size ($ billions of assets)**

| | All | $10+ | $1-10 | Below $1 |
|---|---|---|---|---|
| **Re** | 15.00% | 15.00% | 15.00% | 15.00% |
| **Rd** | 2.57% | 2.33% | 3.38% | 3.52% |
| **C** | 1.00% | 1.20% | 0.80% | 0.70% |
| **A** | 1.03% | 0.94% | 1.32% | 1.42% |
| **O** | 0.50% | 0.60% | 0.45% | 0.40% |
| **L** | 5.23% | 5.02% | 6.13% | 6.31% |

The column for all commercial banks matches the base case numbers from the original paper, except for two related refinements. Most of the costs of raising debt and deposits reflect the expense of maintaining a branch network, which is also a key element of loan production. As explained below, this paper uses a more sophisticated method for calculating and allocating the costs of the branch network. This refinement produced slightly higher total cost numbers, but also reallocated about 50 bps of cost from administrative costs related to lending to the cost of raising deposit funds. As a result, the cost of debt and deposits goes from 2.0% to 2.57% while the administrative costs of lending fell from 1.50% to 1.03%. The total base case cost of providing a loan rose modestly from 5.17% to 5.23%.

The refinements described above, and much of the analysis in the rest of this section, is based on data taken from an FDIC online database for all commercial banks, broken down by size of bank. The figures are for the first half of 2009 except for some supplementary historical numbers. Please see Appendix A for the full data table.

This data also allows us to do a very rough check on the validity of the loan pricing equation, by allowing us to compare the actual yields on bank assets with those implied by the loan pricing equation, as shown in Table 6. However, there are two major caveats. First, the available figures represent the yield on all earning assets, not just loans. As Appendix A shows, loans comprise about two-thirds of these assets, but securities also represent a major part of total earning assets. Second, yields in the first half of 2009 were based on loans made or assets purchased at prices that reflected then-current interest rates for loans and prior assumptions about the levels of credit risk, required returns on bank debt and equity, and then-existing competitive conditions.

**Table 6: Comparison of loan pricing results with yields on earning assets in H1/2009**

| | All | $10+ B | $1-10 B | Below $1 B |
|---|---|---|---|---|
| **Loan cost implied by pricing equation** | 5.23% | 5.02% | 6.13% | 6.31% |
| **Yield on earning assets** | 4.78% | 4.60% | 5.28% | 5.64% |

The loan pricing equation produces values broadly consistent with actual pricing. The raw figures show a 45 bp difference for all commercial banks in the aggregate, which is a reasonable result given the amount of estimation required in the loan pricing equation. Even better, the results become significantly more consistent after adjusting for the presence of lower-yielding securities in the asset mix and for the likelihood that more optimistic assumptions were used when the existing loans were originally priced.

Earning assets are used as the base of comparison because they exclude essentially everything except loans and securities, including bank buildings, office equipment, and goodwill. They also exclude bad loans that are still on the books but are not earning interest. Excluding bad loans is appropriate since we are trying to compare historical yields with the initial pricing for new loans, which will always start out as good loans. (We separately include a credit charge in the loan pricing equation to account for the likelihood of non-payment of some of those loans over time.)

The presence of securities pulls down the yield on total earning assets because banks generally receive a lower yield on securities than they do on loans. Banks accept a lower yield for two reasons. First, some of the securities are held as a source of liquidity to meet unexpected cash needs, which means they must be safe, liquid, and of relatively short maturity. All of these characteristics are associated with lower yields. Second, a bank will accept a lower yield on a security than on a loan of identical credit risk because it does not incur as large an administrative cost to generate or maintain the asset and it benefits from at least modestly greater liquidity on a security investment than on a loan.

It appears from the FDIC data that the yield on non-loan earning assets was about 3.7%, implying that the loans were earning about 5.35%, about 12 bps higher than implied by the loan pricing equation.

A significant problem in comparing the results of the loan pricing model with the 2009 figures is that the former is forward-looking while the latter is based on historical lending patterns. This creates cross-cutting and confusing sources of estimation error. Historical fixed interest rates were higher prior to the bursting of the bubble, but interest spreads on floating rate loans were lower. Further it is also likely

that the loans on the books in the first half of 2009 were made under more optimistic assumptions, since many of them were entered into prior to the eruption of the financial crisis. On the other hand, some of the loans now on the books were agreed after the credit crunch began and loan pricing rose. In sum, we can conclude that the loan pricing model results are broadly consistent with what we see in the market, but it is impossible to conclude anything more precise about the match.

A second point that jumps out from a perusal of Table 6 is that the smaller banks need to charge significantly more for loans, according to the loan pricing equation, and that they do so in practice. For example, banks in the $1-10 billion asset range need to charge 111 bps more for their average loan than do banks with $10 billion or more in assets. In practice the smaller banks had an average yield on earning assets of 68 bps more than the largest banks in the first half of 2009. The difference in terms of yield on total assets is even higher at 91 bps, suggesting that an indirect effect of the differences in average creditworthiness of loans may be at work in this period of very high credit losses -- the smaller banks have a higher percentage of loans on which they are still receiving interest. Some of the remaining difference between the results of the loan pricing equation and recent returns on earning assets may be explained by differences in the securities portfolios. Again, it is not possible to be very precise here, but the broad trends clearly match what we would expect.

**Potential estimation error and sensitivity analysis**

All in all, the loan pricing equation produces results that are fairly in line with the actual experience of banks, which is reassuring. However, it must be recognized that there is considerable estimation involved in setting the base case conditions for banks as a whole and even more so for subsets of banks or customer groups or loan types. Thus, it is critical to reiterate a key finding of the first paper, which is that the effects of changes in capital requirements in the loan pricing model were not very sensitive to changes in the initial assumptions. Errors in estimating the initial conditions, or subjective disagreements about those assumptions, should have little effect on the validity of the overall conclusions about the effects of higher capital requirements.

**Explanation of the base case assumptions for banks of different sizes**

This sub-section walks through the key independent variables in the loan pricing equation and explains the rationale for the chosen values for the different size groups of banks.

**Re**: I assumed that the return on equity demanded by investors in the stocks of these banks did not vary by size, remaining at 15% throughout the size range. It is possible to make an argument in either direction for this variable, so I assumed that the factors cancel out. I am not aware of good direct evidence on this question. On the one hand, larger banks might appear to be lower risk. They are diversified by geography, product types, etc.; have more liquid stocks; and provide more sophisticated financial reporting. On the other hand, modern portfolio theory views exposure to systemic risk, often measured by beta, as the key risk factor. The fortunes of a more geographically concentrated bank may not vary as directly with the national economy and financial markets as does a national bank, thereby producing a lower beta. In addition, it may be easier to understand a smaller, simpler bank, even if the

financial reporting is less sophisticated. Finally, as shown in Appendix 1, there are some modest differences in average capital ratios by size of bank, which should affect the relative return on equity demanded by investors.

**Rd**: The required return on debt and deposits has two components. First, we have the reported figures from the FDIC database for the cost of funds backing earning assets, which average 1.31% for commercial banks in the aggregate. However, we need to add to this a reasonable portion of the cost of maintaining a branch network and other marketing expenses, since this is a key factor in allowing banks to access cheap deposits. This cost almost doubles the 1.31% raw cost of funds.

I estimated the expense of the branch network by taking the FDIC's figure for non-interest expense as a percentage of earning assets and subtracting out a portion of that expense to allocate against non-interest income in excess of that which appears likely to be related to deposit and lending activity[19]. (The other non-interest income relates to businesses such as funds management, insurance brokerage, safe deposit boxes, etc. These business lines have expenses, which should be subtracted out to determine the expenses relevant to the loan and deposit-related activities.) The remaining non-interest expense was then allocated 40% to deposit gathering, 40% to lending, and 20% to general overhead. The figures are subjective, but fortunately only the overhead allocation has any real effect on the end result. Moving costs between deposit gathering and lending has little effect on the ultimate loan pricing, since both sets of expenses are accumulated into the final result. This is not true of the general overhead percentage, which does not appear elsewhere in the loan pricing, but the 20% figure seems reasonable and any error here is small enough not to have a significant effect on the conclusions.

**C**: The aggregate credit charge of 1.00% remains the same as in the first paper. As explained there, it is basically set somewhat above the historical experience from earlier in the decade, which was unusually good. The largest banks were then penalized 20 bps compared to the overall average and the smaller banks rewarded with costs 20-30 bps lower than the average, in recognition of the different levels of historical loan loss performance shown in Appendix A. These differences are likely to continue into the future due to the different business mixes and credit strategies of the smaller banks compared to the larger ones. (For example, credit cards, which have very high loss rates compared to most loans, are dominated by the largest banks.)

**A:** Administrative costs for lending were set at 40% of the relevant non-interest expense figures, as explained under Rd.

**O**: The benefits of receiving other profitable business as a result of making a loan are particularly difficult to estimate. I continue to view 50 bps as a reasonable average for banks in the aggregate. Within the banking system, the larger banks are likely to benefit more, mostly because they offer many

[19] I assumed that the first one percentage point of non-interest income as a percentage of earning assets was the result of ATM fees and other charges related to deposits or loans. The rest of the non-interest income was assumed to be from non-deposit, non-loan products. These other business activities were assumed to have a 60% expense ratio. All other non-interest expense was assumed to be related to the loans, deposits, and overhead.

more services through which they can benefit from a relationship. Thus, the largest banks are assumed to earn 10 bps more than the average and the smaller banks 5-10 bps less.

**Effects of higher capital requirements by bank size**

The effects of higher capital requirements do not vary greatly across bank size in the loan pricing model. This is consistent with the results of the sensitivity analysis in the first paper, which showed that the impact of higher capital was not very sensitive to the starting assumptions.

Table 7 shows how large a change would be necessary in any single variable to offset the effect of an increase in tangible equity ratios from 6% to 10%, if the only changes made were to that one variable. For example, for the aggregate of all banks, the loan price would have to be increased by 76 bps from 5.23% to 5.99% to provide a continued 15% return on equity while covering the same other costs as in the base case. Alternatively, the loan price and all other variables could be maintained constant if equity investors could be persuaded to accept a drop in their expected return from 15% to 9.73%.

**Table 7: Effects of offsetting higher capital requirements by changing any single variable**

| | **All** | | **$10+ B** | | **$1-10 B** | | **Below $1 B** | |
|---|---|---|---|---|---|---|---|---|
| | **6%** | **10%** | **6%** | **10%** | **6%** | **10%** | **6%** | **10%** |
| **Loan price** | 5.23% | 5.99% | 5.02% | 5.78% | 6.13% | 6.85% | 6.31% | 7.04% |
| | | | | OR | | | | |
| **Re** | 15.00% | 9.73% | 15.00% | 9.66% | 15.00% | 9.95% | 15.00% | 10.00% |
| | | | | OR | | | | |
| **Rd** | 2.57% | 1.73% | 2.33% | 1.48% | 3.38% | 2.58% | 3.52% | 2.73% |
| | | | | OR | | | | |
| **C** | 1.00% | 0.24% | 1.20% | 0.43% | 0.80% | 0.08% | 0.70% | NA |
| | | | | OR | | | | |
| **A** | 1.03% | 0.27% | 0.94% | 0.17% | 1.32% | 0.60% | 1.42% | 0.71% |
| | | | | OR | | | | |
| **O** | 0.50% | 1.26% | 0.60% | 1.37% | 0.45% | 1.17% | 0.40% | 1.11% |

The implications of Table 7 are essentially the same as from the equivalent table in the first paper. It is unlikely that the banking system could adjust with any single variable without fairly dire ramifications. An increase of 76 bps in loan price would be likely to put the banking system at a significant competitive disadvantage to other financial sectors, even with the competitive advantages for banks described in Part 1. The necessary changes in any other single variable are even less feasible. (Please see the earlier paper for a longer explanation of why these changes are unlikely to be realistically achievable.) These results hold across the three size categories of banks.

More positively, Table 8 shows the feasibility of the more realistic scenario in which the banking system adjusts through changes to all of the variables studied here. In fact, it appears possible to make the necessary changes without a major effect on loan pricing or availability, which are the variables which would have the largest impact on the overall economy. Thus, it seems possible to gain the considerable stabilization benefits of higher capital without a particularly high economic cost.

**Table 8: Potential scenarios involving changes to multiple variables**

| | All | | $10+ B | | $1-10 B | | Below $1 B | |
|---|---|---|---|---|---|---|---|---|
| | **6%** | **10%** | **6%** | **10%** | **6%** | **10%** | **6%** | **10%** |
| **Loan price** | 5.23% | 5.43% | 5.02% | 5.22% | 6.13% | 6.33% | 6.31% | 6.51% |
| **Re** | 15.00% | 14.00% | 15.00% | 14.00% | 15.00% | 14.00% | 15.00% | 14.00% |
| **Rd** | 2.57% | 2.39% | 2.33% | 2.13% | 3.38% | 3.23% | 3.52% | 3.38% |
| **C** | 1.00% | 0.95% | 1.20% | 1.15% | 0.80% | 0.75% | 0.70% | 0.65% |
| **A** | 1.03% | 0.93% | 0.94% | 0.84% | 1.32% | 1.22% | 1.42% | 1.32% |
| **O** | 0.50% | 0.60% | 0.60% | 0.70% | 0.45% | 0.55% | 0.40% | 0.50% |

The scenario for all commercial banks in aggregate is essentially the same one as used in the first paper. Loan rates are raised by 20 bps, which is an increment small enough that it is unlikely to trigger significant competitive reactions from other financial sectors or discourage potential borrowers to any substantial extent. Equity investors are likely to drop their required return expectations for these now-safer banks by at least 1 percentage point, as explained in considerably greater detail in the original paper. Costs to raise debt and deposit funds would fall both through an active effort by the banks to reduce administrative costs and because the banks would be safer, reducing the required return to debt investors and uninsured depositors. Loan covenants and other protections on loans would be tightened modestly, leading to a 5 bp decline in expected credit losses. Administrative costs for loans would be shaved by 10 bps and banks would negotiate harder with borrowers to obtain an extra 10 bps of profit from business associated with the lending.

Some have raised the question as to why banks would have room to cut costs further. Wouldn't they have already done so if they could? There is a two-fold answer to this. First, the major administrative cost is compensation and it is difficult for a single bank to reduce compensation levels when there is sufficient profit for other banks to continue offering the original level of pay. However, most of the people working at banks have specific skills that make them worth more to banks than to other firms. If the banking system as a whole has to cut compensation costs by 10 or 15%, those employees would not have the opportunity to move to another bank to retain their original pay. Nor could they move to a non-bank, since this would lead to an even larger pay cut. Second, some of the adjustment may result from more efficient banks taking market share from less efficient banks, lowering the industry average cost levels.

One could similarly ask why the bank would be able to obtain more of the profitable ancillary business that comes along with making loans. Here the dynamic is more subtle. The author's experience as a banker showed that companies are willing to offer up some of their lucrative business as an incentive to obtain good loan terms, but they also prefer to retain the option to use other banks for a portion of it. However, they are generally willing to offer up more of that business when it is clear that loan market conditions have tightened. It is my judgment that increased capital requirements would give banks sufficiently greater negotiating leverage to obtain modestly more of the lucrative business potentially available.

The second key conclusion from Table 8 is that there is room for banks of all sizes to follow roughly the same path of supplementing the automatic benefits of lower required returns on equity and debt with a series of cost cutting moves and a push for profitable ancillary business. Perhaps the mix of changes would turn out to be somewhat different across the size groupings, but the general approach shown above appears feasible in all cases.

**Effects of higher capital requirements by customer segment**

Another interesting distributional question is whether large businesses would be affected differently than small businesses or individual borrowers differently from businesses. Table 9 shows the key inputs to the loan pricing model with their assumed values for these three customer types, on average.

**Table 9: Values of key variables in loan pricing equation, by customer type**

| | All | Large bus. | Small bus. | Individual |
|---|---|---|---|---|
| **Re** | 15.00% | 13.00% | 17.00% | 15.00% |
| **Rd** | 2.57% | 2.40% | 2.70% | 2.57% |
| **C** | 1.00% | 0.50% | 1.25% | 1.35% |
| **A** | 1.03% | 0.25% | 1.25% | 1.25% |
| **O** | 0.50% | 1.00% | 0.50% | 0.25% |
| **L** | 5.23% | 3.12% | 6.00% | 6.05% |

There is not a readily available source of reliable information on the values of these variables equivalent to what one can obtain through the FDIC online database to compare banks of different sizes. As a result, the above assumptions should be viewed as what economists refer to as "stylized facts." These are reasonable, very roughly accurate figures that provide a way of exploring an issue. In that spirit, I have erred on the side of showing more differentiation between the various categories than might exist in reality. In particular, the small business customer base may be treated here as somewhat riskier than it truly is[20]. The key reason for showing greater differentiation in general is to drive home the fundamental point that the effects of higher capital requirements do not vary a great deal between these different segments. This is consistent with the findings of the first paper that the starting values of these variables do not have a strong impact on the size of the effect of increasing capital levels.

**Re and Rd**: Large corporations are generally stronger credits than are small businesses or individuals, so I have assumed lower required returns on equity and debt for these loans. (Investors do make at least rough distinctions between banks based on their mixes of business, which creates appropriate marginal costs for shifting business between higher and lower risk mixes.)

**C:** For the same reason, the credit charge for large businesses is set considerably lower than that for small businesses and individuals. The rate for individuals would be even higher than for small businesses

[20] Much of the borrowing by small businesses is secured by collateral such as buildings, which reduces the lender's risk.

if there were not such a high proportion of mortgages in the individual category of loans. (The collateral value of the house provides considerable protection to the lender.)

**A:** Transactions with large corporations benefit from substantial economies of scale, which are reflected in the low costs of administration for lending to them and somewhat higher than average costs for small businesses and individuals.

**O:** Large corporations have the most lucrative and widest range of ancillary business to offer banks in exchange for low loan rates. Further, large businesses do quite actively push this trade-off. Transactions with individuals are generally not tied that closely to lending, but the branch networks do create relationships that are also enhanced by some specific efforts to cross-sell products. Small businesses fall between these two ends of the spectrum.

Although it is impossible to directly validate the implied loan rates, they appear reasonable. On the surface, the average loan rate for large corporations may appear very low, but actual lending rates in today's conditions are often even lower than this for high-quality credits. LIBOR (the London Interbank Offer Rate), which is a key indicator of the wholesale cost of funds that banks charge each other, is running at roughly 25 bps today, whether for 1-month or 3-month floating rate funds. Even a 1-year jumbo CD rate, which would have relatively low administrative and marketing costs, is only 1.64%. Banks tack on a significant credit spread these days, but the resulting rate is still very low.

**Table 10: Effects of offsetting higher capital requirements by changing any single variable**

| | **All** | | **Large Business** | | **Small Business** | | **Individual** | |
|---|---|---|---|---|---|---|---|---|
| | **6%** | **10%** | **6%** | **10%** | **6%** | **10%** | **6%** | **10%** |
| **Loan price** | 5.23% | 5.99% | 3.12% | 3.77% | 6.00% | 6.86% | 6.05% | 6.81% |
| | | | | OR | | | | |
| **Re** | 15.00% | 9.73% | 13.00% | 8.50% | 17.00% | 11.00% | 15.00% | 9.70% |
| | | | | OR | | | | |
| **Rd** | 2.57% | 1.73% | 2.40% | 1.68% | 2.70% | 1.75% | 2.57% | 1.73% |
| | | | | OR | | | | |
| **C** | 1.00% | 0.24% | 0.50% | NA | 1.25% | 0.39% | 1.35% | 0.59% |
| | | | | OR | | | | |
| **A** | 1.03% | 0.27% | 0.25% | NA | 1.25% | 0.39% | 1.25% | 0.49% |
| | | | | OR | | | | |
| **O** | 0.50% | 1.26% | 1.00% | 1.65% | 0.50% | 1.36% | 0.25% | 1.01% |

Once again, the results by sector are very similar to those for the banking system's business as a whole. Attempting to adjust to higher capital requirements with any single variable would range from extremely difficult to clearly impossible. (The "NA" entries indicate situations in which the size of the initial cost level is too low for a reduction to zero to completely offset the cost of more capital.)

Fortunately, Table 11 demonstrates that banks should be able to adjust to this range of capital increases through combined adjustments to all of the variables under their control, as well as benefitting from the

expected reactions of investors. This conclusion continues to hold true for the three sub-sectors of loan customers, as well as for the banking system's business in aggregate.

**Table 11: Potential scenarios involving changes to multiple variables**

| | All | | Large Business | | Small Business | | Individuals | |
|---|---|---|---|---|---|---|---|---|
| | **6%** | **10%** | **6%** | **10%** | **6%** | **10%** | **6%** | **10%** |
| **Loan price** | 5.23% | 5.43% | 3.12% | 3.32% | 6.00% | 6.20% | 6.05% | 6.25% |
| **Re** | 15.00% | 14.00% | 13.00% | 12.00% | 17.00% | 16.00% | 15.00% | 14.00% |
| **Rd** | 2.57% | 2.39% | 2.40% | 2.25% | 2.70% | 2.50% | 2.57% | 2.37% |
| **C** | 1.00% | 0.95% | 0.50% | 0.47% | 1.25% | 1.16% | 1.35% | 1.30% |
| **A** | 1.03% | 0.93% | 0.25% | 0.21% | 1.25% | 1.10% | 1.25% | 1.12% |
| **O** | 0.50% | 0.60% | 1.00% | 1.10% | 0.50% | 0.60% | 0.25% | 0.30% |

Overall, there is relatively little difference between the adjustments required for the different customer segments. Modestly more action is needed for the small business sector, because of the assumed higher starting required return on equity, which makes shifting to higher equity more costly. However, there is also a higher base of administrative costs to cut back and a bit more room to tighten loan covenants and conditions without fundamentally altering the lending conditions.

One could analyze the differences by customer segment in more detail, but it is not worthwhile. The adjustment scenarios simply do not vary that much, nor do any of them seem onerous enough to border on the infeasible. In addition, the starting values for the variables are more prone to estimation error than when breaking the banking system down by size of bank, limiting the utility of drawing excessively precise conclusions.

The adjustment scenarios I constructed for Table 11 implicitly assume that banks have roughly the same pricing and negotiating power for each of the three broad classes of borrowers. This implication lies in the relative distribution of changes between the increased burdens borne by the borrowers and those borne by the banks. I have assumed fairly symmetrical increases in the borrowers' burdens, reflected in loan pricing, the tightness of loan covenants driving the expected credit losses, and the need to dedicate more ancillary business to compensate banks for making the loan. The burden on the banks is principally reflected in the need to cut administrative costs, both direct loan costs and the substantial expenses buried within the deposit costs. (Changes in the returns required by investors are also important but are unaffected by a bank's negotiating leverage with its lending customers.)

In practice, banks tend to have more negotiating power with small businesses than they do with large businesses. (They may also have more leverage with individuals, but this is less clear given the range of competing offerings and the lesser importance of bank relationships for individuals.) Rajan (1992) and Petersen and Rajan (1995) provide theoretical and empirical evidence that small businesses are somewhat locked-in to their primary banks.[21]

[21] I am again indebted to Amir Sufi for pointing me to these papers and emphasizing their importance, as well as suggesting the point about the disproportionate effect of credit crunches on small business.

The key question then becomes whether banks will use this higher level of negotiating leverage to force more of the cost burdens onto small businesses while making fewer changes in their own operating approaches. This is possible, particularly in the short run, but it seems more likely that competition between banks will force the same kind of cost adjustments by banks as they would need to make for other types of borrowers. First, there is significant overlap between the adjustment processes for different types of customers, making it less likely that a specific decision would be made to hold off on squeezing out costs because of greater leverage with small businesses. This is both a question of use of the same administrative functions for different sized businesses and the overall way in which costs tend to be squeezed out in large organizations. If the CEO of a bank decrees the need for cost cuts, they do not tend to end up being focused only in a limited area unless that were the only area where the changes were needed.

Second, if banks really were free to increase loan pricing disproportionately for small businesses then there is some question as to why they would not already have done so. This relates to the third point, which is that if they indeed could do this, it would essentially imply the ability to reap greater underlying profits on small business loans, even if some of the inherent profits were wasted through a willingness to maintain an overly expensive cost structure. I believe there would be a number of banks that would instead make the cost cuts and pocket the excess profits. Those excess profits would then create the usual competitive dynamic of price competition for this more lucrative business, eventually evening out the returns.

Even if there were a greater short-term effect on small businesses, or even a modest permanent difference, it might still be to the benefit of the small business community to have higher capital standards for banks. It seems clear that small businesses suffer more severely from the credit crunches associated with recessions and financial crises than larger businesses do. Certainly this was the case in the recession just ended, at least based on very strong anecdotal evidence. It may be that even if they suffered a modestly disproportionate effect on a day-to-day basis that they would benefit more in the long-run from the greater stability of the financial system.

**Effects of higher capital requirements by loan type**

Finally, one can also break down the lending business by type of loan. There is some overlap with the customer segmentation, but the perspective of loan type brings in some interesting aspects, including the implications of business with very high administrative and credit costs, such as credit cards.

There are many different types of loans. I have chosen five categories to represent the range of major lending types:

- Lines of credit to large companies
- Term loans to small businesses
- Commercial mortgages
- Residential mortgages
- Personal credit cards

These categories include a wide range of expected credit losses, cover all major classes of customers, and include both secured and unsecured loans. They also cover the large bulk of the lending volume in the banking system.

Table 12 shows the base case assumptions for the five loan types. For simplicity and consistency, the large company line of credit assumptions are the same as shown in the previous subsection for large company business in general. Similarly, the small business term loans are assumed to have the same characteristics as the average loan to a small business. In both cases, there is no readily available information to allow greater specificity about these loan types. Fortunately, there are additional information sources for the other three loan types.

**Table 12: Values of key variables in loan pricing equation, by loan type**

| | All | Line of Credit | Small bus. Term loan | Commercial Mortgage | Residential Mortgage | Credit Card |
|---|---|---|---|---|---|---|
| **Re** | 15.00% | 13.00% | 17.00% | 15.00% | 13.00% | 17.00% |
| **Rd** | 2.57% | 2.40% | 2.70% | 2.57% | 2.40% | 2.70% |
| **C** | 1.00% | 0.50% | 1.25% | 1.00% | 0.50% | 5.00% |
| **A** | 1.03% | 0.25% | 1.25% | 1.25% | 1.25% | 6.00% |
| **O** | 0.50% | 1.00% | 0.50% | 0.50% | 0.10% | 0.25% |
| **L** | 5.23% | 3.12% | 6.00% | 5.45% | 5.02% | 14.75% |

As was true for the breakdown by customer type, there is a considerably greater range of uncertainty around some of the estimates for the initial values of the variables in the loan pricing equation when examining loan types than when using the FDIC data broken down by bank size. Nonetheless, an examination of the potential effects of higher capital requirements on these different categories still shows strong evidence that the impact is not likely to be large for any of the loan categories.

**Re and Rd:** As with the breakdown by customer type, it is assumed that certain loan types are somewhat more or less risky in ways that equity and debt investors find relevant, which presumably is primarily a reflection of systematic market risk with perhaps some effect from idiosyncratic risk by loan type. Lines of credit to large companies and residential mortgages are considered safer than the average, while small business term loans and credit card loans are considered riskier. The higher/lower risk is reflected in a two point increase/decrease in required return on equity and a roughly 15 bps increase/decrease in debt and deposit costs.

**C**: Expected credit losses are largely based on historical experience where available, with some adjustment for effects of the current credit crisis and what we have learned from it. However, large company line of credit and small business term loan loss rates are subjective estimates, since good information is not readily available. For its part, the commercial mortgage loss rate is set at 1.00% based on historical experience, plus a significant adjustment upwards to reflect the greater risk uncovered by the current crisis. According to Chen and Southard (2008), "the average annual loss rate for all the commercial [mortgages held by commercial banks] was 40 basis points between 1991 and

2007 with lows of less than 10 bps (2004-2007) and a high of 160 bps (1992)." This rate will clearly peak at a much higher level in this current recession, a level which is not yet clear given the long lags on credit losses in this area. The sharply higher loss rates of this recession suggest that the risk was unusually low in the 1990's and 2000's. Thus, the rate is set at an even 1.00%. Similarly, the residential mortgage loss rate is raised to 0.50% going forward, up from historical averages in the range of 20 bps. Finally, the credit card loss rate is set at 5%. Credit card loss rates generally run at 3-4% during relatively good times, but spike up much higher during recessions. In the current unusually severe recession the levels appear likely to peak above 10% and possibly as high as 12%.[22] For comparison, the New York Times reported that the loss rate for the industry peaked at 7.9% after the tech bubble burst in 2001. I have assumed future loss rates in normal times of 4% and peak rates in recessions of 8%. If one-quarter of the years consist of recessions, the long-term average would be 5%.

**A:** There is not good information publicly available on any consistent basis about the breakdown of administrative costs by type of loan. Therefore, subjective estimates have been made based on the relative intensity of effort by type of loan, plus other known factors likely to affect the cost structure. Large company lines of credit benefit from major economies of scale, given that borrowings are in the range of tens of millions of dollars and up into the billions. Small business term loans have some economies of scale, compared to borrowings by individuals, but also tend to require fairly intense examination of the particular business and ongoing monitoring. Commercial mortgages benefit from economies of scale, but also require a great deal of credit analysis and specific administrative requirements revolving around the collateral. Residential mortgages are fairly standardized, but do have a lot of paperwork and are not of the same size as most business loans. These factors appear likely to offset each other and produce administrative costs somewhat above an average bank loan.

Finally, the credit card business has a very high level of administrative expenses. This is partly because of the low average size of each loan and partly because of very substantial marketing expenses, including the considerable cost related to providing rewards programs. Unfortunately, it is extremely difficult to pin down the relevant administrative costs from the financial reports of the card providers.[23] Therefore, I have chosen to use 6% for illustration, since it seems a reasonable cost level and works with the other variables to produce a loan cost from the model which approximates current market rates. In any event, few would argue with its characterization as a much higher expense ratio business than the other illustrated loan types.

**O:** Other benefits to the bank from making the loan are again difficult to estimate. Generally, large companies have more ancillary business to distribute and are willing to do so. Smaller businesses are

[22] For example, American Express, which has historically had a premium client base with lower credit losses than the industry, had an average loss rate of 3.5% in 2007. This rate rose to 9.7% in the second quarter of 2009 and is on an upward trajectory.

[23] American Express has annual administrative expenses for its U.S. card business of about 15% of its managed card loans. However, it has fees, including the considerable discounts it is paid by merchants, of about 18% of the loan level. Ideally, one would separate the fees and expenses into those related to the lending aspect of the card business and those that are not.

probably closer to the overall average. Commercial mortgages might bring a tad more business than average, except that there may be more focus on them as a stand-alone transaction, given the specialized nature. Individual lines of business appear likely to have fewer relationship benefits, especially credit cards, which is a fairly specialized business dominated by a few mega-players. That said, it is possible that credit cards would benefit more than shown here by leading to travel, insurance, or other business closely related to credit cards themselves.

L: The long-term average loan pricing implied by the above inputs appears reasonable in all cases. The pricing for large and small businesses was discussed in the previous sub-section. Commercial mortgage pricing ranges fairly widely because of the heterogeneous nature of the properties and locations. However, an average newly minted office mortgage appears to require about 6%, with some other categories above or below that level. This is somewhat above the 5.45% implied by the loan pricing model, but the difference is probably explained by the existence of a major credit crunch in the commercial mortgage market, combined with the prospects of near-term declines of some magnitude in commercial property prices. Residential mortgage prices appear to be roughly in line with the 5.02% implied by the loan pricing model. Finally, credit card pricing today appears to be in the range of 14-16%. It is no accident that the loan pricing model produces a result in the same range, since the administrative cost figure was chosen to create this result. Credit cards are the only loan type studied here where the administrative costs are sufficiently high to have a major effect on the pricing result. Since the best estimate of those costs falls somewhere within a very wide range, my choice of a value largely determined the resulting implied loan price.

Table 13 shows the size of changes to any single variable necessary to restore a loan price sufficiently high to cover the capital and other charges. In the interests of space and legibility, figures are not shown for “all”, “line of credit,” or “small business term loan.” Each of these is identical to figures shown in earlier tables. The results for the aggregate have appeared in both previous sub-sections. The results for the large and small business loan types are identical to those in the immediate preceding sub-section.

As with all the previous analyses, it appears quite unlikely that the effects of the capital changes could be completely offset realistically through changing any single variable, with the possible exception of loan price if one believes competition against banks will be very weak. However, credit cards are something of an exception. The high interest rates and the comparative insensitivity of consumers to credit card rates might make it possible to adjust solely through pricing.

**Table 13: Effects of offsetting higher capital requirements by changing any single variable**

| | Commercial Mortgage | | Residential Mortgage | | Credit Card | |
|---|---|---|---|---|---|---|
| | **6%** | **10%** | **6%** | **10%** | **6%** | **10%** |
| **L** | 5.45% | 6.21% | 5.02% | 5.67% | 14.75% | 15.61% |
| | | | OR | | | |
| **Re** | 15.00% | 9.70% | 13.00% | 8.50% | 17.00% | 11.00% |
| | | | OR | | | |
| **Rd** | 2.57% | 1.73% | 2.40% | 1.68% | 2.70% | 1.75% |
| | | | OR | | | |
| **C** | 1.00% | 0.24% | 0.50% | NA | 5.00% | 4.14% |
| | | | OR | | | |
| **A** | 1.25% | 0.49% | 1.25% | 0.60% | 6.00% | 5.14% |
| | | | OR | | | |
| **O** | 0.50% | 1.26% | 0.10% | 0.75% | 0.25% | 1.11% |

Once again, however, there appear to be feasible adjustment scenarios using changes to all of the variables in combination, as shown in Table 14.

**Table 14: Potential scenarios involving changes to multiple variables**

| | Commercial Mortgages | | Residential Mortgages | | Credit Cards | |
|---|---|---|---|---|---|---|
| | **6%** | **10%** | **6%** | **10%** | **6%** | **10%** |
| **Loan price** | 5.45% | 5.65% | 5.02% | 5.22% | 14.75% | 15.03% |
| **Re** | 15.00% | 14.00% | 13.00% | 12.00% | 17.00% | 16.00% |
| **Rd** | 2.57% | 2.40% | 2.40% | 2.23% | 2.70% | 2.55% |
| **C** | 1.00% | 0.95% | 0.50% | 0.45% | 5.00% | 5.00% |
| **A** | 1.25% | 1.14% | 1.25% | 1.15% | 6.00% | 5.70% |
| **O** | 0.50% | 0.60% | 0.10% | 0.10% | 0.25% | 0.25% |

As before, it appears that there is a feasible path for the banking system to adjust to the capital changes for each type of loan without taking actions large enough to result in significant loss of competitive position to other financial sectors. The particular paths may differ significantly across the loan types, as illustrated above, but there appear to be workable solutions in all cases. For example, it is not clear that banks will be able to squeeze much “other” business from individual consumers, but there remains room to cut administrative expenses, including those built into the cost of gathering deposits. In addition, investors will almost certainly reduce their return targets to reflect the lower risk of operations with a higher capital base, giving the banks further room to adjust. The credit card sector appears to have even more room to adjust, assuming that the major players are all faced with the same competitive situation, as is likely.

## Conclusions

The previous paper demonstrated the likelihood that the banking system would be able to adjust to substantially higher capital standards for lending through a combination of actions that would not have a strong effect on the price or availability of bank loans. In Part 1, this paper showed in detail why it is unlikely that other financial sectors would be enough of a competitive threat to keep banks from successfully implementing this type of strategy. In Part 2, this paper has demonstrated that the conclusions that apply for the banking system as a whole remain valid when looking at banks of different sizes, loans to different customer segments, and loans of different types.

This is good news. Higher capital requirements can play a significant role in increasing the safety of the financial system. These papers suggest strongly that it is possible to obtain this stability at a low cost in terms of loan pricing and availability, making them eminently worthwhile. That said, it will be very important to make any changes carefully, with global coordination, attention to the need for substantial transition periods, etc. My conclusion that banks will be able to adapt without major harm is not intended to suggest that the changes will be easy or painless.

**Appendix 1: Data on U.S. Commercial Banks by Asset Size for first half of 2009**

| | All H1/2009 | $10+ B H1/2009 | $1-10 B H1/2009 | Below $1 B H1/2009 |
|---|---|---|---|---|
| **Yield on total assets** | 4.06% | 3.84% | 4.75% | 5.17% |
| **Yield on earning assets** | 4.78% | 4.60% | 5.28% | 5.64% |
| **Cost of funding earning assets** | 1.31% | 1.16% | 1.83% | 1.96% |
| **Net interest margin** | 3.47% | 3.44% | 3.45% | 3.68% |
| **Non-interest income to earning assets** | 2.48% | 2.80% | 1.51% | 1.07% |
| **Non-interest expense to earning assets** | 3.46% | 3.42% | 3.60% | 3.59% |
| **Efficiency ratio** | 54.7% | 51.5% | 66.0% | |
| **Assets per employee ($ millions)** | 6.24 | 7.04 | 5.05 | 3.41 |
| **Net loans and leases to deposits** | 80.7% | 79.1% | 90.4% | 82.8% |
| **Net loans and leases to core deposits** | 116.2% | 118.7% | 113.3% | 105.0% |
| **Core capital (leverage) ratio** | 8.1% | 7.8% | 9.1% | |
| **Tier 1 risk-based capital ratio** | 10.7% | 10.3% | 11.7% | |
| **Average assets ($ millions)** | 12,139 | 9,751 | 1,153 | 1,235 |
| **Average earning assets ($ millions)** | 10,309 | 8,140 | 1,038 | 1,131 |
| **Average equity ($ millions)** | 1,219 | 968 | 125 | 126 |
| **Average equity/average assets** | 10.0% | 9.9% | 10.8% | 10.2% |
| **Average loans ($ millions)** | 6,804 | 5,156 | 796 | 852 |
| **Average deposits ($ millions)** | 8,430 | 6,520 | 880 | 1,029 |
| **Average core deposits ($ millions)** | 5,856 | 4,342 | 702 | 812 |

Note: “Average” for this table means average over the course of the half year

Source: FDIC online database and arithmetic calculations by the author from those figures

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