Securitization and the Declining Impact of Bank Finance on Loan Supply: Evidence from Mortgage Acceptance Rates*

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Abstract

Low-cost funding and increased balance-sheet liquidity raise bank willingness to approve illiquid loans but not loans that are easily sold or securitized. We exploit the GSEs' inability to purchase jumbo mortgages to identify an exogenous decline in mortgage liquidity around the jumbo-loan cutoff. The volume of a bank's jumbo mortgage originations increases with its holdings of liquid assets and decreases with its cost of raising deposits. These variables have no effect, however, on a bank's volume of mortgage originations in the non-jumbo market. The result suggests that the increasing depth of the mortgage secondary market fostered by securitization has reduced the effect of lender financial condition on credit supply.

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I. INTRODUCTION

Liquidity transformation – funding illiquid loans with liquid deposits – has been viewed as a fundamental role for banks. Diamond and Dybvig (1983) argue that banks improve welfare by allowing depositors to diversify liquidity risk while investing in high-return but illiquid projects. Securitization has changed the way banks provide liquidity.[1] Today, while real projects remain illiquid, loans have become more liquid because banks often securitize them, thereby replacing deposits with bonds as the primary source of finance. As loans have become more liquid, credit supply has become less sensitive to changes in bank financial condition. For example, a bank has the option to finance a liquid loan with either deposits or, via securitization, with funds from capital markets. Liquidity provides a substitute source of finance for loan origination because the originator need not hold the loan. In contrast, illiquid loans must be held and thus funded by the originating lender. An increase in the originator's costs of deposits (for example from tight monetary policy) could thus restrict the supply of illiquid loans.

Many financial assets have been securitized in recent years, with the growth of structured products such as collateralized debt obligations (CDOs), collateralized loan obligations (CLOs), credit-card securitizations, asset-backed commercial paper, and so on. Nevertheless, securitization has grown fastest in mortgage markets, in large part due to the secondary-market activities of the government-sponsored enterprises (GSEs, i.e. Fannie Mae and Freddie Mac).[2] By regulation, the GSEs only buy mortgages below a given size threshold (the jumbo-loan cutoff). Mortgages below this threshold are thus more liquid than those above the threshold. We exploit this difference, showing that while a bank's liquidity and cost of deposits affect its supply of relatively illiquid loans (jumbo mortgages), these variables have no effect on its supply of relatively liquid loans (non-jumbos).

We study mortgages because their liquidity falls sharply around the jumbo-loan cutoff. Such a discrete and exogenous drop in liquidity is difficult to find elsewhere.[3] To exploit this special feature of the U.S. mortgage market, we first regress the difference in lending volumes for non-jumbo and jumbo mortgages on bank-specific financial variables – liquidity and the cost of deposits - and other controls. By modeling *relative lending volumes*, we 'difference out' unobservable but potentially confounding demand-side factors. We then study mortgage acceptance rates, and continue to find that banks with liquid balance sheets or low-cost deposits are more willing to approve jumbo mortgages than other banks. In contrast, there is no evidence that these measures of financial condition affect acceptance rates for non-jumbos. Loan liquidity therefore seems to sever the link from a bank's financial condition to its willingness to supply credit. Mortgage liquidity has increased rapidly over the past 30 years, in part through GSE subsidies. Private-sector financial institutions have also increased loan liquidity in other sectors by securitizing consumer and business loans. Our results therefore extend into these other markets as well.

Figure 1 illustrates the main result by comparing the difference in average loan origination rates above and below the jumbo-loan cutoff (scaled by assets), stratified first by bank liquidity (cash plus securities / assets) and second by cost of deposits (interest expense on deposits / deposits). Banks in the top quartile of the liquidity distribution originate 6% more non-jumbo mortgages annually (per dollar of assets) relative to jumbos; this difference increases to 14.5% for banks in the bottom quartile of the liquidity distribution. In other words, while all banks seem to originate more non-jumbos than jumbos (because of greater demand), banks flush with liquidity originate relatively more in the illiquid jumbo market (because they can supply illiquid loans more easily). The same pattern emerges when we stratify banks by cost of deposits: banks with low-cost deposits originate a relatively larger amount of non-jumbo mortgages compared to banks with high-cost deposits.

To validate the simple results from Figure 1, we start by describing the institutional features of the mortgage market and argue that these features help identify how liquidity and funding costs affect supply. We then estimate how loan volumes in the jumbo and non-jumbo markets vary with bank liquidity, deposit costs and a long list of control variables related to credit quality, neighborhood characteristics, and mortgage demand conditions. Our key result (Figure 1) is robust across model specifications and samples. We then unpack the overall result into effects related to relative acceptance rates and relative applicant flows. These results suggest that mortgage supply adjusts to lender financial variables at both the intensive and extensive margins. Banks with low levels of liquidity (or high cost deposits) receive fewer applications in the jumbo segment – reflecting adjustment at the extensive margin; banks with low liquidity (or high cost deposits) also are relatively more likely to reject loans in the jumbo segment – reflecting adjustment at the intensive margin.

This paper contributes to several strands of research at the intersection of finance and macroeconomics. Holmstrom and Tirole (1997) present a theoretical analysis showing how real shocks can be exacerbated by reductions in credit supply. Bernanke (1983) first showed empirically that shocks to finance can have significant effects on the magnitude of business downturns, focusing on the U.S. Great Depression. More recent research has focused on regional downturns, and most studies find that real shocks are amplified by their effects on local banks (e.g. Bernanke and Lown (1991), Ashcraft (2005), Becker (2005)). In contrast to the jumbo-loan market, we find *no link* between a bank's funding or liquidity and its propensity to supply non-jumbo mortgages. Hence, there less reason to expect that shocks to local banks will affect most mortgage borrowers. This result matters quantitatively because more than 90% of mortgage applications fall below the jumbo-loan cutoff, and because shocks to the local financial system can potentially worsen business downturns.

Second, consistent with Estrella (2002) and Loutskina (2005), expansion of the secondary market in mortgages has likely dampened the effects of monetary policy on real economic activity. According to the 'bank lending' channel of monetary policy, central banks can slow real activity by raising bank funding costs (e.g. the cost of deposits) and thereby constrain the supply of credit. We find no statistically significant link between bank funding costs and credit supplied to the non-jumbo mortgage market. Kashyap and Stein (2000) show that banks flush with balance-sheet liquidity respond less to monetary tightening because such banks can continue originating loans in the face of increased funding costs by running down their stock of liquid assets. Their findings complement ours, because we find that the supply of *liquid* loans does not respond to banks' cost of funds. Together with studies on the increasing size and geographical scope of banks, our results thus suggest that the overall potency of monetary policy ought to be reduced relative to earlier times when banks were smaller, less well integrated with other banks, and less able to sell their loans into secondary markets (Houston, James and Marcus (1997), Ashcraft (2003), Morgan, Rime and Strahan (2004), Demyanyk, Ostergaard, and Sorensen (2005).[4]

Finally, our results shed more light on how non-financial firms' cost of capital depends on their bank's financial condition.[5] Most of the extant research has tested for effects of monetary policy or bank solvency (capital) shocks on credit supply to bank-dependent firms.[6] Our results indicate that securitization increases banks' willingness to supply credit to all (even illiquid) sectors, but that high costs of deposits or limited balance-sheet liquidity only affect the supply of illiquid loans (jumbo mortgages here, although the result likely generalizes to other illiquid lending such as small business credit). Like the earlier literature, we also find some evidence that bank solvency affects credit supply -- better capitalized banks receive a larger flow of jumbo applications than less capitalized ones. However, we find no direct link from bank capital to mortgage acceptance rates.

II. THE SECONDARY MARKET FOR RESIDENTIAL MORTGAGES

A. The Growth of Securitization

Credit markets have been reshaped by the growth of trading in secondary markets. Banks traditionally originated and held loans on their balance sheets, and thus credit availability depended in part on the cost and availability of funds to banks. Over the past quarter century, however, loan securitization has reshaped lending markets. Securitization typically involves pooling the cash flows from a number of similar assets (e.g. mortgages or credit card accounts) and selling the pool to a separate legal entity known as a special purpose vehicle (SPV). The pooling process results in a diversified portfolio of cash flows, which are used to support payments on debt securities issued by the SPV. Often, the cash flows come with some additional implicit or explicit guarantees from the originating financial institution (or the originator retains the residual or equity tranche in the SPV). Creating this separate SPV isolates the cash-flow generating assets and/or collateral so that securities issued by the SPV are not a general claim against the issuer, just against those assets. Cash flows from the original pool of loans can be further stripped and repackaged based on various characteristics (e.g., the prepayment behavior or payment priority) to enhance their liquidity.[7]

Table 1 illustrates the growing quantitative significance of loan securitization for different types of loans over time. The Table presents the amount of loans outstanding and securitized for six loan categories between 1976 and 2003. Consider, for example, home mortgages: In 1976, the amount of securitized home mortgages was $28 billion; by the end of 2003 the total amount of securitized home mortgages had grown almost 150 times, reaching $4.2 trillion. Over the same period, the amount of home mortgages outstanding grew from $489 billion to $7.3 trillion.

Securitization has also made inroads in the financing of other kinds of loans, albeit less dramatically. In 1976 there was no securitization of commercial mortgages, business loans (commercial and industrial, or C&I, loans) or consumer loans. By the end of 2003, $294 billion of commercial mortgages were securitized, $104 billion worth of C&I loans were securitized, along with $658 billion worth of consumer loans. Figure 2 illustrates these trends graphically.

To understand why securitization of mortgages has taken off so dramatically, one needs to appreciate the role of The Federal National Mortgage Association (Fannie Mae) and the Federal Home Loan Mortgage Corporation (Freddie Mac). Fannie Mae was created by the U.S. Congress with passage of the National Housing Act of 1934. During its first three decades, Fannie Mae was operated as a government agency that purchased mainly FHA-insured mortgages. In 1968, Fannie Mae became a public corporation; its role in purchasing FHA mortgages (as well as mortgages insured by the Veteran's Administration) was taken over by a new government agency, the Government National Mortgage Association (GNMA). Freddie Mac was chartered by Congress in 1970 to provide stability and liquidity to the market for residential mortgages, focusing mainly on mortgages originated by savings institutions. Freddie Mac was privatized in 1986.

By the 1990s, both Fannie Mae and Freddie Mac were heavy buyers of mortgages from all types of lenders, with the aim of holding some of those loans and securitizing the rest. Together they have played the dominant role in fostering the development of the secondary market. As shown by Frame and White (2005), the GSEs combined market share has grown rapidly since the early 1980s. For example, by 1990 about 25% of the $2.9 trillion in outstanding mortgages were either purchased and held or purchased and securitized by the two major GSEs. By 2003, this market share had increased to 47%. In other words, today approximately half of all mortgages outstanding were sold to the GSEs after origination (neither Fannie nor Freddie is permitted to originate mortgages themselves). GNMA also provides a very important source of mortgage finance to low-income borrowers, holding or securitizing about 10% of all mortgages outstanding. However, as we describe below, our tests are designed to 'difference out' potentially biasing demand-side factors. We therefore drop the government-insured mortgages typically held or securitized by GNMA because our identification strategy requires relatively homogeneity across the jumbo and non-jumbo segments.

The GSEs enhance mortgage liquidity either by buying and holding mortgages or by securitizing them. When the GSEs buy mortgages, they bear both credit and interest rate risk. When GSEs securitize mortgages, they either buy them and issue mortgage-backed securities (MBS), or they just sell credit protection to the original lender. In the first case, the originating bank retains no stake in the mortgage. In the second case, the bank continues to fund the mortgage and bear the interest rate risk, but obtains the option to sell it off as an MBS (because of the credit protection). In all cases, the GSEs enhance liquidity.[8]

Most important for our identification strategy, the GSEs operate under a special charter limiting the size of mortgages that they may purchase or securitize. These limitations were designed to ensure that the GSEs meet the legislative goal of promoting access to mortgage credit for low and moderate-income households. Today, the GSEs may only purchase 'non-jumbo' mortgages, defined as those below $417,000 for loans secured by single-family homes.[9] The loan limit, first set at $93,750 in 1980, increases each year by the percentage change in the national average of one-family housing prices, based on a survey of major lenders by the Federal Housing Finance Board. The limit is 50% higher in Alaska and Hawaii. Because the loan limit changes mechanically and only as a function of *national* housing prices, local housing supply or demand conditions have no effect on the jumbo-loan cutoff. Thus, there is a discrete drop in mortgage liquidity around this cutoff that is exogenous to financial intermediary or borrower decisions. (We sweep out aggregate effects in our models with a full set of annual time fixed indicators.)

B. Mortgage Market Segmentation

The GSE charter limitation conveniently splits the U.S. mortgage market into a liquid segment (non-jumbo mortgages) and an illiquid segment (jumbo mortgages). How do we know that liquidity really falls at the cutoff? It is certainly true that jumbo mortgages are sometimes securitized. For our identification strategy to work, we need a decline in the costs of selling or securitizing loans around the jumbo-loan cutoff; there are at least *five* reasons to believe these costs are lower in the jumbo market. First, in contrast to jumbos, most non-jumbo mortgages can be sold by the original lender. Second, the GSEs are the only financial institution that will buy individual mortgage loans, but only those below the jumbo-loan cutoff. Thus, securitization of non-jumbos would be especially costly for small banks without the GSEs. Third, mortgage-backed securities issued by GSEs come with required capital only one-fourth as large as required capital for similar securities (such as jumbo-mortgage securitizations) issued by private financial institutions under the Basel Capital Accord. Fourth, there is a sharp increase in the frequency of mortgage applications just below the jumbo-loan cutoff, suggesting that the GSE withdrawal from the jumbo market increases the cost of borrowing. And, more directly, the pricing of mortgages changes around the jumbo-loan cutoff. Yields on non-jumbo loans are on the order of 20 basis points lower than the yields on jumbos (e.g. Mckenzie (2002) provides a survey of this literature). If liquidity fell gradually with mortgage size, yields would rise smoothly with size. Instead, yields jump discretely around the jumbo-loan cutoff. Moreover, this yield differential has been relatively stable over time (Figure 3).[10]

The jumbo/non-jumbo spread would seem to offer a natural measure of the value of liquidity from the GSEs. Passmore, Sherlund and Burgess (2005) present a model in which this spread rises with bank funding costs, and they use aggregate data to show that this spread increases as the availability of core deposits declines. There are no empirical studies testing how the jumbo/non-jumbo spread varies across lenders, however, because pricing information by lender is not available.

Our approach differs from the extant studies of pricing. We focus on the quantity side of the market (because we can link loan applications to the originating bank) and test whether a lender's own financial position affects its relative approval rate for jumbo mortgages. Funding costs should not affect willingness to approve non-jumbos – these loans can be sold to one of the GSEs. Funding costs, however, may affect approval rates for jumbo mortgages because the lender must hold and thus fund these loans. Similarly, lenders with relatively low holdings of liquid assets may be reluctant to approve illiquid jumbos because they are difficult to sell, while liquidity concerns should not affect approval rates for non-jumbos that may either be held or sold. Liquidity effectively substitutes for other sources of finance because the originator need not hold the loan.

C. Securitization in Europe

Unlike the United States, securitization has not been spurred elsewhere by government enterprises – there are no institutions analogous to the GSEs in Europe. Nevertheless, securitization has taken root in recent years as private banks have begun to tap into markets to fund various kinds of loans. Table 2 (Panel A) reports the rate of securitization issuance for new loans between 2000 and 2006, and by collateral type in 2005. The figures show rapid growth overall. For example, between 2000 and 2006 securitization origination rates soared by more than 35% per year in Europe; in contrast, based on growth in outstandings, securitization in the U.S. rose by only about 9% per year over the same period. Securitization of residential mortgage-backed securities grew fastest in Europe, by almost 70% between 2005 and 2006. Moreover, as in the U.S., securitization of loans backed by real estate – both residential and commercial - seem to be taking the lead, comprising about 56% of total securitization in 2005 (compared with about 80% share for real estate loans in the U.S.). Presumably real estate backed loans are relatively transparent and thus amenable to purchase by a diffuse class of investors, in contrast to more opaque assets such as loans to businesses.

Panel B of Table 2 reports aggregate figures by country across Europe, focusing on the market for residential mortgages. The data indicate that the U.S. market for owner-occupied housing is deeper and more mature than elsewhere in Europe. For example, total residential mortgages outstanding exceed 70% of GDP in the U.S.; in European, this ratio is below 50% of GDP. The real estate markets are larger in the U.K. and Netherlands relative to the U.S. as a fraction of the economy, but smaller in every other European country. Moreover, only 28% of new mortgage originations were securitized in 2005 across Europe. This rate is considerably lower than in the U.S., where about 60% of outstanding mortgages had been securitized by 2003. Although we do not have figures on originations in the U.S., the percentage of mortgages outstanding that have been securitized has risen steadily over time, suggesting that securitization rates of new loans exceeds the rate for overall outstanding loans. These comparisons suggest that Europe lags the U.S. both in the development and depth of the real estate markets as well as in liquidity of the financing of this market, although this gap is shrinking over time.

These admittedly rudimentary comparisons suggest two conclusions. First, the actions of the GSEs help explain, in part, the large difference between mortgage securitization rates in the U.S. relative to Europe. The difference is narrowing as private-sector entities become more active securitizers across Europe, and these activities will likely continue to grow rapidly over the foreseeable future. However, the GSEs in the U.S. do subsidize the costs of securitization as we have argued above, suggesting that the U.S. will continue to rely more heavily on this type of finance. Second, studying whether the impact of the financial variables has been mitigated by securitization in Europe is more difficult than the approach we implement for the U.S., where we can observe the *potential* for mortgage securitization based on the size of the loan. (Again, taking advantage of the GSEs' inability to purchase jumbo mortgages.) In contrast, one would need to observe *actual* securitization rates by European banks. Moreover, actual securitization, and hence loan liquidity, is chosen by banks in combination with other liquidity and financial variables. One would expect banks with high-cost deposits or low levels of balance sheet liquidity to optimally choose to securitize more loans. This endogeneity would complicate efforts to determine the causal impact of securitization on loan availability. Nevertheless, one could potentially exploit differences in the securitization rates across European countries and across asset classes to evaluate how loan liquidity affects bank willingness to supply credit, and how shocks to bank finance are propogated. For example, Ehrmann, Gambacorta, Martinez-Pages, Sevestre, and Worms (2001) focus on how bank size and liquidity affect monetary transmission; a similar modeling strategy could be used to assess the effects of securitization for European banks, as Loutskina (2005) does for the U.S.

III. DATA & SAMPLE SELECTION

A. HMDA Data on Mortgage Applications

To build our dataset, we start with a comprehensive sample of mortgage applications and originations that have been collected by the Federal Reserve since 1992 under provisions of the Home Mortgage Disclosure Act (HMDA). The sample covers loan applications from 1992 to 2003. HMDA was passed into law by Congress in 1975 and expanded in 1988, with the purpose of informing the public (and the regulators) about whether or not financial institutions adequately serve local credit needs. In addition, regulators use the HMDA data to help identify discriminatory lending. These data are collected by the Federal Reserve under Regulation C, and all regulated financial institutions (e.g. commercial banks, savings institutions, credit unions, and mortgage companies) with assets above $30 million must report.

To our knowledge, ours is the first study using HMDA data to test how financial variables affect loan supply. The extant research has focused instead on mortgage discrimination. Munnell et al (1996) use a subset of HMDA data from the Boston area, enhanced with financial information not available in the main dataset (e.g. borrower assets and loan obligation ratios like the loan-to-value), and report evidence the acceptance rates are lower for minority applicants conditional on a large set of observables. In contrast, Horne (1997) argues that the effects of minority status on acceptance rates vary substantially with small changes in either the sample or specification, thus making it difficult to interpret the results as evidence of discrimination. These studies spawned a large number of articles on mortgages discrimination without resolving the issue. Given these studies, we do control for characteristics possibly related to discrimination, but our conclusions are not sensitive to the inclusion of these variables.

The HMDA data include information on the year of the application (although we know nothing about exactly when during a given year a loan application was made), the dollar amount of the loan, and whether or not the loan was accepted. Lender identity is reported, which we use to collect the funding and liquidity variables (described below). For credit risk, we control for the log of the applicant's income as well as the income-to-loan-size ratio. There is no information on borrower assets, indebtedness or the market value of the property in the HMDA data. Nevertheless, we can control for economic conditions with an indicator for properties located within Metropolitan Statistical Areas (MSAs) and with the median income in the property's Census Tract. We also include the average size of mortgage applications made by *all* lenders in each bank's markets to absorb variation in property values. Last, we include indicators for minority and female applicants, as well as the share of the population that is minority in the property's Census Tract. As noted, the earlier studies focused on discrimination, so these factors help absorb such effects.

Figure 4 plots a histogram of the frequency distribution of mortgage applications from HMDA data as a function of the ratio of loan size to the jumbo-loan cutoff (Panel A).[11] The figure shows first that most mortgage applications come in below the cutoff value (i.e. most mortgages can be sold easily into the secondary market). Also, we see a sharp spike in the frequency of loan applications just below the cutoff. This spike suggests that the applicant pool itself is endogenously determined, at least in part, by financial conditions. That is, we know that interest rates are higher for jumbo loans, thus some applicants with loan demand “near” the jumbo-loan cutoff may borrow less than they otherwise would to take advantage of the lower rate.

Panel B of Figure 4 reports the average acceptance rate for mortgages, again as a function of the ratio of the loan amount to the jumbo-loan cutoff. As in Panel A, we see a sharp upward spike in the acceptance rate for loans just below the cutoff. The high acceptance rate just below the cutoff suggests that some of the most creditworthy clients borrow less than the cutoff, either to take advantage of lower rates or because the lender would not approve a jumbo loan for these clients. The figure also shows that acceptance rates appear to fall off sharply for very small loans, and the acceptance rate also falls off gradually as loan size increases beyond the jumbo-loan cutoff. The very small loans may be riskier due to the low income and wealth of the applicants, while the very large loans may be riskier due to unusually high demand for credit (Stiglitz and Weiss, 1982).

B. Bank Financial Variables

To understand how funding costs and liquidity affect the supply of mortgage credit, we collect bank-level data by merging the HMDA loan application data to the *Reports of Income and Condition* for commercial banks (the ‘Call Report’). We merge each application to the Call Report from the fourth quarter of the year of the mortgage application using the HMDA bank identification number with call report identification number (RSSD ID) for banks reporting to

Federal Reserve Bank, with FDIC certificate ID (item RSSD9050 in Call report) for banks reporting to FDIC, and with OCC ID (item RSSD9055 in Call report) for banks reporting to OCC. The unmatched institutions from HMDA dataset are then matched manually using a bank's name and the zip code of its location.

Using Call Report data, we focus our attention on the cost of deposits to the lender (measured by the ratio of total interest expenses on deposits to total deposits), and on the lender's balance sheet liquidity (the ratio of cash plus securities to total assets). We also control for lender size (log of total assets), leverage (the ratio of capital to assets) and profitability (net income to total assets). Last, we supplement the traditional measure of balance sheet liquidity with an additional measure of loan liquidity, defined following Loutskina (2005) as follows:

$$LoanLiquidity_{it} = \sum_{j=1}^{6} \left(\frac{\text{Economy-wide Securitized Loans of Type } j \text{ at Time } t}{\text{Economy-wide Total Loans Outstanding of Type } j \text{ at Time } t} \right) * \left(\begin{array}{c} \text{Share of Type } j \text{ Loans} \\ \text{in Bank } i \text{ Portfolio at Time } t \end{array} \right)$$

The economy-wide data on securitization and loans outstanding come from the U.S. *Flow of Funds*, while the bank-level data come from the Call Report. This index can be thought of as a weighted average of the potential to securitize loans of a given type (based on economy-wide averages – the first term in parentheses), where the weights reflect each bank's individual loan portfolio (the second term in parentheses). Thus, market trends generate time variation in the index (recall Figure 2), whereas differences in bank loan portfolios generate variation across institutions. To construct this measure, we break the loan portfolio into six categories: (i) home mortgages; (ii) multifamily residential mortgages, (iii) commercial mortgages, (iv) consumer credit, (v) business loans not secured by real estate (commercial and industrial loans), and (vi) farm mortgages.

C. Samples of Mortgage Applications

In all but one of our set of regressions, we focus on the bank-year as the unit of observation. The dependent variables represent several measures of loan quantity – total volume of originations (scaled by assets), the bank's overall acceptance rate (approved mortgages / total applications), and the volume of applications. We build these dependent variables from two samples of the HMDA data. The first sample is all inclusive, and thus has the benefit of completeness. In the second approach, we drop refinancing mortgages and focus on applications near the jumbo-loan cutoff to reduce the possibility that our results are driven by unobserved heterogeneity.

The raw HMDA data contain almost 250 million applications. Of these, we first drop mortgages originated by savings institutions, mortgage bankers, credit unions and other non-bank lenders, leaving about 120 million applications to financial institutions reporting to FDIC, FRB, and OCC (mostly commercial banks). We then drop mortgages where borrowers are subsidized by the Federal Housing Authority, the Veterans Administration or other government programs, leaving us with about 106 million loan applications. We then drop applications with missing characteristics such as loan size, property location, or the bank's approval decision on the loan, leaving 72 million applications. After merging this sample to the Bank Call Report, we are left with about 62.5 million applications, which we will call the 'full sample'. In our second sample, we drop applications for refinancing existing mortgages ('refis'), and we keep only those applications between 50% and 250% of the jumbo-mortgage cutoff. These two filters reduce the sample to about 6 million applications.

Figure 5 reports the frequency distribution and acceptance rates for mortgages in our full sample (with refis) and our filtered sample (no refis) between 50% and 250% of the jumbo-loan cutoff. For both samples, the frequency and acceptance rates look very similar. For example, we see in both samples a spike in the number of applications and a jump in the acceptance rate just below the jumbo-loan cutoff. We also see the same fall off in the acceptance rate as the size of the mortgages falls, and as mortgage size increases beyond the cutoff.

Table 3 contains simple summary statistics for the mortgage application data that we use in our two samples. We report the acceptance rate, loan size, applicant income, and the share of loans made in urban areas (i.e. in MSAs). Acceptance rates are lower in the full sample than in the filtered sample (80% v. 91%), reflecting the fall off in acceptance rates for very small loans. Similarly, both average loan size ($209 thousand vs. $102) and the mean ratio of loan size to applicant income (2.4 vs. 1.6) are higher in the filtered sample. In the full sample, about 13% of the loan applicants are to minority borrowers, and about 19% are to female borrowers. The median census tract income (averaged across tracts) is $44 thousand per year. Most of these characteristics are quite stable over time, although the jumbo-loan cutoff increases as housing prices have risen throughout the sample.

Table 4 reports lender characteristics for data included in our samples (Panel A). We also report these characteristics for banks that are excluded, either because they did not appear in the HMDA dataset or because we were unable to match their identifier to HMDA (Panel B). The median bank in our sample holds about $85 million in assets, and the median bank received 240 mortgage applications (215 accepted) in a typical year in the full sample; for the filtered sample, the number of applications for the median bank falls to just 16. For the full sample, the flow of applications translates into 7.7% of assets originated annually in non-jumbo mortgages, plus 1.4% of assets originated for jumbos for the median bank. The median deposit cost, defined as interest expenses on deposits divided by total deposits, equals about 3.3%, and the median bank held about 28% of its assets in either cash or other marketable securities. Our measure of loan liquidity, which again takes account of both a bank's portfolio choices and the depth of the market for securitization in aggregate, was about 23%. This variable trends upward throughout our sample period as the securitization market has expanded. In contrast, the banks excluded tend to be smaller, less focused on lending, and less focused on mortgage lending in particular, although no less profitable. This is reasonable to expect since the HMDA data cover mortgage lenders with total assets in excess of $30 million.

IV. EMPIRICAL STRATEGY

A. Identification

How do funding conditions and liquidity affect an individual bank's willingness to supply credit? Answering the question convincingly creates the challenge of separating the effects of loan *demand* from those of loan *supply*. To understand this identification problem, consider the reduced form regression of loan originations on a bank's cost of raising deposits. If availability of local deposits affects loan supply, then an increase in a bank's cost of deposits ought to be associated with a decline in originations (and an increase in price in the other reduced form). Strong loan demand, however, will tend to increase a bank's appetite for deposits to fund that demand, thus potentially leading to higher yields on deposits (and a positive correlation between deposit yields and originations). Similarly, a bank's willingness to hold liquid assets – for example, cash or other marketable securities – may be directly affected by loan demand. Where demand is weak, we would expect banks to hold more securities. Thus, demand-side forces will tend to generate a negative correlation between measures of bank liquidity and loan originations.

Our research method specifically addresses these identification problems. We estimate reduced form models linking the quantity of originations to demand and supply shifters, but rather than model overall originations, we instead focus on the *difference* between the volume of non-jumbo mortgage originations and jumbo originations. We assume that unobserved demand-side variables affect the jumbo and non-jumbo mortgages at a given bank-year in the same way, and thus can be eliminated by differencing. The identification strategy allows us to measure the effect of liquidity and deposit costs on the supply of jumbo mortgages relative to the supply of non-jumbos. Since the strategy requires a homogenous pool of loans (to remove demand), we compare the full sample results on overall originations with results from a filtered sample without refis. We then further refine our tests by focusing on acceptance rates for applications around the jumbo cutoff, thereby unpacking the results for total originations. In these refinements, we also compare the full sample with the filtered sample without refis and without mortgages below 50% of the jumbo-loan cutoff or above 250% of the cutoff. By comparing results for loans near the cutoff with results from the full sample we can assess the validity of our identification assumption (i.e. demand homogeneity across the two segments of the market).

B. Estimation

To understand our estimation, consider two reduced form equations relating the volume of mortgage originations to market-level demand-side variables and to bank-level funding characteristics (supply-side variables), as follows:

$$VOL^{NJ}_{i,t} = \gamma^{NJ}_1 \textit{Balance-sheet liquidity}_{i,t-1} + \gamma^{NJ}_2 \textit{Deposit cost}_{i,t-1} + \gamma^{NJ}_3 \textit{Loan liquidity}_{i,t-1} + \\ + \beta^{NJ} \textit{Borrower Risk}^{NJ}_{i,t} + \textit{Unobservable Demand-Side Variables}_{i,t} + \varepsilon^{NJ}_{i,t}, \quad \textbf{(1a)}$$

$$VOL^{J}_{i,t} = \gamma^{J}_{1} Balance\text{-}sheet\ liquidity_{i,t-1} + \gamma^{J}_{2} Deposit\ cost_{i,t-1} + \gamma^{J}_{3} Loan\ liquidity_{i,t-1} + \\ + \beta^{J} Borrower\ Risk^{J}_{i,t} + Unobservable\ Demand\text{-}Side\ Variables_{i,t} + \varepsilon^{J}_{i,t}, \qquad \mathbf{(1b)}$$

where the unit of observation in these regressions is the bank-year. Subscript *i* indicates bank, and subscript *t* indicates year. For each bank-year, the dependent variable equals the volume of new originations summed across all non-jumbo (or jumbo) mortgages in year *t*, divided by the bank's assets at the end of year *t-1*. Each equation may contain demand-side variables that are unobservable, as well as variables reflecting the funding and liquidity position of the potential lender. These unobservable demand factors potentially bias estimation of the direct effects of liquidity and deposit costs on loan origination for the reasons described above. But we expect that banks with more balance-sheet liquidity to be more willing to supply illiquid jumbo mortgages than liquidity-constrained banks. In contrast, liquidity constraints should not affect a bank's willingness to supply non-jumbo mortgages because these can be converted to mortgage-backed securities (which are liquid), or they can be sold off easily (to one of the GSEs). For funding costs, we expect banks with high deposit costs to reduce loan supply more for illiquid jumbo mortgages than for liquid non-jumbos, again because the bank must hold and thus fund the illiquid ones (Kashyap and Stein, 2000; Campello, 2002). That is, we expect the following relationships to hold:

$$0 <= \gamma^{NJ}_{1} < \gamma^{J}_{1} \qquad \text{and} \qquad 0 >= \gamma^{NJ}_{2} > \gamma^{J}_{2}.$$

If demand-side effects are common across equations (1a) and (1b), then they can be eliminated by subtraction, as follows:

$$VOL^{NJ}_{i,t} - VOL^{J}_{i,t} = \beta_1 \textit{Balance-sheet liquidity}_{i,t-1} + \beta_2 \textit{Deposit cost}_{i,t-1} + \beta_3 \textit{Loan liquidity}_{i,t-1} + + \beta^{NJ} \textit{Borrower Risk}^{NJ}_{i,t} - \beta^{J} \textit{Borrower Risk}^{J}_{i,t} + \eta_{i,t}, \tag{1c}$$

where $\beta_1 = \gamma^{NJ}_1 - \gamma^{J}_1$, etc. Thus, we can remove the potentially biasing demand-side effects, but we are only able to identify the difference in the coefficients in equations (1a) and (1b). This differencing also removes any other common but unobservable variable affecting acceptance rates in a given bank-year. So, for example, a bank fixed effect is differenced out of the regression. Equation (1c) represents our benchmark regression.

Balance sheet liquidity and the cost of holding deposits, our main variables of interest, are defined above. We also include loan liquidity in the regressions, which may affect the relative loan supply either positively or negatively. On the one hand, loan liquidity per se ought to increase a bank's willingness to make illiquid loans for the same reason that the more standard measure of balance sheet liquidity does. On the other hand, banks holding very high levels of mortgages (and hence having a relatively liquid loan portfolio), may be motivated to originate non-jumbo mortgages that can easily be removed from the balance sheet.[12] The increasing depth of the securitization market (illustrated in Figure 2), which tends to increase our measure of loan liquidity over time, may also encourage banks to set a lower acceptance hurdle for non-jumbo relative to jumbo mortgages. Thus, we include loan liquidity as a control variable, although as it turns out the main results are not sensitive to the inclusion of this variable.

To control for characteristics of the pool of loans used to build the dependent variable, we include the following: the ratio of the loan size to applicant income; the log of applicant income; the share of properties located in MSAs; the percent minority in the population around the property; the median income in the area around the property; and shares of female and minority loan applicants. We construct these characteristics by averaging across all of the non-jumbo loans (*Borrower Risk*$^{NJ}_{i,t}$) and across all of the jumbo loans (*Borrower Risk*$^{J}_{i,t}$). We allow the coefficients on these risk characteristics to differ by loan type.[13] To control for property values (which we do not observe directly), we include the log of average application size for *all* loans in the bank's market (MSA or non-MSA county).[14] For banks receiving applications from multiple markets, we use an equally-weighted average of the mean application sizes across these markets. We also include bank size (log of assets), an indicator equal to one for banks owned by multi-bank holding companies, a measure of leverage (the capital-asset ratio), and accounting profits (net income to assets). Because there may be additional unobserved bank effects or some autocorrelation in the residual, we cluster the error in the model by bank in constructing standard errors.[15]

Changes in the stance of monetary policy could in principle be included in our model to test how aggregate funding shocks (e.g. an increase in the Fed Funds rate) affect the supply of liquid v. illiquid loans. Loutskina (2005) finds uses quarterly data to show that banks with balance sheets dominated by liquid mortgages tend to be less affected by changes in monetary policy than other banks. Unfortunately, the HMDA loan application data are not 'time stamped'. All we can observe is the year in which a given application is made. Since Federal Reserve policy can change sharply over the course of a single year, we simply absorb year effects with a set of indicator variables. We also incorporate state indicator variables in all of our models. According to Passmore, et al (2005), removing state effects is important, both because of differences in foreclosure laws across states, and because the jumbo-mortgage market is much better developed in states with relatively high housing costs, compared to states with lower-priced houses.

V. RESULTS

A. Volume regressions

Table 5 reports the benchmark results. Balance sheet liquidity and the cost of holding deposits, our main variables of interest, are defined above. Each of these variables comes from the fourth-quarter Call Report for the year before the loan application. We use prior-year bank data to reduce any mechanical relationship between our dependent variable and the bank characteristics. We report four specifications across the full sample, and the same four specifications for the filtered sample (without refis). The first three specifications (columns 1-3 and 5-7) focus on balance-sheet liquidity, deposit cost, and loan liquidity individually. Then, we report one specification with all three variables together (columns 4 & 8). In all of our models we include the full set of loan-pool control variables.[16]

All eight specifications suggest that banks with more balance sheet liquidity and banks with lower cost of deposits supply more credit to the illiquid sector (jumbos) relative to the liquid sector (non jumbos). The effects are robust across the specifications and samples, although we find larger coefficients in the full sample than in the sample without refis. To understand the magnitudes, consider an increase in balance sheet liquidity variable from the 25th to the 75th percentile of its distribution (an increase of 17.5% of assets). This change would increase the volume of jumbo originations by 3.2% (1.9% in the sample without refis) of assets relative to non-jumbos. This increase is large relative to the overall distribution of loan originations, where the median bank originates 5.6 percentage points more non-jumbos than jumbos (see Table 3). For deposits, a move from the 25th to 75th percentile in the distribution of yields (and increase of 1.1 percentage points) is associated with a relative increase in originations of a little more than 0.8% of assets (0.6% in the smaller sample).

The effects of bank size and capital also confirm our overall findings. Large banks and well capitalized banks originate more jumbo mortgages than smaller, less well-capitalized banks. Because there are many differences in the operating and financial policies of large and small banks, we include these mainly as control variables. But the size result may reflect, in part, large banks' better access to alternative sources of funds, as well as their greater ability to manage liquidity risk. For example, large banks have a greater ability to borrow in the Fed Funds market than smaller banks.[17] Similarly, with better ability to borrow in capital markets, large banks are also less reliant on deposits as a marginal source of funds for their lending.

B. Mortgage Acceptance Rates

To understand the volume results, we next regress the average acceptance rates for jumbo mortgages relative to non-jumbos by bank-year, against the same set of variables as in Table 5. (We report probit models below.) This approach offers two specific advantages over the volume regressions. First, acceptance rates reflect specific decisions of the lender, and thus are more naturally linked to the supply side of the market. Second, the dependent variable is, by construction, normalized by the overall flow of applications (total approved mortgages / total application), which can be seen as another means to sweep out effects from loan demand (which drives the denominator).

To further validate our identification strategy, we compare the results using all loans with results for a sample filtered both to remove refis and to remove loans that are very large (greater than 250% of the cutoff) or very small (less than 50% of the cutoff). The full sample provides us with less noisy estimates of the acceptance probabilities because the number of loan applications is 20 to 50 times higher for each bank than in the filtered sample. Inspection of Figure 4 shows, however, that the acceptance rates fall off for small loans, suggesting that these borrowers may be very different from borrowers near the cutoff. The filtered sample thus ensures compatibility of loans and hence may account better for demand-side effects.

The acceptance-rate results, reported in Table 6, are qualitatively consistent with those reported on total loan volumes. Banks flush with liquidity are more likely to approve jumbo mortgages than non-jumbos, as are banks with low costs of deposits. These effects are consistent across specifications and samples. The robustness across samples is especially notable given the large difference in the number of bank-years (14,872 vs. 21,690) as well as the large difference in the number of loan applications used to build the dependent variable (the full sample contains 10 times as many applications as the filtered sample). Magnitudes are somewhat larger in the full sample, although the difference is less than two standard errors for both the coefficient on liquidity and deposit costs.

C. Sorting and Loan-Application Size

While qualitatively similar, the economic magnitudes in Table 6 are considerably smaller than those reported in Table 5. For example, moving balance sheet liquidity from the 25th to the 75th percentile increases the jumbo-loan acceptance rate by about 0.7 percentage points. If applications were randomly distributed across lenders, then this shift in bank-loan acceptance rates should explain all of the shifts in loan volumes. However, only about 20% of the 3.2% relative increase in total jumbo-loan originations can be explained by differences in acceptance rates (0.7/3.2 = 0.22).

Loan applications are evidently not randomly assigned to lenders. As we noted above, application size may be endogenously determined by banks' ability to securitize or sell off mortgages below the jumbo-loan cutoff. This notion seems consistent both with the flow of applications, which spikes upward for loans just below the cutoff (Figure 4A), and with acceptance rates, which also spike upward just below the cutoff (Figure 4B). We do not observe exactly how a bank might influence its applicants, although it seems likely that influence could be accomplished with carrots ('lower interest rates below the cutoff…') or sticks ('the loan will only be accepted if it comes in below the cutoff…').

Even when loan-size is not endogenous, advertising to customers, mortgage brokers, and internet search services likely lead to non-random sorting of applications across banks. Banks with liquid balance sheets and low-cost deposits may thus experience a greater flow of jumbo loan applications than other banks. Figure 6 reports the histogram of applications for banks defined as 'financially constrained' with a similar histogram for banks that are 'financially unconstrained'. To construct these two groups, we define a bank as constrained if its cost of deposits is in the top 25th percentile of the distribution (in a given year) and its liquid assets ratio is in the bottom 25th percent. Conversely, unconstrained banks have deposit costs in the bottom quartile and liquidity in the top quartile. The graph shows that constrained banks consistently receive a higher fraction of applications below the cutoff, and a lower fraction above the cutoff.

To test formally how bank financial condition shapes the pool of applications, we focus separately on marginal and non-marginal loan applications. Marginal applications are those where individuals may *choose* to borrow less than they otherwise would, for example to take advantage of pricing differentials around the cutoff. Non-marginal applications are those further away from the cutoff, where loan-size choice is not plausibly linked to pricing incentives, but sorting across banks may be important. We construct the share of marginal non-jumbo loans as the number of applications between 95% and 100% of the cutoff, divided by the number all applications near the cutoff (95% to 105% of the cutoff). To test for sorting effects, we construct the number of non-marginal non-jumbo loans (less than 95% of the cutoff) divided by the number of all non-marginal applications (i.e. loans less than 95% or greater than 105% of the cutoff). We then relate these two variables to the same set of bank financial conditions as before.

Tables 7 and 8 report the results, with the same set of specifications reported in Table 5. As before, balance sheet liquidity and funding costs are significantly related to the flow of loan applications. The applicant flow is skewed toward the relatively liquid mortgages (those below the cutoff) for banks with lower levels of balance sheet liquidity or higher cost of deposits. These results support the idea that more liquid banks and banks with cheaper deposits are better financially positioned to originate illiquid loans and hence are less likely to affect the flow of mortgage applications. Presumably banks encourage customers to borrow in the non-jumbo market using pricing incentives, although we can not directly test this notion due to lack of bank-level data on mortgage rates.

These effects across specifications are robust in both Tables 7 and 8. The coefficients suggest that the shifts in the loan-application distribution are most pronounced for loans near the jumbo cutoff, which makes sense because both sorting across banks as well as shifts in the amount borrowed will tend to occur together. In contrast, for loans away from the cutoff we are observing non-random sorting of borrowers to banks. Borrowers demanding large loans tend to apply at banks with high levels of liquid assets and with low-cost deposits. In terms of the coefficient magnitudes, the effect of liquidity is again notable. A move from the 25^{th} to the 75^{th} percentile in the liquid-assets distribution is associated with an increase of 1.8 percentage points in the share of jumbo loans around the cutoff. Thus, the total effect of liquidity and deposit costs is explained in part by a shift in acceptance rates (Table 6) and in part by the shift in the distribution of applications (Tables 7 & 8).

Before continuing, it is worth recalling that our identification strategy attempts to isolate the supply-side impact of both liquidity and deposits. In contrast to the analysis of acceptance rates, demand effects are more likely to drive applicant flows. Thus, we have estimated our model with and without the log of average application size, which acts as the best available proxy for property values and thus loan demand. The results are not sensitive to inclusion of this variable. Moreover, we have also estimated the applicant flow regressions with an alternative measure of loan demand based on an index of housing prices at the MSA level. This variable is correlated with the average application size, and produces a similar sign and magnitude on the coefficients of interest (not reported).

D. Financial Effects and Acceptance Rates

We have tried to rule out demand side interpretations of our results by differencing across the jumbo loan cutoff, by focusing on a homogeneous sample, and by varying the set of potential demand-side variables included in the models. Next, we offer a test of the basic premise of the paper, namely that loan liquidity falls discretely around the jumbo loan cutoff. If true, then the effects that we observe should *not* show up at other size-related cutoffs. For example, we should see no correlation between bank liquidity and relative acceptance rates of loans bigger or smaller than 75% of the jumbo-loan cutoff. Similarly, we should see no correlation between bank liquidity and relative acceptance rates of loans bigger or smaller than 150% of the jumbo-loan cutoff. All of the action should happen around the cutoff, *but nowhere else across the distribution*.

This of course seems evident in the Figures reported earlier, but we now provide a formal test, as follows. For each bank-year, we construct the acceptance rate for loans in the following four size bins: 50% to 75% of the jumbo-loan cutoff; 75% to 100% of the cutoff; 100% to 150%

of the cutoff; and 150% to 250% of the cutoff. We thus have four observations of the dependent variable for each bank-year.[18] We regress these acceptance rates on the same set of variables as before, including interactions between bin-size indicators and the continuous variables. The first set of interactions multiplies the jumbo indicator by balance sheet liquidity, loan liquidity and deposits. We add another set of interactions between an indicator for loans 75% to 100% of the cutoff and the financial variables, and a third set for loans 150% to 250% of the cutoff. Thus, the coefficients on the linear terms reflect the correlation between the acceptance rates for small loans (50%-75%) and the financial variables. The coefficient on the interactive terms with the 75%-100% indicator test whether loans that are larger but not yet above the cutoff respond differently to financial variables than other small loans; the 150%-250% interactions test whether jumbo loans that are very large respond differently to financial variables than other jumbo loans.

Table 9 offers very strong support for our identification strategy. For balance sheet liquidity, there is no effect of liquidity or deposits for any category of mortgages below the cutoff. For jumbo loans, liquidity is positively related to acceptance rates, but there is no additional effect for very large mortgages (i.e. the interaction is positive but not significant). For deposits, we see a slight increase in the negative effect of deposit costs on jumbo-loan acceptance rates for the very large mortgages. However, this additional impact is less than 1/10 as large as the effect around the jumbo cutoff. The effect of loan liquidity does seem to vary across the whole loan-size distribution, with its greatest impact for the smallest loans under consideration.

E. Acceptance Rates for a Homogenous Sample

In our last test, we design an experiment that considers only loans with a change in classification in adjacent years due to the exogenous increase in the jumbo cutoff. That is, for a given year we include only jumbo loans that will be classified as non-jumbo in the next year, when the cutoff is increased to reflect higher housing prices. Similarly, we include only non-jumbo loans that would have been classified as jumbo one year earlier. Thus we intentionally create a sample of very similar loans. Since the sample is much smaller, we analyze the acceptance probability by loan rather than by bank-year in a probit model. We randomly select at most 1,000 applications for a given bank-year to mitigate the influence of very large banks.

We include the same set of regressors as before, and we interact each with the jumbo-loan indicator. Table 10 reports these last results, and again shows the same impact of both balance sheet liquidity and deposits as before. Banks with more liquidity are more likely to approve jumbo loans, but no more likely to approve non-jumbos. The same holds for deposits – no effect of deposit costs on approval probability for non-jumbos, but a negative effect for jumbos.

VI. CONCLUSIONS

Traditional banks originated illiquid loans and funded them with liquid deposits. As a result, a decline in deposit supply reduced loan supply. Banks also needed to hold enough cash and marketable securities to satisfy random demands for liquidity from depositors. Securitization is changing the model of banking from one of 'originate and hold' to one of 'originate and sell', thereby mitigating the effects of both deposit supply and balance sheet liquidity on loan supply. As evidence, we show that a bank's willingness to approve jumbo mortgages (an example of illiquid loans) depends on both its cost of deposits and its holdings of liquid assets. In contrast, financial condition has no effect on acceptance rates for non-jumbo loans. Given the rapid expansion of loan securitization (as well as the growth of loan sales and syndication), the results suggest that access to capital is less subject to variations in the supply of local deposits to banks than in the past.

The expansion of the secondary market in mortgages has also likely dampened the effects of monetary policy on real economic activity by limiting the extent of the bank lending channel. Loutskina (2005) has found that banks with more liquid balance sheets – essentially banks with greater holding of mortgages – respond less to variation in stance of monetary policy. This paper suggests that much of this reduction in the impact of monetary policy is traceable to the liquidity produced from securitization, and that this liquidity has been subsidized by the GSEs. As we have shown, similar developments have been growing recently across European markets, although without subsidies from the GSEs, securitization in Europe remains much less important that in the U.S.

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Figure 1: Volume of Non-Jumbo Loans Less Volume of Jumbo Loans as % of Total Assets

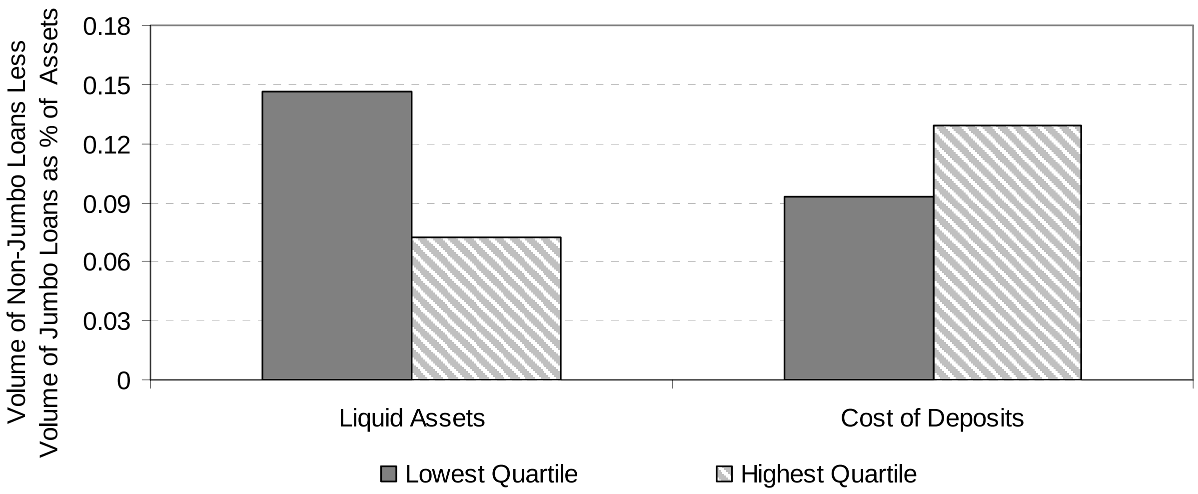

Figure 2
Securitization of Loans in the US Economy

The Figure presents the percentage of loans securitized relative to total loans outstanding for six categories of loans: (i) home mortgages, (ii) multifamily residential mortgages, (iii) commercial mortgages, (iv) consumer credit, (v) business loans, and (vi) farm mortgages. The data are from Flow of Funds Accounts of the United States.

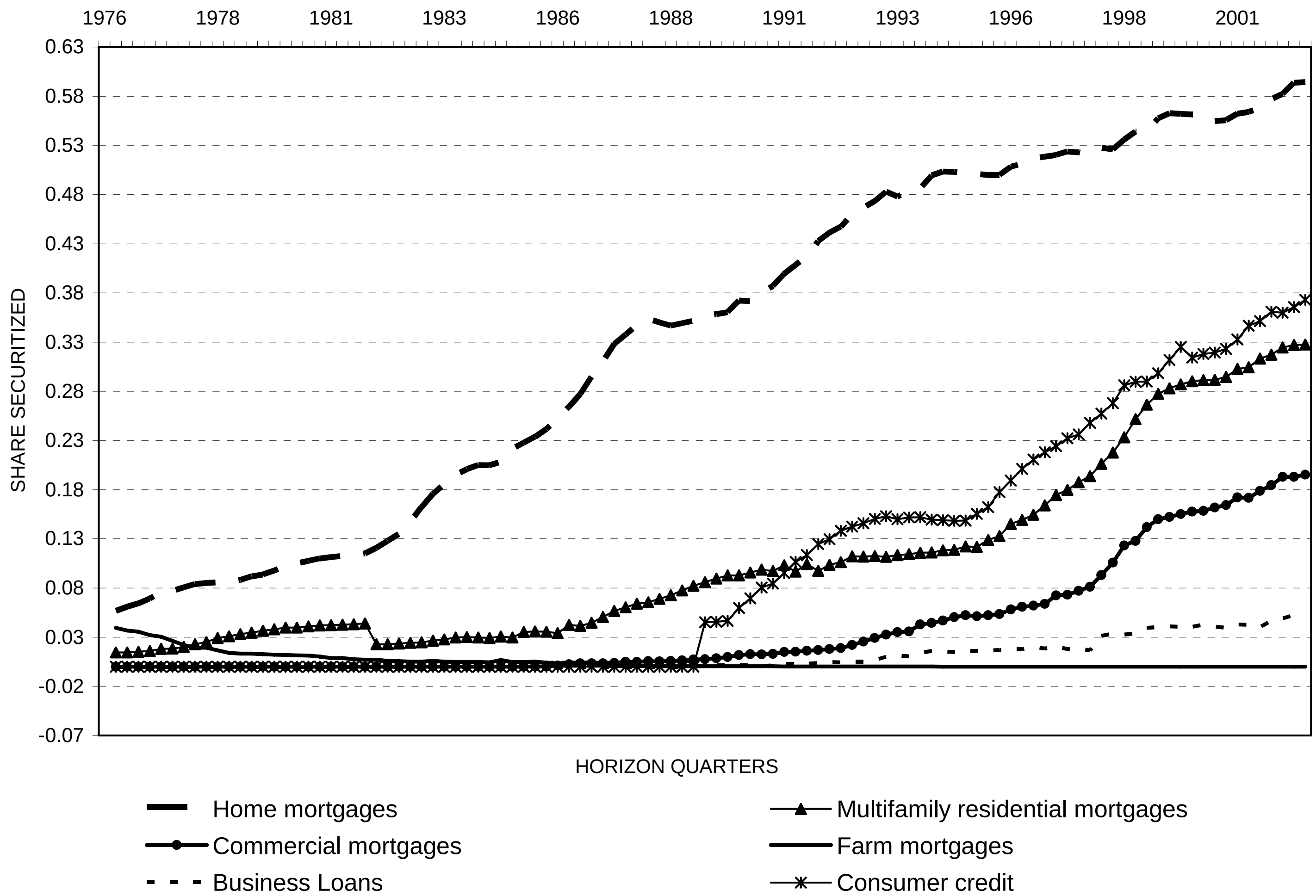

Figure 3: Jumbo/Non-Jumbo Spread Controlling for Credit Risk
Source: McKenzie (2002)

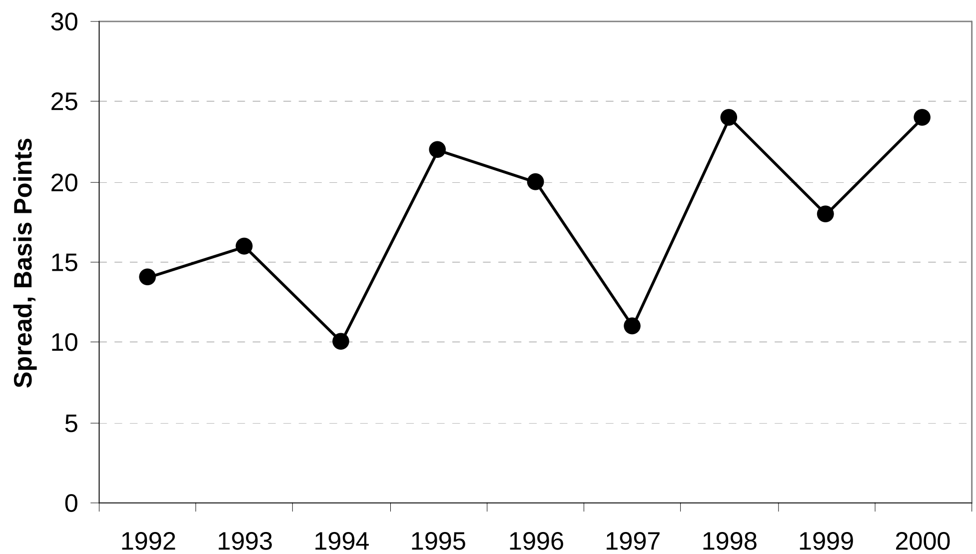

Figure 4A: Histogram of Loan Applications to All Financial Institutions, 1992-2003

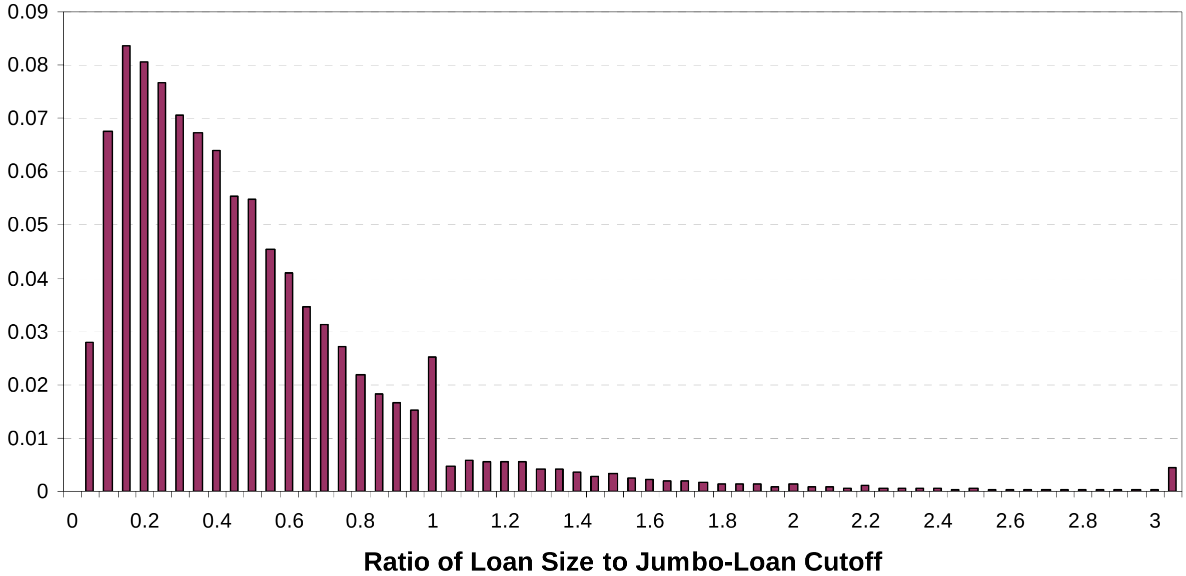

Figure 4B: Probability of Acceptance for Loan Applications to All Financial Institutions, 1992-2003

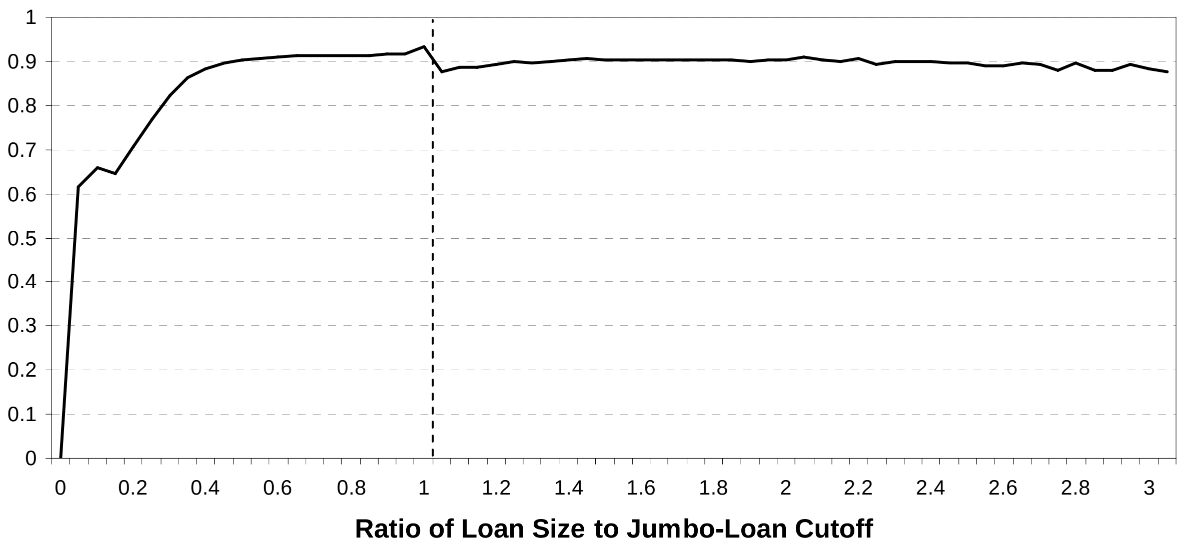

Figure 5A: Histogram of Loan Applications, 1992-2003

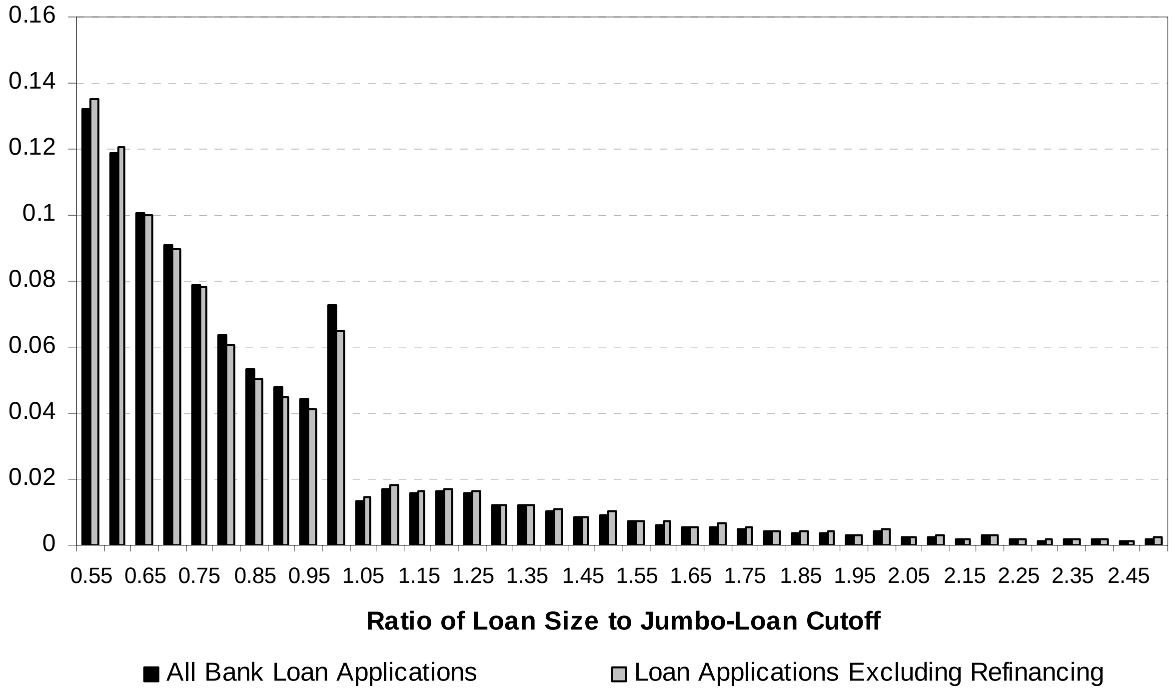

Figure 5B: Probability of Acceptance for Loan Applications, 1992-2003

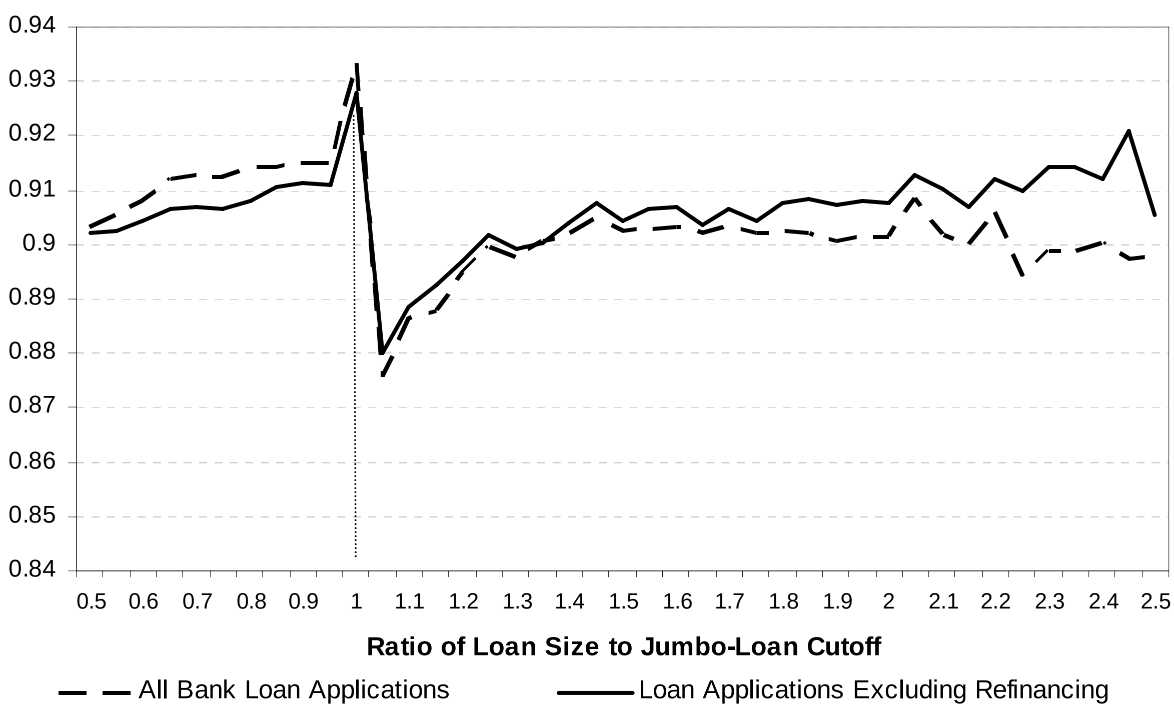

Figure 6: Histogram of Loan Applications by Financial Constraints

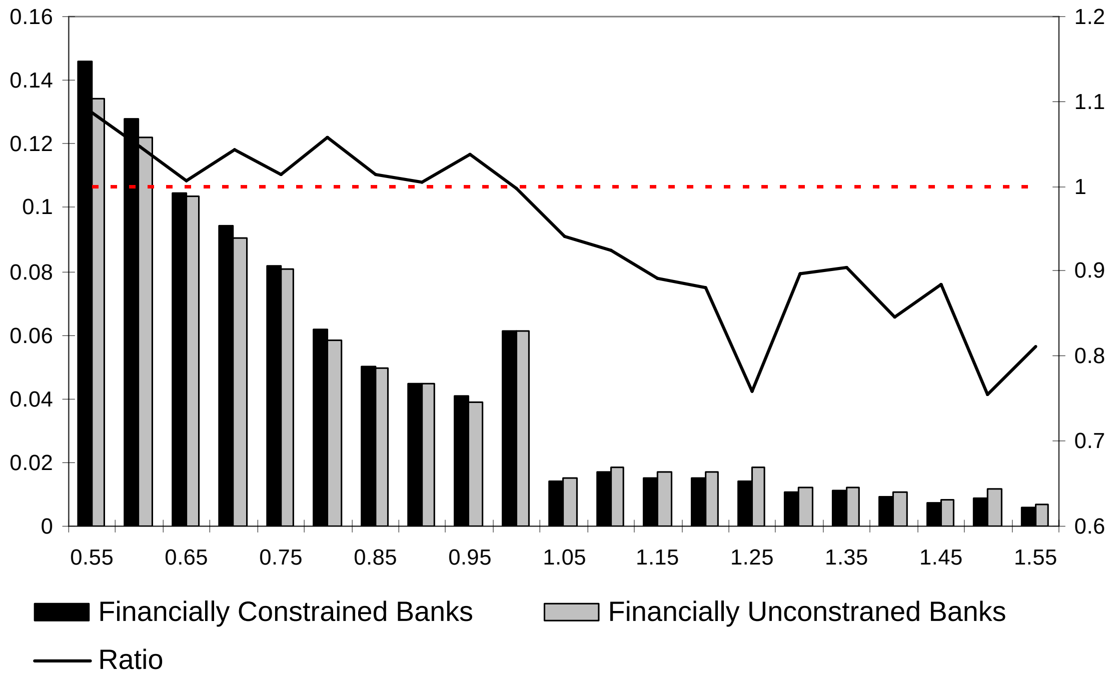

Table 1: Loans Outstanding and Securitization

This table presents economy-wide loans outstanding and securitized. Data are from the U.S. Flow of Funds.

	1976	1986	1996	2003
Single-Family Mortgages				
Loans Outstanding (Billions)	$489	$1,554	$3,533	$7,283
Securitized Loans (Billions)	$28	$411	$1,806	$4,223
Securitized Share	5.7%	26.4%	51.1%	58.0%
Multi-Family Residential Mortgages				
Loans Outstanding (Billions)	$101	$212	$268	$504
Securitized Loans (Billions)	$1	$9	$40	$175
Securitized Share	1.0%	4.2%	14.9%	34.7%
Commercial Mortgages				
Loans Outstanding (Billions)	$162	$553	$729	$1,452
Securitized Loans (Billions)	$0	$1	$45	$294
Securitized Share	0.0%	0.3%	6.2%	20.2%
Farm Mortgages				
Loans Outstanding (Billions)	$51	$104	$85	$132
Securitized Loans (Billions)	$2	$0	$0	$0
Securitized Share	3.9%	0.4%	0.0%	0.0%
Commercial & Industrial Loans				
Loans Outstanding (Billions)	$409	$1,192	$1,674	$2,194
Securitized Loans (Billions)	$0	$0	$30	$104
Securitized Share	0.0%	0.0%	1.8%	4.7%
Consumer Loans				
Loans Outstanding (Billions)	$205	$607	$1,163	$2,040
Securitized Loans (Billions)	$0	$0	$226	$658
Securitized Share	0.0%	0.0%	19.4%	32.3%

Table 2: Securitization and Residential Mortgage Markets in Europe

Panel A: Securitization by Year & Collateral

Year	Total Securitization (€ million)	Annual Growth Rate	2005 Securitization by Collateral: Collateral	Total (€ million)	Share
2000	78.2	-	Auto Loans	4.1	1.3%
2001	152.6	95.1%	Credit Card	11.7	3.6%
2002	157.7	3.3%	CDOs	48.9	15.0%
2003	217.3	37.8%	Commercial Mortgages	38.6	11.8%
2004	243.5	12.1%	Loans & Leases	55.1	16.9%
2005	327.0	34.3%	Residential Mortgages	144.9	44.3%
2006	458.9	40.3%	Other	23.7	7.2%
			Total	327.0	100.0%

Sources: Thomson Financial, Dealogic, JP Morgan, Merrill Lynch, Structured Finance International, Bloomberg

Panel B: Overview of Residential Mortgage Markets, 2005

Country	Value of Residential Mortgage Debt (€ million)	Residential Debt to GDP	Mortgage Growth in 2005 (€ million)	Origination of Residential MBSs: Amount (€ million)	As % of loan growth
Austria	53,815	21.90%	6,404	0	0%
France	503,600	29.40%	83,094	4,000	5%
Germany	1,162,588	51.70%	5,813	1,100	19%
Greece	45,420	25.10%	15,170	1,500	10%
Ireland	98,956	61.70%	28,202	0	0%
Italy	243,622	17.20%	44,096	8,200	19%
Netherlands	487,322	97.10%	57,991	25,000	43%
Portugal	79,452	53.90%	9,296	7,000	75%
Russia	5,072	0.80%	7,694	0	0%
Spain	475,571	52.60%	112,235	27,300	24%
Sweden	159,025	55.20%	14,789	0	0%
Turkey	7,387	2.50%	15,069	0	0%
UK	1,414,386	80.00%	134,367	70,700	53%
EU	5,014,078	48.90%	521,464	144,800	28%
US	***7,144,201***	***71.20%***	985,900	n/a	n/a

Source: European Mortgage Federation

Table 3: Summary Statistics for Mortgage Applications Characteristics

This table contains summary statistics for our two samples of mortgages. The first sample is based on all home mortgage applications to commercial banks from the HMDA data, collected by the Federal Reserve Board. The second sample includes only mortgage applications between 50% and 250% of the jumbo-loan cutoff and omits refinancings.

	Full Sample	**Mortgages between 50%-250% of Jumbo Cutoff, without Refis**
Number of Loan Applications	62,587,880	6,143,057
Probability of Acceptance (%)	79.93	90.85
Average Loan Amount (thousands)	$102	$209
Average Applicant Income (thousands / year)	$79	$120
Average Area Income (thousands / year)	$44	$51
Average Loan-to-Income Ratio	1.60	2.4
Percent Minority	12.75	14.14
Percent of Minority Population in the Area	16.81	14.83
Percent Female	19.01	15.02
Percent of Loans in MSA	84.17	91.84

Table 4: Summary Statistics for Bank Characteristics

This table reports information on the distribution of characteristics for banks that we matched to the mortgage application data, and for banks that we exclude from our analysis. Liquid assets equals cash plus marketable securities. The cost of deposits equals interest expense on deposits to total deposits. Loan liquidity is a measure of the ability of a bank to sell its loans into the secondary market (see text for details).

	Panel A: Banks Included in Our Sample			***Panel B: Excluded Banks***		
	25th Percentile	**Median**	**75th Percentile**	**25th Percentile**	**Median**	**75th Percentile**
Total Assets (millions of $s)	42.6	84.4	194.1	17.4	32.5	62.9
Financial Struture & Liquidity (%)						
Liquid Assets / Assets	19.9	27.8	37.4	22.9	32.7	43.9
Loan Liquidity	16.9	22.8	30.1	13.1	19.6	26.8
Cost of Deposits	2.7	3.3	3.9	2.7	3.5	4.1
Capital / Assets	7.4	8.5	10.1	8.0	9.4	11.6
Loan Shares (% of assets)						
Total Loans	53.9	63.3	71.1	47.0	58.1	67.4
Commercial & Industrial Loans	9.7	17.6	27.4	14.4	25.7	41.4
Home Mortgages	20.2	31.2	46.3	14.3	25.2	37.8
Commercial Mortgages	10.7	18.1	26.9	4.9	10.7	19.4
Consumer Loans	4.9	9.9	17.5	7.6	12.8	20.4
Loan Originations (% of assets)						
Non-Jumbo Mortgages	3.09	7.74	16.26	n/a	n/a	n/a
Jumbo Mortgages	0.65	1.38	3.05	n/a	n/a	n/a
Non-Jumbo Mortgages less Jumbo Mortgages	1.33	5.57	13.41	n/a	n/a	n/a
Loan Originations without Refinancing (% of assets)						
Non-Jumbo Mortgages	1.56	3.83	7.55	n/a	n/a	n/a
Jumbo Mortgages	0.44	0.91	1.97	n/a	n/a	n/a
Non-Jumbo Mortgages less Jumbo Mortgages	0.44	2.46	5.87	n/a	n/a	n/a
Profit (%)						
Net Income / Assets	0.7	1.0	1.3	0.7	1.1	1.4
Mortgage applications						
Number of loan applications	90	240	627	n/a	n/a	n/a
Number of loans Issued	79	215	564	n/a	n/a	n/a
Probability of Acceptance (%)	85.5	91.5	95.6	n/a	n/a	n/a
Mortgage applications between 50-250% of jumbo cutoff w/o refis						
Number of loan applications	6	16	54	n/a	n/a	n/a
Number of loans Issued	5	15	50	n/a	n/a	n/a
Probability of Acceptance (%)	88.9	96.5	99.0	n/a	n/a	n/a

Table 5: Regression of Loan Volumes for Non-Jumbo Mortgages Relative to Jumbos on Bank Characteristics

This table reports regressions of the volume of approved non-jumbo minus jumbos mortgages, divided by beginning of period assets. The unit of observation is the bank-year, from 1992 to 2003. The regressions include the following controls for the loan-pool characteristics in each bank-year: the share of loans made to borrowers in MSAs; percent minority applicants in the bank's lending markets; mean loan-to-income ratio; log of mean applicant income; average median income in bank's lending markets; the share of minority applicants; and the share of female applicants. We allow the coefficient on each of these variables to be different for the two segments of the market (jumbo and non-jumbo). All regressions also include year and state fixed effects.

Dependent Variable:	(Volume of Approved Non-Jumbos - Volume of Jumbos)/$Assets_{t-1}$							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bank Financial Condition								
Liquid Assets / Assets	-0.166			-0.185	-0.098			-0.106
	(11.65)***			(12.62)***	(10.87)***			(11.31)***
Loan Liquidity		0.382		0.403		0.186		0.196
		(14.29)***		(14.63)***		(10.98)***		(11.24)***
Cost of Deposits			1.01	0.623			0.648	0.480
			(4.60)***	(3.11)***			(4.82)***	(3.63)***
Other Bank Controls								
Log of Average Application Size[1]	-0.052	-0.044	-0.051	-0.046	-0.036	-0.033	-0.035	-0.033
	(5.15)***	(4.36)***	(4.94)***	(4.58)***	(5.57)***	(5.00)***	(5.42)***	(5.13)***
Log of Bank Assets	-0.015	-0.013	-0.015	-0.013	-0.009	-0.008	-0.009	-0.008
	(10.46)***	(9.03)***	(10.38)***	(9.08)***	(10.46)***	(9.23)***	(10.38)***	(9.37)***
Bank owned by Holding Company	-0.021	-0.007	-0.018	-0.006	-0.009	-0.002	-0.007	-0.001
	(4.13)***	(1.43)	(3.46)***	(1.26)	(3.00)***	(0.70)	(2.37)**	(0.35)
Capital / Assets	-0.224	-0.359	-0.305	-0.239	-0.1	-0.175	-0.145	-0.102
	(3.01)***	(4.80)***	(4.09)***	(3.18)***	(2.44)**	(4.22)***	(3.56)***	(2.45)**
Net Income / Assets	0.015	-0.383	-0.15	-0.227	-0.134	-0.343	-0.209	-0.254
	(0.06)	(1.56)	(0.58)	(0.97)	(0.88)	(2.23)**	(1.34)	(1.71)*
Loan-Pool Characteristics Included?	*Yes*							
Sample	*All mortgages*				*Without Refinancings*			
Observations	33,060	33,060	33,060	33,060	27,439	27,439	27,439	27,439
R-squared	0.17	0.19	0.16	0.20	0.11	0.12	0.10	0.14

T-statistics in parentheses, based on errors clustered at the bank level.
* significant at 10%; ** significant at 5%; *** significant at 1%

[1]The average applicant size reflects the typical size of mortgages in a lender's market. For banks lending in more than a single market (MSA), we construct and equally-weighted average the applicant sizes across markets.

Table 6: Regressions Approval Rates for Non-Jumbo Mortgages Relative to Jumbos on Bank Characteristics

This table reports regressions of the acceptance rate for non-jumbo mortgages minus the acceptance rate for jumbos by bank-year, from 1992 to 2003. The regressions include the following controls for the loan-pool characteristics in each bank-year: the share of loans made to borrowers in MSAs; percent minority applicants in the bank's lending markets; loan-to-income ratio; log of mean applicant income; average median income in bank's lending markets; share of minority applicants; share of female applicants. We allow the coefficient on each of these variables to be different for the two segments of the market - jumbo and non-jumbo. All regressions also include year and state fixed effects.

Dependent Variable:	Acceptance Rate for Non-Jumbos - Acceptance Rate for Jumbos							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bank Financial Condition								
Liquid Assets / Assets	-4.207			-4.073	-2.533			-2.387
	(4.49)***			(4.44)***	(2.80)***			(2.65)***
Loan Liquidity		5.889		5.26		2.306		1.808
		(4.08)***		(3.63)***		(1.70)*		(1.30)
Cost of Deposits			73.469	56.172			43.542	36.144
			(4.76)***	(3.65)***			(2.77)***	(2.25)**
Other Bank Controls								
Log of Average Application Size[1]	1.871	1.938	1.837	1.987	0.264	0.224	0.24	0.317
	(2.53)**	(2.62)***	(2.48)**	(2.70)***	(0.35)	(0.30)	(0.32)	(0.42)
Log of Bank Assets	-0.778	-0.739	-0.783	-0.744	-0.312	-0.297	-0.319	-0.301
	(7.54)***	(7.17)***	(7.66)***	(7.24)***	(3.83)***	(3.61)***	(3.94)***	(3.66)***
Bank owned by Holding Company	-1.123	-0.88	-0.848	-0.655	-0.377	-0.277	-0.209	-0.122
	(3.73)***	(2.87)***	(2.78)***	(2.12)**	(1.24)	(0.88)	(0.67)	(0.38)
Capital / Assets	4.685	1.703	4.661	5.799	0.635	-1.061	0.312	1.201
	(1.35)	(0.50)	(1.35)	(1.64)	(0.18)	(0.31)	(0.09)	(0.34)
Net Income / Assets	3.952	-4.073	0.784	1.22	-15.194	-18.404	-16.933	-15.876
	(0.26)	(0.27)	(0.05)	(0.08)	(0.94)	(1.14)	(1.05)	(0.99)
Loan-Pool Characteristics Included?	*Yes*							
Sample	*All mortgages*				*Mortgages between 50-250% of jumbo cutoff without refis*			
Observations	21,690	21,690	21,690	21,690	14,872	14,872	14,872	14,872
R-squared	0.10	0.10	0.10	0.10	0.03	0.03	0.03	0.03

T-statistics in parentheses, based on errors clustered at the bank level.
* significant at 10%; ** significant at 5%; *** significant at 1%

[1]The average applicant size reflects the typical size of mortgages in a lender's market. For banks lending in more than a single market (MSA), we construct and equally-weighted average the applicant sizes across markets.

Table 7: Regressions the Share of Non-Jumbo Applications Near the Jumbo Cutoff on Bank Characteristics

This table reports regressions of the share of marginal applications (i.e. applications near the jumbo-loan cutoff) that are non-jumbo (i.e. below the cutoff), by bank-year, from 1992 to 2003. The regressions include the following controls for the loan-pool characteristics in each bank-year: share of loans made to borrowers in MSAs; percent minority applicants in the bank's lending markets; loan-to-income ratio; log of applicant income; average median income in bank's lending markets; share of minority applicants; share of female applicants. We allow the coefficient on each of these variables to be different for the two segments of the market - jumbo and non-jumbo. All regressions also include year and state fixed effects.

Dependent Variable:	Number of applications between 95% & 100% of cutoff / Number of applications between 95% and 105% of cutoff							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bank Financial Condition								
Liquid Assets / Assets	-0.112			-0.113	-0.100			-0.104
	(6.22)***			(6.25)***	(4.65)***			(4.83)***
Loan Liquidity		0.037		0.044		0.081		0.098
		(2.28)***		(2.47)***		(2.45)**		(2.94)***
Cost of Deposits			0.324	0.298			0.416	0.620
			(2.22)***	(1.95)*			(2.02)**	(1.99)**
Other Bank Controls								
Log of Average Application Size[1]	0.035	0.031	0.031	0.035	0.048	0.045	0.044	0.048
	(2.25)**	(2.08)**	(2.08)**	(2.29)**	(2.78)***	(2.63)***	(2.56)**	(2.78)***
Log of Bank Assets	0.017	0.017	0.016	0.017	0.023	0.024	0.023	0.024
	(9.46)***	(9.59)***	(9.45)***	(9.67)***	(12.53)***	(12.89)***	(12.49)***	(13.02)***
Bank owned by Holding Company	0.015	0.016	0.015	0.018	0.017	0.021	0.015	0.021
	(2.54)**	(2.61)***	(2.57)**	(2.94)***	(2.45)**	(2.89)***	(2.13)**	(2.89)***
Capital / Assets	-0.294	-0.355	-0.342	-0.297	-0.224	-0.287	-0.278	-0.251
	(4.27)***	(5.23)***	(4.97)***	(4.25)***	(2.59)***	(3.35)***	(3.27)***	(2.89)***
Net Income / Assets	-0.325	-0.426	-0.405	-0.335	-0.284	-0.362	-0.347	-0.337
	(1.23)	(1.59)	(1.51)	(1.27)	(0.81)	(1.03)	(0.98)	(0.96)
Loan-Pool Characteristics Included?	*Yes*							
Sample	*All Mortgages*				*Without Refinancings*			
Observations	34,385	34,385	34,385	34,385	7,197	7,197	7,197	7,197
R-squared	0.43	0.44	0.43	0.44	0.18	0.18	0.18	0.18

T-statistics in parentheses, based on errors clustered at the bank level.
* significant at 10%; ** significant at 5%; *** significant at 1%

[1]The average applicant size reflects the typical size of mortgages in a lender's market. For banks lending in more than a single market (MSA), we construct and equally-weighted average the applicant sizes across markets.

Table 8: Regressions of the Share of Non-Jumbo Applications that are away from the Jumbo Cutoff on Bank Characteristics

This table reports regressions of the share of non-applications (i.e. applications not close to the jumbo-loan cutoff) that are non-jumbo (i.e. below the cutoff), by bank-year, from 1992 to 2003. The regressions include the following controls for the loan-pool characteristics in each bank-year: share of loans made to borrowers in MSAs; percent minority applicants in the bank's lending markets; loan-to-income ratio; log of applicant income; average median income in bank's lending markets; share of minority applicants; share of female applicants. We allow the coefficient on each of these variables to be different for the two segments of the market - jumbo and non-jumbo. All regressions also include year and state fixed effects.

Dependent Variable:	Number of applications between below 95% of cutoff / Number of all applications less application between 95% and 105% of cutoff							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bank Financial Condition								
Liquid Assets / Assets	-0.038			-0.048	-0.068			-0.073
	(3.13)***			(3.99)***	(4.98)***			(5.40)***
Loan Liquidity		0.291		0.293		0.247		0.245
		(14.29)***		(13.94)***		(11.21)***		(10.63)***
Cost of Deposits			0.815	0.589			1.135	0.536
			(4.67)***	(3.09)***			(6.01)***	(2.83)***
Other Bank Controls								
Log of Average Application Size[1]	-0.051	-0.049	-0.052	-0.049	-0.035	-0.032	-0.034	-0.032
	(7.32)***	(7.02)***	(7.34)***	(7.04)***	(3.62)***	(3.34)***	(3.51)***	(3.33)***
Log of Bank Assets	0.007	0.008	0.007	0.008	0.011	0.012	0.011	0.012
	(5.88)***	(6.71)***	(5.89)***	(6.75)***	(6.91)***	(7.97)***	(6.94)***	(7.97)***
Bank owned by Holding Company	-0.006	-0.001	-0.007	-0.002	-0.008	0.002	-0.004	0.004
	(2.13)**	(0.35)	(2.36)**	(0.79)	(1.79)*	(0.40)	(0.90)	(0.96)
Capital / Assets	-0.197	-0.203	-0.197	-0.216	-0.168	-0.233	-0.179	-0.168
	(4.48)***	(4.63)***	(4.47)***	(4.87)***	(3.33)***	(4.75)***	(3.55)***	(3.27)***
Net Income / Assets	0.476	0.380	0.486	0.384	0.410	0.199	0.361	0.262
	(3.06)***	(2.50)**	(3.12)***	(2.61)***	(2.03)**	(0.98)	(1.75)*	(1.33)
Loan-Pool Characteristics Included?	*Yes*							
Sample	*All mortgages*				*Mortgages between 50-250% of jumbo cutoff w/o refis*			
Observations	34,385	34,385	34,385	34,385	26,218	26,218	26,218	26,218
R-squared	0.43	0.44	0.43	0.44	0.22	0.23	0.22	0.23

T-statistics in parentheses, based on errors clustered at the bank level.
* significant at 10%; ** significant at 5%; *** significant at 1%

[1]The average applicant size reflects the typical size of mortgages in a lender's market. For banks lending in more than a single market (MSA), we construct and equally-weighted average the applicant sizes across markets.

Table 9: Regressions Analysis of Loan Approval Rates for Mortgages
By Size Relative to the Jumbo Cutoff

This table reports regressions of the acceptance rate for mortgages of different sizes. For each bank-year, there are 4 observations representing the acceptance rate for loans 50-75% of the jumbo cutoff, 75-100% of the cutoff, 100-150% of the cutoff, and from 150 to 250% of the cutoff. The regressions include the following controls for the loan-pool characteristics in each bank-year: share of loans made to borrowers in MSAs; percent minority applicants in the bank's lending markets; loan-to-income ratio; log of applicant income; average median income in bank's lending markets; share of minority applicants; share of female applicants. We allow the coefficient on each of these variables to be different for the four loan-size bins. These regression also include indicators for each loan size bin, as well as the other bank controls from the earlier tables (log of applicant size, log of bank size, BHC indicator, capital/assets and net income/assets). All regressions also include year and state fixed effects. We include refinance mortgages in all specifications.

Dependent Variable:	Loan Acceptance Rate							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bank Financial Condition								
Liquid Assets / Assets	-0.528			-0.713	-0.484			-0.67
	(0.57)			(0.78)	(0.52)			(0.73)
Liquid Assets / Assets * Indicator for loans 75-100% of jumbo cutoff	1.906			1.886	1.747			1.812
	(1.31)			(1.30)	(1.72)			(1.11)
Liquid Assets / Assets * Jumbo Indicator	2.896			2.558	2.876			2.611
	(2.77)***			(2.45)**	(2.61)***			(2.38)**
Liquid Assets / Assets * Indicator for loans 150-250% of jumbo cutoff	0.742			1.034	0.748			0.958
	(0.58)			(0.81)	(0.57)			(0.74)
Liquid Assets / Assets		9.447		9.209		9.559		9.297
		(6.35)***		(6.37)***		(6.40)***		(6.40)***
Loan Liquidity * Indicator for loans 75-100% of jumbo cutoff		-5.94		-5.699		-6.495		-6.347
		(5.82)***		(5.54)***		(6.13)***		(5.92)***
Loan Liquidity * Jumbo Indicator		-3.943		-3.246		-4.661		-4.039
		(2.79)***		(2.29)**		(3.19)***		(2.76)***
Loan Liquididty * Indicator for loans 150-250% of jumbo cutoff		-4.655		-4.687		-3.983		-3.93
		(2.80)***		(2.80)***		(2.38)**		(2.33)**
Cost of Deposits			45.833	30.389			45.308	30.037
			(1.57)	(1.34)			(1.62)	(1.54)
Cost of Deposits * Indicator for loans 75-100% of jumbo cutoff			-13.122	-5.816			-15.283	-7.369
			(0.67)	(0.25)			(0.96)	(0.61)
Cost of Deposits * Jumbo Indicator			-77.926	-72.854			-73.07	-67.016
			(5.78)***	(5.47)***			(5.28)***	(4.90)***
Cost of Deposits * Indicator for loans 150-250% of jumbo cutoff			-11.469	-4.348			-16.562	-10.492
			(4.12)***	(3.44)***			(3.22)***	(2.50)**
Other Bank Characteristics Included?	*Yes*							
Loan-Pool Characteristics Included?	*Yes*							
Sample	*Mortgages between 50-250% of jumbo cutoff*				*Mortgages between 50-95% and 105-250% of cutoff*			
Observations	106,450	106,450	106,450	106,450	103,066	103,066	103,066	103,066
R-squared	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09

T-statistics in parentheses, based on errors clustered at the bank level.
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 10: Probit Regressions for Loan Approval Rates for Jumbo and Non-Jumbo Mortgages Including only Mortgages Near the Jumbo Cutoff

This table reports probit regressions of acceptance rates for mortgages of different sizes, where the unit of observation is the individual mortgage application. We include only mortgages that are non-jumbo but would be deemed jumbo during the preceding year, and mortgages that are jumbo but will be deemed non-jumbo in the subsequent year. From this pool of loans, we draw up to 1,000 applications for each bank-year. In cases where there are fewer than 1,000 applications, we use all mortgage applications that meet the selection criterion defined above. We report marginal effects rather than probit coefficients. The probit regressions include the following additioanl controls: the jumbo-loan indicator; the loan-to-income ratio; log of applicant income; average median income in the property market; share of minority applicants; share of female applicants. All regressions also include year and state fixed effects.

Dependent Variable:	1 if Loan is Approved and 0 Otherwise							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bank Financial Condition								
Liquid Assets / Assets	0.022			0.027	0.004			0.009
	(0.84)			(0.98)	(0.17)			(0.36)
Liquid Assets / Assets * Jumbo Indicator	0.052			0.046	0.023			0.014
	(3.21)***			(3.30)***	(2.70)***			(2.21)***
Loan Liquidity		-0.046		-0.045		-0.031		-0.03
		(1.31)		(1.24)		(1.07)		(1.07)
Loan Liquidity * Jumbo Indicator		0.066		0.068		0.055		0.06
		(2.87)***		(3.15)***		(3.25)***		(3.70)***
Cost of Deposits			-0.008	0.007			-0.058	-0.065
			(0.02)	(0.02)			(0.17)	(0.20)
Cost of Deposits * Jumbo Indicator			-1.21	-1.289			-1.322	-1.338
			(4.83)***	(5.30)***			(6.68)***	(5.99)***
Other Bank Controls								
Log of Average Application Size[1]	0.062	0.066	0.054	0.057	0.053	0.055	0.042	0.043
	(3.36)***	(3.33)***	(3.02)***	(3.03)***	(3.24)***	(3.23)***	(2.78)***	(2.78)***
Log of Bank Assets	-0.011	-0.011	-0.011	-0.012	-0.003	-0.003	-0.003	-0.003
	(4.73)***	(5.05)***	(5.20)***	(5.24)***	(1.59)	(1.66)*	(1.91)*	(1.87)*
Bank owned by Holding Company	-0.334	-0.317	-0.329	-0.341	-0.062	-0.055	-0.066	-0.068
	(2.28)**	(2.16)**	(2.28)**	(2.37)**	(0.77)	(0.70)	(0.82)	(0.85)
Capital / Assets	-0.012	-0.015	-0.003	-0.008	-0.026	-0.03	-0.021	-0.023
	(0.29)	(0.39)	(0.08)	(0.21)	(0.79)	(0.91)	(0.70)	(0.78)
Net Income / Assets	0.093	0.084	0.029	0.126	0.182	0.19	0.183	0.209
	(0.25)	(0.22)	(0.08)	(0.37)	(0.68)	(0.68)	(0.69)	(0.79)
Applicant Characteristics Included?	*Yes*							
Sample	*Sampling from All Mortgages*				*Sampling without Refis*			
Observations	354,180	354,180	354,180	354,180	167,515	167,515	167,515	167,515
Pseudo R-squared	0.137	0.137	0.138	0.139	0.107	0.107	0.109	0.109

T-statistics in parentheses, based on errors clustered at the bank level.
* significant at 10%; ** significant at 5%; *** significant at 1%
[1]The average applicant size reflects the typical size of mortgages in a lender's market. For banks lending in more than a single market (MSA), we construct and equally-weighted average the applicant sizes across markets.

Endnotes

[1] Kashyap, Rajan and Stein (2002), Gatev and Strahan (2006) and Gatev, Schuermann and Strahan (2005) show that bank liquidity production also now stems from the asset side via loan commitments and lines of credit, but that this liquidity risk tends to be offset or diversified by funding through transactions deposits.

[2] In recent years, the GSEs have opted to hold rather than securitize many of the mortgages that they buy to take advantage of subsidized borrowing rates. Policymakers have become concerned about the resulting expansion of interest rate risk at the GSEs (Greenspan, 2004). As of 2003, for example, Fannie Mae and Freddie Mac held over $1.5 trillion in mortgages (Frame and White, 2005). Passmore, Sherlund and Burgess (2005) argue that most (but not all) of the benefits of GSE subsidized borrowing benefits their shareholders rather than mortgage borrowers. Vickery (2005) shows that GSE subsidies are concentrated in the fixed-rate mortgage (FRM) segment rather than the adjustable-rate mortgage segment, explaining why FRMs dominate in the U.S. relative to the U.K. While the effects of this government subsidy are important for public policy, they are not the focus here.

[3] Benmelech, Germaise and Moskowitz (2005) use a similar identification strategy to analyze how real-asset liquidity (as opposed to financial-asset liquidity here) affects debt capacity. In their case, they exploit differences in the liquidity of commercial properties stemming from variation in zoning restrictions.

[4] For evidence that bank size and scope reduces the potency of monetary policy, see Ashcraft (2003), Campello (2002), Jayaratne and Morgan (2000), Kashyap and Stein (2000), and Loutskina (2005).

[5] Petersen and Rajan (1994) show that small firms benefit by concentrating their business with a single lender, and their results suggest that such borrowers face high costs of switching banks. Thus, many small firms are 'bank dependent'. The geographical scope of loan markets, particularly for bank dependent firms, tends to be limited geographically because local lenders have better information than competing lenders. Technology has increased the average distance between small-business borrowers and lenders, but physical proximity continues to affect bank lending supply and pricing (Petersen and Rajan, 2002; Degryse and Ongena, 2005). Our results suggest that bank dependent firms' cost of capital depends on the financial condition (cost of deposits and liquidity) of local lenders.

[6] Bernanke (1983) focused on credit effects of bank failures during the Depression. More recently, Bernanke and Lown (1991) show that credit in regions with many poorly capitalized banks suffered most during the 1991-92 recession. Peek and Rosengren (2000) show that distressed Japanese banks reduced credit supply to borrowers in California (relative to California banks). Ashcraft (2005) shows that local output falls when the FDIC closes even *healthy* banks. Slovin, Sushka and Polonchek (1993) provide evidence that borrowers from Continental Illinois were potentially harmed by that bank's failure. Hubbard, Kuttner and Palia (2002) show that low capital banks price business loans at higher yields than better-capitalized banks. Like our paper, Mian and Khwaja (2005) and Paravisini (2004) focus on how liquidity shifts loan supply. Mian and Khwaja exploit bank runs following Pakistan's unexpected nuclear test in 1998; they show that firms borrowed less from banks experiencing greater runs and more from banks experiencing smaller runs. Paravisini finds that profitable lending expands following an infusion of liquidity by the Argentine government into banks.

[7] Gorton and Souleles (2005) argue that this process reduces financial distress costs of debt.

[8] We have also disaggregated our liquidity measure by separating out mortgage-backed securities from other liquid assets. In these robustness tests, there is no additional effect of mortgage-backed securities, suggesting that our coefficient represent shifts in bank behavior in response to variation in liquidity. We thank Scott Frame for suggesting this test to us.

[9] We are only able to identify which mortgages are jumbo in our data, and hence can not be sold to the GSEs. For loans below the jumbo-loan cutoff, most can be sold to the GSEs. However, some non-jumbo loans do not meet the other criteria used to determine whether a mortgage is 'conforming' and thus can be sold to the GSE. For example,

a mortgage must have a loan-to-value ratio below 0.8 or be credit enhanced with personal mortgage insurance. Thus, there is some measurement error in our classification of loans as 'conforming', which will tend to bias our coefficients against finding a difference between the jumbo and non-jumbo segments.

[10] The extent to which the yield differentials reflects liquidity, rather than differences in credit risk, between non-jumbo mortgages and jumbos remains somewhat controversial. A recent study by Ambrose, LaCour-Little and Sanders (2004) controls carefully for credit risk and concludes that the yield differential is only about 5 basis points between non-jumbo and jumbo mortgages. Nevertheless, there seems to be little doubt that there is an increase in yields for jumbos, and that some of that increase reflects differences in liquidity.

[11] Here we consider only single-family home purchase mortgage applications across the lending financial institutions in the United States.

[12] We are not able to observe the fraction of on-balance sheet mortgages that are below the jumbo-loan cutoff.

[13] We have also estimated a more parsimonious approach, in which we control for average bank-specific loan pool characteristics, and obtain results that are very similar to those reported here.

[14] In computing average application size, we include all mortgage applications, including those to other lenders such as savings institutions, mortgage bankers and so on.

[15] We have also estimated standard errors clustered by state and clustered by year. We find similar levels of statistical significance in each of these alternative approaches to those reported here.

[16] In an earlier draft we report specifications without borrower control variables and find that our main results are not sensitive to the inclusion of these variables.

[17] Large banks typically borrow in this market, whereas smaller banks typically supply funds to the Fed Funds market.

[18] Since we are slicing the data into four bins instead of just two, we report the results with refis to allow us to get more precise estimates of the acceptance rates.