Bank Regulation and Monetary Policy Transmission: Evidence from the U.S. States Liberalization

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Abstract

This paper studies the impact of banking deregulation on the effectiveness of monetary policy and provides new evidence on how bank-level heterogeneity affects the bank lending channel of transmission. Exploiting the staggered deregulation of interstate banking in the U.S. throughout the 1980's, we find that the deregulation strengthens the effect of monetary policy on bank lending, doubling the response of loan growth to monetary shocks. This effect occurs primarily for small and relatively illiquid banks, pointing to a strengthening of the bank lending channel. After deregulation this subset of banks engages in a larger substitution of securities for bank loans following a contractionary monetary shock. Changes in bank market structure and loan portfolio composition cannot explain these effects of the deregulation. By contrast, the findings point to a dilution in the strength of bank-borrower customer relationships and a stronger propensity of banks to cut loans to their customers.

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1 Introduction

The impact of regulatory changes in recent decades on the U.S. banking industry has been well documented.[1] A relatively unexplored aspect of these regulatory changes has been their effect on monetary policy. As a recent literature documents, structural features of the banking sector can influence the responsiveness of lending to monetary policy.[2] Bank lending is an important mechanism through which monetary policy is transmitted to the broader economy. For both policymakers and bank regulators it is therefore important to know how changes in banking regulation may impact the effectiveness of monetary policy. In this paper we address these issues by exploiting the natural experiment provided by the staggered state-level removal of geographic banking restrictions throughout the 1980's.

We find that lending becomes more responsive to monetary policy after a bank's home state removes interstate geographic banking restrictions.[3] After a state removes interstate restrictions the response of real lending growth to monetary policy doubles, however the removal of intrastate restrictions has no effect. More precisely, our results indicate that interstate banking deregulation strengthens the bank lending channel of monetary policy transmission. Kashyap and Stein (2000) establish that the bank lending channel is operative for small and relatively illiquid banks. We find that interstate deregulation increases the sensitivity of lending to monetary policy primarily for small banks and that the effect is larger for relatively illiquid banks, pointing to a strengthening of the bank lending channel.

We consider a variety of possible explanations for the greater impact of monetary policy after interstate deregulation. Deregulation increases average bank market power, increases local banking concentration, and decreases state banking concentration. Amidu and Wolfe (2013), Yang

[1] See Jayaratne and Strahan (1998), Berger, Demsetz, and Strahan (1999), Berger and DeYoung (2001), Stiroh and Strahan (2003), and Berger, Demirguc-Kunt, Levine, and Haubrich (2004) among others.

[2] See Adams and Amel (2011), Olivero, Li, and Jeon (2011), and Amidu and Wolfe (2013).

[3] There are two main types of restrictions: those on interstate (out-of-state) banking and those on intrastate (within-state) branching. Interstate deregulation allows out-of-state bank holding companies to acquire and operate in-state banks. Intrastate deregulation allows banks headquartered within a state to open additional branches through mergers and acquisitions.

and Shao (2016), and Adams and Amel (2011) find that lending is more responsive to monetary policy for banks with greater market power or banks located in more highly concentrated local markets. However, these changes in bank market structure cannot account for the effect of deregulation, as we find that banks with greater market power are less responsive to monetary policy, and that concentration has no impact on the relationship between policy and lending. Den Haan, Sumner, and Yamashiro (2007) find that commercial and industrial loans increase following a contractionary monetary policy shock while real estate and consumer loans decrease. We find all three types of loans become more sensitive to monetary policy after deregulation at roughly the same magnitude, ruling out the possibility that deregulation's impact on monetary policy is driven by changes in the composition of bank loan portfolios.

One mechanism that arises as a potential candidate for rationalizing our findings is a change in the intensity of bank-borrower relationships and the accompanying propensity of banks to shield their customers from negative shocks. Ashcraft (2006) finds that stand alone banks are more responsive to monetary policy than banks affiliated with a holding company. We find this is true prior to interstate deregulation, but that affiliated banks actually become more responsive post-deregulation. After the removal of interstate restrictions small banks affiliated with a holding company are unique in responding to contractionary monetary policy by more strongly adjusting the asset side of their balance sheets towards securities and away from lending. The literature has found that bank-customer relationships can play an important role in the availability of loans and in cushioning firms from contractionary shocks. However their strength can be diluted by bank mergers and acquisitions, especially when these entail consolidation across geographically distant markets.[4] One explanation for our results is that banks affiliated with holding companies engage in more transactional lending than relationship lending. After the deregulation and associated consolidation process these banks become more inclined to curtail loans in response to an adverse monetary shock.[5]

[4] See Berger and Udell (1995), Berger and Udell (2002), Degryse and Ongena (2005), Minetti (2011), and Araujo and Minetti (2011).

[5] See Peek and Rosengren (1998), Calomiris and Karceski (2000), Sapienza (2002), Bofondi and Gobbi (2006), and Berger and Bouwman (2009) on the effect of mergers, entry, and organizational structure on lending practices.

Finally, we investigate the impact of deregulation for loan growth at the aggregated state-level. The effect of interstate deregulation on the response of total loan growth to monetary policy is negative but insignificant. However the effect on aggregate lending from a subsample of small banks affiliated with bank holding companies is negative, significant, and relatively large at -8%. These banks make up 16% of total lending on average, hence there is a non-negligible effect on total lending at the state-level.

The rest of the paper unfolds as follows. Section 2 details a brief history of geographic banking regulation in the United States. Section 3 discusses the data and estimation. Section 4 presents the main results and investigates the role of the bank lending channel. Section 5 explores potential explanations. Section 6 documents the effect of deregulation for aggregate lending at the state-level, and section 7 concludes.

2 Geographic Banking Regulation

Since the 19th century most U.S. states have imposed restrictions on the ability of banks to expand geographically [6]. These restrictions typically included an outright ban on out-of-state banks owning in-state banks as well as strict limitations on the number of branches that an in-state bank can operate. Deregulation of these restrictions took place in the majority of states from the mid-1970's to mid-1990's. Over this time frame every state other than Hawaii began to allow interstate banking and 35 different states removed restrictions on intrastate branching [7].

Interstate banking was effectively banned by the Douglas amendment to the Bank Holding Company Act of 1956. The amendment stated that a bank holding company (BHC) could not acquire an out-of-state bank unless the state the bank is located in has passed a statue explicitly allowing such transactions. Maine was the first state to pass such a statue and began allowing out-of-state bank holding companies to acquire Maine banks in 1978. Deregulation picked up in the 1980's, particularly after passage of the federal Garn-St Germain Act of 1982,

[6] See Kroszner and Strahan (1999) for a detailed history

[7] 14 states already allowed intrastate branching and one, Iowa, did not deregulate at all

which amended the Bank Holding Company Act to allow out-of-state bank holding companies to acquire failed banks or thrifts in any other state. States began entering reciprocal regional or national agreements through which bank holding companies in any state which had agreed to the arrangement could purchase banks operating in any of the other states. 38 states joined such an agreement between 1984 and 1988 [8].

Restrictions on intrastate branching were often removed in three steps. First, BHC's would be allowed to own multiple banks within one state, with each subsidiary operating as a separate institution - e.g., a depositor at one subsidiary could not access funds at a different subsidiary. Second, banks were allowed to establish additional branches through mergers and acquisitions (M&A). Importantly, this allowed BHC's operating within a state to convert their subsidiaries into branches of a single bank. Finally, unrestricted branching was allowed in which banks were free to open new within-state branches as they pleased. The literature has focused on the second step, allowing branching via M&A, as the most important one. Most states had removed restrictions on in-state BHC expansion by the mid-1970's. Of the 15 who removed such restrictions after 1975, this often occurred around the same time that M&A branching restrictions were removed. Similarly, most states allowed unrestricted branching only a short time after allowing M&A branching.

Table 1 lists the year for which each state and the District of Columbia began to allow branching via M&A and interstate banking [9]. Congress passed the Riegle-Neal Interstate Banking and Branching Efficiency Act in 1994, which allowed for national interstate banking and branching, effectively ending the period of state-level deregulation. The legislation went fully into effect in 1997 but many states adopted early in mid-1995. Thus the period of interest for state-level deregulation is from 1976 (when U.S. bank-level data becomes available) to 1994.

3 Data and Estimation

[8] Amel (1993)

[9] Dates from Amel (1993) and Kroszner and Strahan (1999).

3.1 Monetary Policy Data Conventional measures of monetary policy, such as the federal funds rate, can be problematic for two reasons. First, such measures are endogenous, i.e. they change in response to past and contemporaneous economic conditions. Second and more importantly, they reflect anticipatory movements by the monetary policymaker. Romer and Romer (2004) seek to surmount these issues by devising a new series of monetary policy shocks. First, they construct a series of intended federal funds rate changes around FOMC meetings by combining information from the *Weekly Report of the Manger of Open Market Operations* and narrative accounts of each FOMC meeting. Second, using the Fed's internal Greenbook forecasts, they purge the series of variation attributable to forecasts of future macroeconomic activity through the following regression:

$$\begin{aligned}\Delta ff_m = \alpha + \beta ffb_m + \sum_{i=-1}^{2} \gamma_i \Delta\widetilde{y}_{mi} + \sum_{i=-1}^{2} \lambda_i (\Delta\widetilde{y}_{mi} - \Delta\widetilde{y}_{m-1,i}) \\ + \sum_{i=-1}^{2} \varphi\widetilde{\pi}_{mi} + \sum_{i=-1}^{2} \theta(\widetilde{\pi}_{mi} - \widetilde{\pi}_{m-1,i}) + \rho\widetilde{u}_{m0} + \epsilon_m\end{aligned} \tag{3.1}$$

where Δff_m is the change in the intended federal funds rate at meeting m, ffb_m is the level of the intended funds rate prior to meeting m, $\Delta\widetilde{y}$ is forecasted real output growth, $\widetilde{\pi}$ is forecasted inflation, and $\widetilde{u}$ is the forecasted unemployment rate. Note that the previous period and contemporaneous forecasts of output growth and inflation are included in addition to forecasts of the next two quarters [10]. The residual of the above estimated equation, $\widehat{\epsilon}_m$, then becomes a cleaner measure of monetary policy shocks purged of endogenous and anticipatory variation. This measure will be our baseline indicator of monetary policy and will henceforth be referred to as the RR shock series.

Using the change in the effective fed funds rate as a measure of monetary policy may be particularly troublesome when estimating the effect of monetary policy on bank lending. Bluedorn, Bowdler, and Kochc (2017) provide evidence that such estimates at the individual bank-level are quite sensitive to the measure of monetary policy used. They argue that the RR shocks

[10] The previous period forecasts are typically observed data.

eliminate some of the major sources of endogenous variation plaguing other measures of policy. For instance, suppose the FOMC increases the fed funds rate due to anticipated higher output growth in the coming quarters. Higher output growth is likely to be associated with an increased demand for bank loans. A regression of the change in bank lending on lagged changes in the fed funds rate may therefore show a positive correlation, i.e. that contractionary monetary policy is associated with increased bank lending. Such an increase in the fed funds rate will not show up in the RR shocks however, mitigating such endogeneity concerns.

We use an updated series of RR shocks from Coibion, Gorodnichenko, Kueng, and Silvia (2012). The series is initially calculated at the frequency of FOMC meetings then aggregated to a quarterly average. The updated RR shocks as well as the change in the effective fed funds rate are plotted in Figure 1. The RR shock is smaller in magnitude than the change in the fed funds rate, which is unsurprising given that it is a residual of the latter. The two series typically move together and have a high positive correlation of 0.82. There is a noticeable period of outliers for both series from 1979 to 1982. During this period the Federal Reserve was targeting non-borrowed reserves (NBR) rather than the fed funds rate which resulted in large and volatile gyrations in the funds rate. Our baseline specifications include year or quarter dummy variables to account for this period.

3.2 Banking Data

Bank-level data is from the Consolidated Reports of Condition and Income ("Call Reports") which all banks in the U.S. are required to file on a quarterly basis with the Federal Financial Institutions Examinations Council (FFIEC). We follow Kashyap and Stein (2000) and Den Haan, Sumner, and Yamashiro (2002) in defining our sample as all commercial banks which are insured, have positive assets, and are located in the fifty states or Washington, D.C. Since mergers typically create discontinuities in the acquiring bank's balance sheet, a bank observation is dropped from the sample in any quarter in which a merger occurs. To prevent outliers from driving the results a bank-quarter is dropped whenever total loan growth is more than five standard deviations away from that quarter's average loan growth. Additionally, a bank-quarter is dropped if there are not four preceding quarterly observations for total loan

growth. This leaves slightly over 900,000 observations from 16,000 different banks in the sample.

Summary statistics for bank-level variables of interest are reported in table 2. The first two columns show summary statistics for the entire sample (1976Q2-1994Q4). The third and fourth columns show summary statistics for the early part of the sample (1976Q2-1985Q4) when a majority of states had not deregulated. The fifth and sixth columns show summary statistics for the later part of the sample (1986Q1-1994Q4) when a majority of states had deregulated. The main bank-level variable of interest is real loan growth[11]. Over the entire sample average quarterly loan growth at a single bank is 1.13% with a standard deviation of 7.25%. Average real loan growth across all banks is plotted in figure 2. The series is relatively stable across the sample except for the period of NBR targeting in the early 1980's, which features a sharp drop. The share of total U.S. credit included in our sample is substantial. Figure 3 plots aggregated commercial bank lending in our data as a share of total private credit in the U.S. Over this time period commercial bank lending in our sample accounts for 30-43% of all private sector credit.

The Call Reports do not directly include data on loan rates. However, following Jayaratne and Strahan (1998) and Zarutskie (2013), a proxy for the average interest rate on a bank's loan portfolio can be calculated as total interest and fee income on loans divided by total loans[12]. Interest and fee income on loans is reported on a year to date basis. Hence, the previous quarter's value is subtracted from the current value to obtain a quarterly measure. Interest and fee income on loans is reported biannually prior to 1983. In order to use our full sample we replace the missing first quarter observations with half of the second quarter value and the missing third quarter observations with the average of the second and fourth quarter values. All results below are robust to leaving the missing values empty however. The annualized mean of a bank's average loan rate is roughly 11.5% for the entire sample, with a standard deviation just over 4%. The average loan rate across all banks is plotted in figure 4. As with real loan growth, there are large variations in the early 1980's before stabilizing for the rest of the sample.

[11] Call report loan data is in nominal terms; we adjust for inflation using CPI.

[12] Jayaratne and Strahan (1998) uses this approach to study the effects of deregulation on loan pricing. Zarutskie (2013) studies the effects of deregulation and securitization on loan pricing.

Loan growth for the three major loan categories are included as well. Real estate lending saw the largest average growth over the sample at 2.16% per quarter. Commercial and industrial (C&I) lending growth averaged 0.76% for the entire sample, and saw a large drop from 1.63% in the early part of the sample to -0.33% in the later part. Similarly. consumer lending grew an average of 1.04% in the early part of the sample before falling to -0.27% in the later part. Each categories average share of total lending reflects these growth trends as the share of real estate lending grew over the sample while the share of C&I and consumer lending decreased.[13]

Other bank-level variables of interest include total assets, security holdings, liquidity ratio, equity ratio, and bank holding company affiliation. Average bank assets almost double from the early part of the sample to the later part, with a mean of $173 million for the entire sample. We follow Kashyap and Stein (2000) in defining our securities variable. There is not a consistent variable tracking securities in the Call Reports over the entire sample. Prior to 1984 total securities is calculated as the sum of U.S. Treasury securities, U.S. government agency and corporate obligations, obligations of states and political subdivisions, all other bonds, stocks, and securities, and fed funds sold and securities purchased under agreements to resell. From 1984 to 1993 it is calculated as the sum of the book value of total investment securities, assets held in trading accounts, and fed funds sold. A consistent definition is not available for 1994, the final year of our sample. Average security holdings in a quarter double from the early part of the sample to the later part, with an overall average of $38 million. Liquidity ratio is defined as the ratio of cash and reserves to total liabilities. The average liquidity ratio for the sample is 0.09. Equity ratio is measured as the ratio of total equity to total assets and is stable across the sample with a mean of 0.09. Finally, affiliation with a bank holding company increases greatly over this time frame, as restrictions on bank expansion and acquisition are removed. Three measures of bank market structure are reported: the Lerner Index, which measures a bank's market power, county-level HHI, which measures local banking concentration, and state-level HHI, which measures state banking concentration. All three measures increase from the early to

[13] Zarutskie (2013) studies these trends in detail.

late part of the sample.

Summary statistics split by bank size are reported in table 3. As is conventional in the literature, small banks are defined as any bank under the 95th percentile in total assets for a given quarter. Large banks are defined as any bank above the 95th percentile for a given quarter.[14] Average assets for small banks over the entire sample is \$51 milllion, whereas average assets for large banks is much larger at \$2.5 billion. Loan growth is higher on average for small banks at 1.15% versus 0.86% for large banks. Average loan rates are similar for both. Real estate lending makes up the largest share of loans for both although it is a higher share for small banks. Large banks have higher liquidity ratios and lower equity ratios on average, and are more likely to be affiliated with a bank holding company. Large banks also have higher average market power.

3.3 Estimation

How did deregulation of geographic banking restrictions impact the effectiveness of monetary policy? In answering this question we follow the literature in specifying two distinct types of deregulation: intrastate branching deregulation and interstate banking deregulation. To determine the effect of each type of deregulation on monetary transmission we estimate a dynamic panel regression:

$$\begin{aligned}\Delta log(L_{ist}) = c &+ \sum_{j=1}^{4} \alpha_j \Delta log(L_{ist-j}) + \sum_{j=0}^{4} \mu_j MP_{t-j} + \gamma_1 INTRA_{st} + \gamma_2 INTER_{st} \\ &+ \sum_{j=0}^{4} \phi_j (MP_{t-j} * INTRA_{st}) + \sum_{j=0}^{4} \varphi_j (MP_{t-j} * INTER_{st}) + \sum_{j=0}^{4} \beta_j NATIONAL_{t-j} \\ &+ \sum_{j=0}^{4} \delta_j STATE_{st-j} + \sum_{k=1}^{3} \psi_k QUARTER_{kt} + \sum_{k=1}^{17} \xi_k YEAR_{kt} + \eta_i + \epsilon_{ist}\end{aligned} \tag{3.2}$$

where the dependent variable is real loan growth of bank i, located in state s, in quarter t. The independent variables include 4 lags of bank i's loan growth, the contemporaneous value and 4

[14] Note that these definitions allow for banks to move between size categories over time.

lags of monetary policy shocks, a dummy variable equaling 1 if state s permits in-state branching via M&A in quarter t, an analogous dummy variable equaling 1 if interstate banking is allowed in state s during quarter t, and interactions between the monetary policy shocks and deregulation dummies. Also included are the contemporaneous values and 4 lags of national and state control variables, quarter dummy variables, year dummy variables, and a bank fixed effect.

The national-level variables include change in real GDP, change in the personal consumption expenditures (PCE) index, and the CRSP value weighted stock return index. The state-level variables include percentage change in personal income and change in the U.S. Federal Housing Finance Agency all-transactions house price index. Quarter dummies are included to control for seasonality in lending. Year dummies are included to control for additional macro-level phenomena occurring during this time period, e.g. the gradual phaseout of regulation Q, the Fed regime of targeting non-borrowed reserves, and the Great Moderation. Alternate specifications with varying levels of fixed effects and time dummies are presented below, with the most comprehensive dropping all national-level variables in favor of quarterly fixed effects.

The coefficients of interest are the sum of the $\phi_j's$ and sum of the $\varphi_j's$. A significant $\sum_{j=0}^{4} \phi_j$ would indicate that monetary policy has a significantly different impact on bank lending following intrastate branching deregulation. A significant $\sum_{j=0}^{4} \varphi_j$ would indicate the same for interstate banking deregulation. We have no prior expectation regarding the sign of the coefficients, as the effect of deregulation on loan sensitivity to monetary policy is theoretically ambiguous.

4 Results

4.1 Impact of Deregulation

Equation 3.2 is estimated over the sample 1976Q2 - 1994Q4. Results for the summed coefficients of interest are presented in panel (a) of table 4. Results for all coefficients are presented in table 5. Columns (1) through (5) in table 4 display results from a variety of specifications, with column (4) reporting the baseline specification depicted in equation 3.2. Columns (1)-(3) provide results for more loosely specified variations of equation 3.2

and column (5) provides results for a more tightly specified variation. In the first four columns the summed coefficients of the monetary policy indicator are negative and jointly significant at the 1% level [15]. A contractionary 100 basis point exogenous monetary policy shock reduces lending by roughly 1-2% over the following four quarters [16]. The summed coefficients on the interaction between intrastate branching deregulation and monetary policy are small and insignificant in all five columns, indicating that intrastate deregulation has no effect on loan sensitivity to monetary policy.

The summed coefficients on the interaction between the interstate banking deregulation dummy and the monetary policy indicator are negative and significant in all five columns. An exogenous, contractionary monetary policy shock reduces lending by an additional 1.38-4.26% for a bank located in a state that has removed interstate banking restrictions [17]. According to the first four columns, the total effect of a contractionary monetary policy shock on lending for a bank located in a deregulated state is a decline of 2.5-4.1%. The baseline specification in column (4) indicates that the sensitivity of lending to monetary policy essentially doubles following interstate deregulation. Column (5) includes the strongest controls for time-specific macro variation, and indicates that the effect of interstate deregulation is even stronger than that reported in column (4).

There is significant overlap in years that both types of restrictions are deregulated for a given state. To check that inclusion of both sets of deregulation dummies is not biasing the results in panel (a) equation 3.2 is estimated separately for each type of deregulation. Panel (b) presents the summed coefficients of interest for estimating equation 3.2 with interstate deregulation dummy and interactions only. Similarly, panel (c) presents results for estimating equation 3.2 with intrastate deregulation dummy and interactions only. Both panels are consistent with the baseline results, confirming that lending becomes more sensitive to monetary policy after

[15] Column (5) reports results including time fixed effects which are perfectly collinear with national-level variables such as the monetary policy indicator.

[16] One standard deviation of the monetary policy indicator is 70 basis points, hence a contractionary one standard deviation shock reduces lending by 0.8-1.4% over the next four quarters.

[17] A contractionary one standard deviation shock reduces lending by an additional 1-3%.

interstate banking deregulation and that intrastate branching deregulation has no effect.

As discussed in section 3.1, our preferred measure of monetary policy is the RR shock series rather than a traditional measure such as the fed funds rate. To check whether the baseline results are driven by the choice of monetary policy indicator, equation 3.2 is also estimated with the quarterly change in the fed funds rate as the monetary policy indicator. Results using the fed funds rate are presented in panel (d). Once again, a contractionary monetary policy shock leads to a significant decline in lending over the following four quarters. According to columns (1)-(4), a 100 basis point increase in the federal funds rate leads to a 0.37-0.92% decline in lending over the next year.[18] Intrastate deregulation once again has no effect.

Columns (1)-(3) of panel (d) report that lending is less sensitive to monetary policy after interstate deregulation. Columns (4) and (5), which more completely control for unobserved macro variation, are consistent with the results in panel (a) however. The summed coefficients in columns (4) and (5) suggest that lending declines by an additional 0.66-1.02% after a state has removed interstate restrictions. The smaller magnitudes and positive coefficients in columns (1)-(3) are not surprising. The endogeneity and anticipatory components of the fed funds rate, which the RR shocks control for, would naturally lead to a less pronounced effect or even opposite effect of policy. Regardless, the richer specifications in panel (d) indicate that lending responds more strongly to policy after interstate deregulation, suggesting that choice of monetary policy variable is not driving our results.

An additional concern raised in section 3.1 is that outliers in the monetary policy indicator (as well as real loan growth) during the Fed's period of non-borrowed reserve (NBR) targeting are driving the results. To explicitly control for the NBR targeting period we estimate two other variations of equation 3.2 with results reported in table 6. Column (1) shows results including a NBR dummy variable which equals 1 from 1979Q4-1982Q3 and 0 otherwise. Column (2) interacts the NBR dummy with the contemporaneous value and lags of the monetary policy indicator. Column (1) shows that the baseline results hold up when including the NBR dummy: lending

[18] This is in line with estimates from Ashcraft (2006), who finds that a 100 basis point increase in the federal funds rate decreases bank lending by 0.45%.

declines by 1.71% prior to interstate deregulation and by an additional 2.33% after deregulation. The negative and significant coefficient on the NBR dummy indicates that lending growth was lower during the NBR targeting regime. Interestingly, in column (2) the summed coefficients on the monetary policy indicator are positive and significant while the summed coefficients on the interaction between the NBR dummy and monetary policy are negative and significant. Monetary policy therefore has a strongly negative effect on lending during the NBR period. For our purposes, the key result is the negative and significant coefficient on the interaction between interstate deregulation and monetary policy, which confirms that the greater sensitivity of lending to policy after interstate deregulation is not being driven by the NBR targeting regime.

The results in table 4 indicate that lending becomes more responsive to monetary policy along the quantity dimension following interstate deregulation. Next, we examine how deregulation impacts the sensitivity of lending to monetary policy along the price dimension. As discussed in section 3.2, direct data on loan rates is not available through the Call Reports. We can proxy for the average rate on a banks loan portfolio through the ratio of interest income on loans to quantity of total loans however. This ratio is referred to as a bank's average loan rate in the following.

Table 7 presents results for estimating equation 3.2 with average loan rate as the dependent variable.[19] Column (1) of table 7 shows that average loan rates significantly increase following a monetary tightening. For the four quarters following a 100 basis point exogenous and contractionary monetary policy shock average loan rates increase by 69 basis points. The interaction between the intrastate deregulation dummy and monetary policy is small and insignificant in both columns (1) and (2), indicating that the removal of intrastate branching restrictions had no effect on the sensitivity of loan pricing to monetary policy.

The interaction between the interstate deregulation dummy and monetary policy is positive and significant in both columns, indicating that loan pricing becomes more sensitive to monetary policy after interstate banking restrictions are removed. According to column (1), a bank located

[19] In the following we focus on the richer specifications including year dummies or time fixed effects, i.e. the specifications corresponding to columns (4) and (5) in table 4.

in a state that has removed interstate restrictions increases its average loan rate by an additional 113 basis points following a 100 basis point exogenous monetary tightening, which is more than double the average increase for a bank in a state that has not deregulated. Column (2) reports a somewhat smaller magnitude, indicating that a bank in a deregulated state increases its average loan rate by an additional 47 basis points following a monetary tightening. Regardless, this is a meaningful response as it is roughly two-thirds larger than that of a bank in a state which prohibits interstate banking.

From 1976-1982 interest and fee income on loans is only reported in the second and fourth quarters. For the above results we fill in the missing first and third quarter values so that first quarter average loan rate is equal to the second quarter observation, and so that third quarter average loan rate is equal to the fourth quarter observation. To check that replacing these missing values is not driving the above results we re-estimate equation 3.2 for an abbreviated sample from 1983-1994. Results are presented in columns (3) and (4) of table 7. The summed coefficients on the monetary policy indicator in column (3) are no longer significant at the 10% level, but the magnitude is similar and the standard errors are not large. The summed coefficients on the interaction between the interstate deregulation dummy and monetary policy remain positive and significant in both columns (3) and (4). These subsample results confirm that replacing the missing observations from 1976-82 is not driving the results in columns (1) and (2).

4.2 Role of Bank Lending Channel

These results raise the question: why does interstate banking deregulation strengthen the effect of monetary policy on lending? To investigate, we examine bank-level heterogeneity across a variety of dimensions. The literature has established multiple characteristics which influence the strength of the bank lending channel of monetary policy. Such characteristics include bank size (Kashyap and Stein (1995)), liquidity (Kashyap and Stein (2000)), and capitalization (Kishan and Opiela (2000)). In this section we study the role of bank-level heterogeneity in explaining the greater sensitivity of lending to monetary policy after interstate deregulation and the implications for the lending channel of transmission.

Kashyap and Stein (1995) find that small banks are more sensitive to monetary policy than larger banks. Similarly, Kashyap and Stein (2000) find that small and relatively illiquid banks are most strongly affected by monetary policy. Cetorelli and Goldberg (2012) also report that global banks are less responsive to monetary policy. We therefore investigate how heterogeneity across size and domestic/foreign status is related to interstate deregulation's impact on monetary policy effectiveness. To investigate, we estimate equation 3.2 separately for small banks, large banks, and branches of foreign banks operating in the United States. Consistent with the literature, we define a small bank as any bank below the cross-sectional 95th percentile in total assets within a given quarter. Correspondingly, a large bank is defined as any above the 95th percentile in total assets for a given quarter.

Results are presented in panel (a) of table 8. Columns (1)-(2) have results for small banks, (3)-(4) for large banks, and (5)-(6) for foreign banks. The summed coefficients in the first row show that both small and large banks have a roughly 2% decline in lending for the four quarters following a 100 basis point contractionary monetary policy shock prior to deregulation. The response of lending from foreign banks is insignificant. The second row shows that intrastate branching deregulation has no effect of the sensitivity of small bank lending, although it may have a small negative effect on large bank lending. Interestingly, intrastate branching deregulation seems to make branches of foreign banks much more sensitive to policy. The third row shows that interstate banking deregulation only affects small banks. The coefficients are very similar to the baseline results for all banks, as the response of small bank lending to a monetary shock doubles after deregulation.

The results in panel (a) are consistent with Kashyap and Stein (1995) and Kashyap and Stein (2000). As an additional check, we estimate 3.2 with average loan rate as the dependent variable for both small and large bank samples. Foreign banks do not report interest and fee income on loans, hence we cannot calculate average loan rates for them. Results are presented in table 9. The first row of table 9 confirms that both small and large banks increase loan rates following a monetary tightening. Columns (1) and (3) suggest that following interstate

deregulation the sensitivity of loan pricing to policy increases for both small and large banks. Column (2) confirms this for small banks, however the summed coefficient for the interaction of interstate deregulation and monetary policy is small and insignificant for large banks in column (4). These results provide further support that the effect of interstate deregulation impacts monetary transmission through small banks.

Kashyap and Stein (2000) find that the bank lending channel operates through small and relatively illiquid banks. To investigate the role of liquidity we estimate equation 3.2 by liquidity quartile, where the 1st quartile includes the least liquid banks in a given quarter and the 4th quartile includes the most liquid.[20] Results are presented in table 10. Panel (a) displays results for all banks. Prior to deregulation all four quartiles respond similarly to monetary policy, declining by roughly 2% for the four quarters following a contractionary shock. After interstate deregulation the least liquid banks are more strongly affected, with the most liquid banks in the 4th quartile not responding any more strongly. Panel (b) presents results for small banks only and panel (c) for large banks only. These panels confirm that the overall effect is being driven by the small banks. According to the specification using time fixed effects all four quartiles become more sensitive to policy after interstate deregulation, but the increase in response to policy is decreasing in liquidity. Column (1) in panel (c) indicates the least liquid large banks may become slightly more sensitive to policy after interstate deregulation, however column (2) does not confirm this. Overall, there is little to no effect on large banks across liquidity quartiles.

Kishan and Opiela (2000) find that the effect of monetary policy on lending is stronger for relatively undercapitalized banks, particularly small ones. We once again estimate equation 3.2, this time by equity ratio quartile, where the 1st quartile includes the least capitalized banks in a given quarter and the 4th quartile includes the most highly capitalized banks. Equity ratio is calculated as total equity divided by total assets. Results are presented in table 11. Panel (a) displays results for all banks. Prior to deregulation all four quartiles respond similarly to policy. After interstate deregulation banks in all four quartiles become more responsive to policy, with

[20] We use a narrower measure of liquidity - the ratio of cash and reserves to total liabilities - than Kashyap and Stein (2000) for ease of interpretation.

an additional decline in lending growth of 3.54-4.14% according to the specifications with time fixed effects. The increased response is slightly larger for banks in the 1st and 2nd quartiles, but not large enough enough to suggest that capitalization plays a major role in explaining the greater sensitivity of lending to policy after interstate deregulation. Panel (b) presents results for small banks only and panel (c) presents results for large banks. Once again, it is primarily small banks that become more sensitive after deregulation.

5 Potential Explanations

The previous section establishes that following the removal of interstate banking restrictions monetary policy has a stronger effect on lending for small and relatively illiquid banks. This implies that interstate banking deregulation strengthens the bank lending channel of monetary transmission. In this section we investigate three potential explanations for the strengthening of the lending channel after deregulation. These explanations include changes in bank market structure, changes in loan portfolio composition, and changes in bank-borrower relationships following deregulation.

5.1 Bank Market Structure

The effects of geographic banking deregulation have been widely discussed in the literature. Jayaratne and Strahan (1998), Evanoff and Ors (2008) and Chortareas, Kapetanios, and Ventouri (2016) find that deregulation increased efficiency in the banking sector. Stiroh and Strahan (2003) report that deregulation improved competitive dynamics by reallocating market share to better performing banks. Zou, Miller, and Malamud (2011) offer mixed evidence, arguing that deregulation increased efficiency of small banks but decreased efficiency of medium-sized banks. Similarly, Berger and DeYoung (2001) find both positive and negative links between geographic expansion and bank efficiency. Rhoades (2000) argues that nationwide banking concentration increased from 1980-1998, in part due to geographic deregulation, and Jeon and Miller (2003) find that deregulation is significantly correlated with higher state-level concentration.

Additionally, a relatively new literature has examined the relationship between banking market structure and monetary policy transmission. In cross-country studies using bank-level measures of market power Fungáčová, Solanko, and Weill (2014) and Leroy (2014) find that lending is less sensitive to monetary policy when banks have greater market power. On the other hand, Amidu and Wolfe (2013) and Yang and Shao (2016) find that lending is more sensitive to policy when banks have greater market power. The only published study on bank market structure and monetary transmission in the U.S. is Adams and Amel (2011) which takes market concentration at the local level (MSA or county) as the measure of market structure. They use annual Community Reinvestment Act data on new loan origination for a sample running from 1996-2004, and their results show that monetary policy has a weaker effect on bank lending in more highly concentrated markets.

The effect of geographic deregulation on banking market structure is not clear, nor is the effect of market structure on monetary policy effectiveness. In this section we test how each type of deregulation impacted bank market power and banking concentration, at both the local and state level. Additionally, we examine whether changes in market power and concentration can explain the increased sensitivity of lending to policy following interstate deregulation. The measure of market power used is a bank-level Lerner index and the measures of concentration used are the Herfindahl-Hirschman Index (HHI), calculated at the local (county) and state levels.

The Lerner index is a measure of a banks market power, calculated as the difference between price of output and marginal cost, divided by marginal cost. In calculating the Lerner index we follow Fungáčová, Solanko, and Weill (2014) among others. The average price of bank production is proxied by the ratio of total revenues to total assets. The marginal cost is calculated by estimating a translog cost function with one output and three input prices. The output price is total assets and the input prices are the price of labor, price of fixed assets, and price of borrowed funds (interest on deposits). The cost function is specified as follows:

$$log(TC_{it}) = \alpha_0 + \alpha_1 log(y_{it}) + 0.5\alpha_2(log(y_{it}))^2 + \sum_{j=1}^{3} \beta_j log(w_{j,it})$$
$$+ \sum_{j=1}^{3}\sum_{k=1}^{3} \beta_{jk} log(w_{j,it}) * log(w_{k,it}) + \sum_{j=1}^{3} \gamma_j log(y_{it}) * log(w_{j,it}) + \rho_t + \eta_i + \epsilon_{it} \tag{5.1}$$

Where y is total assets and $\sum_{j=1}^{3} w_j$ are the three input prices. Quarter dummies and bank fixed effects are included. Symmetry and linear homogeneity restrictions are imposed on input prices. Total cost is the sum of the three input prices. Marginal cost can then be calculated from the estimated coefficients:

$$MC = (TC/y) * (\alpha_1 + \alpha_2 log(y) + \sum_{j=1}^{3} log(w_j)) \tag{5.2}$$

The resulting Lerner index, calculated as (P-MC)/MC, is a bank-level measure of market power, with a value of 0 representing a perfectly competitive bank (P=MC) and a value of 1 representing a pure monopolist. Since expense data is available only biannually until 1983 we fill the missing first and third quarter observations with the average Lerner Index of the previous and following quarters.

The Herfindahl-Hirschman Index (HHI) is calculated as the summed squares of firm market shares within an industry:

$$HHI = \sum_{i=1}^{N} {s_i}^2 \tag{5.3}$$

where s is the market share of firm i and there are N banks in the market. Hence in a monopoly, where a single banks's market share is equal to 100%, the HHI index would be 1. On the opposite end of the spectrum, the HHI for a decentralized market with many firms would be close to zero. We calculate HHI at both the county and state levels, as concentration at the local level and at the state level may be quite different.

Each of the three bank structure measures are regressed on the deregulation dummies and

controls in the following specification:

$$BMS_{ist} = c + \gamma_1 INTRA_{st} + \gamma_2 INTER_{st} + \delta STATE_{st} + \beta BANK_{ist-1} + \rho_t + \eta_i + \epsilon_{ist} \tag{5.4}$$

Results are presented in panel (a) of table 12. The first row shows that intrastate branching deregulation increased county-level banking concentration but had no effect on the Lerner index or state-level concentartion [21]. Interstate deregulation also increased county-level concentration, along with increasing the Lerner index and decreasing state-level concentration. These results indicate that the removal of interstate banking restrictions increased bank market power, increased local concentration, and decreased state concentration.

Now that we have documented the effect of interstate deregulation on a variety of bank market structure measures, we examine how these measures are related to the the sensitivity of loan pricing to monetary policy. To do so we estimate an alternative version of equation 3.2, with the bank market structure variables interacted with the monetary policy indicator.

$$\begin{aligned}\Delta log(L_{ist}) = c &+ \sum_{j=1}^{4} \alpha_j \Delta log(L_{ist-j}) + \sum_{j=0}^{4} \mu_j MP_{t-j} + \gamma BMS_{ist} + \sum_{j=0}^{4} \phi_j (MP_{t-j} * BMS_{ist}) \\ &+ \sum_{j=0}^{4} \beta_j NATIONAL_{t-j} + \sum_{j=0}^{4} \delta_j STATE_{st-j} + \sum_{k=1}^{3} \psi_k QUARTER_{kt} \\ &+ \sum_{k=1}^{17} \xi_k YEAR_{kt} + \eta_i + \epsilon_{ist}\end{aligned} \tag{5.5}$$

The summed coefficients on the interaction between bank market structure and monetary policy, $\sum_{j=0}^{4} \phi_j$, informs us of the differential response of bank loan pricing to monetary policy depending on a banks market power, local market concentration, and state concentration [22]. Results are presented in panel (b) of table 12. Columns (1), (3), and (5) show results for estimating equation

[21] Note: the state HHI regression is ran at the state-level rather than the bank-level.
[22] Note: The Lerner Index is included with one lag to reduce simultaneity concerns.

5.5 with each bank market structure variable without the deregulation dummy and interactions. Columns (2),(4), and (6) show results for estimating equation 5.5 with each bank market structure variable as well as the interstate deregulation dummy and interactions.

Across all six columns a contractionary monetary policy shock results in a decrease in lending over the following four quarters, with the decrease being significant for all columns. The first column reports that banks with a higher Lerner index (i.e. greater market power) are less sensitive to monetary policy. A bank which is a pure monopolist (Lerner = 1) decreases lending by 0.48% for the four quarters following a monetary tightening whereas a perfectly competitive bank (Lerner = 0) decreases lending by 2.91%. Column (2) confirms that the effect of policy on lending increases by roughly 2% after interstate deregulation as in the baseline results. Columns (3)-(6) report that county-level and state-level concentration have no effect on loan response to monetary policy. Column (4) and column (6) also confirm that interstate banking deregulation increases the sensitivity of lending to monetary policy.

The results in table 12 indicate that interstate deregulation did not affect loan sensitivity through banking competition or market structure. Banking concentration has no impact on the sensitivity of lending to monetary policy. Increased bank market power weakens the impact of policy on lending. Since interstate deregulation increased bank market power but strengthened the impact of policy on lending, the effect of deregulation could not have been driven by change in market power. As a final investigation we estimate equation 3.2 for subsamples corresponding to Lerner index quartile and local HHI quartile. While deregulation may not have operated through increasing market power or concentration it is possible that banks were asymmetrically impacted depending on their competitive environment. We therefore investigate the role of market structure heterogeneity on the effect of deregulation.

Table 13 shows the effect of deregulation by Lerner index quartile, with the 1st quartile having the lowest market power (and hence being relatively more competitive) and with the 4th quartile having the highest market power (and hence being relatively less competitive). Panel (a) shows results for all banks, panel (b) shows results for small banks only, and panel (c) shows results

for large banks only. There is no clear trend across quartiles, as all four respond more strongly after interstate deregulation, particularly the first and fourth quartiles. Once again, only small banks respond more strongly after interstate deregulation, as there is no effect for large banks. Similarly, table 14 shows the effect of deregulation by county HHI, with the 1st quartile having the lowest concentration and the 4th quartile having the highest concentration. Panel (a) shows results for all banks, panel (b) shows results for small banks, and panel (c) shows results for large banks. Interstate deregulation has a significant effect across all four quartiles, once again driven by small banks. Bank market structure therefore seems to play no role in the greater sensitivity of lending to monetary policy after the removal of interstate restrictions.

5.2 Loan Portfolio Composition

Den Haan, Sumner, and Yamashiro (2007) find that certain types of loans are more sensitive to monetary policy than others. Interstate deregulation may therefore increase certain types of lending which are more sensitive to policy. Den Haan, Sumner, and Yamashiro (2007) examine loan portfolio response to monetary policy at the aggregate level and find differential responses depending on loan type. Real estate and consumer loans decrease following a monetary tightening but commercial and industrial (C&I) loans actually increase. In explaining these results the authors suggest that adjusting loan portfolio composition may be an optimal response to monetary shocks for a variety of reasons.

Focusing on total lending may therefore hide important compositional effects. First, we check whether interstate deregulation altered the average composition of a bank's loan portfolio. Panel (a) of table 15 shows the effect of deregulation on the average share of each loan category (relative to total loans). Intrastate and interstate deregulation both significantly decrease C&I and real estate lending as a share of total loans. Interstate deregulation significantly increases the share of consumer lending. The coefficients for each category share are small however, as share of loans going to consumer lending increases by just 0.37% after deregulation. This makes it implausible that a change in loan portfolio composition is driving the baseline results.

To investigate further, equation 3.2 is estimated separately for each of the three main loan categories (C&I, real estate, and consumer) with results presented in panel (b) of table 15.

Interestingly, and inconsistent with Den Haan, Sumner, and Yamashiro (2007), columns (1), (3), and (5) report that each loan category responds negatively to a monetary tightening [23]. While the summed coefficients on the interaction between interstate deregulation and monetary policy are not significant for the baseline specification, the alternate specification including time fixed effects shows that each category becomes more sensitive to policy following deregulation, and at a similar magnitude as total lending in table 4. Since each type of lending responds to interstate deregulation in a similar manner it appears that the greater sensitivity of overall lending to monetary policy after deregulation cannot be explained by changes in loan portfolio composition.

5.3 Bank-Borrower Relationships

A third potential explanation for our results is a dilution of bank-borrower customer relationships and a greater propensity of banks to cut lending following interstate deregulation. Petersen and Rajan (1994) find that bank-borrower relationships increase credit availability for bank customers. Cole, Goldberg, and White (2004) find that large banks make lending decisions based on standard financial criteria whereas small banks employ greater discretion based on impressions of borrower characteristics. Bonaccorsi di Patti and Gobbi (2001) report that acquisition and entry into new markets tends to reduce credit supply. These results suggest that increased entry into new markets and increased concentration following deregulation may weaken relationships between banks and borrowers, leading to a greater decline in lending following a contractionary monetary shock.

To investigate we estimate equation 3.2 for two subsamples: banks that are affiliated with a BHC and stand alone banks that are unaffiliated with a holding company. Affiliated banks are more likely to operate within a centralized organizational structure that is less sensitive to local borrower characteristics. If the strengthening of the bank lending channel is driven by a weakening of bank-borrower relationships we would therefore expect affiliated banks to be more strongly affected. Results are presented in panel (a) of table 16. Columns (1)-(2) show results for

[23] There are important differences between this study and Den Haan, Sumner, and Yamashiro (2007) however as they use aggregate data in a VAR framework for a sample that extends to 2004.

stand alone banks and columns (3)-(4) show results for BHC affiliated banks. Ashcraft (2006) has previously found that the bank lending channel is stronger for stand alone banks than for affiliated banks. Consistent with these results, columns (1) and (3) show that stand alone banks respond more strongly to monetary policy than affiliated banks pre-deregulation. However after interstate deregulation affiliated banks become significantly more sensitive than stand alone banks. Column (1) indicates that interstate deregulation does not significantly impact stand alone banks. Column (2) suggests stand alone banks become somewhat more sensitive to policy after deregulation. Columns (3) and (4) indicate that affiliated banks become significantly more responsive to monetary policy after deregulation, by a relatively large magnitude of 2.7-5.16%. Panel (b) presents results for small banks only and panel (c) for large banks only. Once again, the overall effect is driven by small banks, as the BHC affiliated small banks respond more strongly than stand alone small banks.

Heterogeneity across bank size, liquidity, and BHC affiliation therefore appear to be driving the effect of interstate deregulation on monetary policy. Small banks, less liquid banks, and banks affiliated with a BHC are most strongly impacted by deregulation. Therefore, we further split the sample to account for all three characteristics. Equation 3.2 is estimated across liquidity ratio quartile for four groups: small affiliated banks, small stand alone banks, large affiliated banks, and large stand alone banks. Panel (a) of table 17 shows the effect of interstate deregulation by liquidity quartile for small BHC-affiliated banks; panel (b) for small stand alone banks; panel (c) for large BHC-affilaited banks; and panel (d) for large stand alone banks. The results confirm that deregulation primarily leads to small and affiliated banks becoming more sensitive to monetary policy, and that the effect is decreasing in liquidity.[24]

Next, we test why small affiliated banks are most strongly affected. To do so we look more broadly at the asset side of a bank's balance sheet. We once again estimate equation 3.2 across liquidity quartile for small banks based upon their BHC affiliation, but now with total asset

[24]The least liquid small stand alone banks and the 2nd quartile of large stand alone banks also become more sensitive to policy after deregulation.There are very few large stand alone banks, hence the relatively large and weakly significant coefficient for the 2nd quartile in panel (d) should be interpreted with caution.

growth as the dependent variable in one specification and with securities growth as the dependent variable in a second specification. Table 18 presents results. Panel (a) shows how interstate deregulation impacts the sensitivity of asset growth to monetary policy for small affiliated banks. Panel (b) shows the same effect for small stand alone banks. Panel (c) shows how interstate deregulation impacts the sensitivity of securities growth to monetary policy for small affiliated banks. Panel (d) shows the same effect for small stand alone banks. Noticeably, small affiliated banks adjust both assets and securities in response to a monetary shock whereas small stand alone banks do not adjust either. Small affiliated banks below the 4th quartile in liquidity see a relatively small decline in assets for the four quarters following a monetary policy shock. As seen in table 17, these banks are reducing lending to a relatively large degree. On the other hand, panel (c) in table 18 shows that they increase securities holdings in response to a contractionary shock (except for the 3rd quartile), resulting in an overall small decline in assets. Thus it appears that relatively illiquid small banks affiliated with a BHC respond uniquely to monetary policy after interstate deregulation, by shifting the asset-side of their balance sheets away from lending and towards securities.

We find that the bank lending channel of transmission strengthens primarily for small, relatively illiquid banks affiliated with a BHC. These banks are unique in more strongly adjusting the asset-side of their balance sheets towards securities and away from loans following a contractionary monetary shock. These results are consistent with the notion that interstate deregulation weakens bank-borrower relationships and increases the propensity of banks to cut lending in response to a contractionary monetary shock.

6 Aggregate Effects

We have documented that bank lending becomes more sensitive to monetary policy following interstate banking deregulation, particularly for small banks and banks affiliated with a bank holding company. In this section we aggregate our bank-level data to the state-level to investigate the state-level effects of deregulation. Table 20 presents results for estimating equation 3.2 with

state-level variables.[25] Column (1) presents results with state-level real loan growth from all banks as the dependent variable. The interaction between interstate deregulation and monetary policy is negative but insignificant, indicating that deregulation has no effect on aggregate state-level loan growth.

To investigate further we aggregate state loans separately for four different categories of banks. The four categories are the same as those focused on in section 5.3: small BHC affiliated banks, small stand alone banks, large BHC affiliated banks, and large stand alone banks. Table 19 presents summary statistics for the share of total loans from each type of bank. Figure 5 plots each groups loan share over the entire sample. For the whole sample 61% of total lending comes from large affiliated banks with small affiliated banks having the next largest share at 16%. The average share of small stand alone banks drops by half, from 16% to 8% from the early part of the sample to the later part. The shares of the other three groups increase over this time frame, with small affiliated banks having the largest increase from 13% to 18%.

We once again estimate equation 3.2 with aggregate loan growth from each of the four bank categories as the dependent variable. Results are presented in table 20. Interstate deregulation only impacts aggregate lending from small affiliated banks. Following a 100 basis point contractionary shock lending growth from all small and affiliated banks within a state declines by 8% over the following four quarters. Small affiliated banks make up on average 16% of total lending over the sample, hence a back-of-the-envelope calculation indicates that after interstate deregulation state lending growth declines by an additional (8% x 0.16) = 1.28% following a contractionary shock. This rough estimate is in-line with the summed coefficients on the interstate-monetary policy interaction term in the first column of table 20 for all banks. While the magnitude is not large, it is noteworthy that interstate banking deregulation results in a greater response of state-level loan growth to monetary policy in addition to the stronger response at the individual bank-level.

[25] The results shown are from the specification with time fixed effects rather than year dummies.

7 Conclusion

This paper examines the relationship between bank regulation and monetary policy. From the mid-1970's to mid-1990's a majority of states removed restrictions on geographic bank expansion. There were two types of restrictions: those on out-of-state ownership of in-state banks (interstate) and those on within-state branching (intrastate). By exploiting the staggered timing of state-level deregulation we find that interstate banking deregulation, but not intrastate branching deregulation, increases the sensitivity of lending to monetary policy. The response of real loan growth to monetary policy doubles following interstate deregulation.

More specifically, interstate banking deregulation strengthens the bank lending channel of monetary transmission, as monetary policy has a greater effect on small and relatively illiquid banks after deregulation. We consider a variety of explanations for these results. Though deregulation increases bank market power and local banking concentration, neither of these changes in bank market structure can explain the increased sensitivity of loans to monetary policy. Deregulation impacts all three major loan categories similarly, also ruling out the possibility that the greater response of lending is driven by changes in loan portfolio composition.

On the other hand, we find that banks affiliated with a bank holding company are most strongly impacted by deregulation. After deregulation small banks affiliated with a bank holding company respond to monetary policy through a larger substitution of securities for bank loans. These results point to a weakening of bank-borrower relationships and an increased propensity of banks to cut lending as the mechanism behind interstate deregulation's strengthening of monetary policy transmission. Finally, we find that interstate banking deregulation leads to a greater effect of monetary policy on loan growth at the aggregate state-level in addition to at the individual bank-level. Further investigation into the aggregate effects of interstate banking deregulation remains an intriguing avenue for future work.

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State	Intrastate branching via M&A	Interstate banking
Alabama	1981	1987
Alaska	<1970	1982
Arizona	<1970	1986
Arkansas	1994	1989
California	<1970	1987
Colorado	1991	1988
Connecticut	1980	1983
Delaware	<1970	1988
Washington, DC	<1970	1985
Florida	1988	1985
Georgia	1983	1985
Hawaii	1986	*
Idaho	<1970	1985
Illinois	1988	1986
Indiana	1989	1986
Iowa	*	1991
Kansas	1987	1992
Kentucky	1990	1984
Louisiana	1988	1987
Maine	1975	1978
Maryland	<1970	1985
Massachusetts	1984	1983
Michigan	1987	1986
Minnesota	1993	1986
Mississippi	1986	1988
Missouri	1990	1986
Montana	1990	1993
Nebraska	1985	1990
Nevada	<1970	1985
New Hampshire	1987	1987
New Jersey	1977	1986
New Mexico	1991	1989
New York	1976	1982
North Carolina	<1970	1985
North Dakota	1987	1991
Ohio	1979	1985
Oklahoma	1988	1987
Oregon	1985	1986
Pennsylvania	1982	1986
Rhode Island	<1970	1984
South Carolina	<1970	1986
South Dakota	<1970	1988
Tennessee	1985	1985
Texas	1988	1987
Utah	1981	1984
Vermont	1970	1988
Virginia	1978	1985
Washington	1985	1987
West Virginia	1987	1988
Wisconsin	1990	1987
Wyoming	1988	1987

Table 1: Column 1 lists the year that each state allowed branch banking through mergers and acquisitions. Column 2 lists the year each state entered into an interstate banking agreement with other states. * indicates that a state had not deregulated before 1994. Dates from Amel (1993) and Kroszner and Strahan (1999).

	Whole Sample		1976-1985		1986-1994	
All banks	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Real loan growth - Total (%)	1.13	(7.25)	1.39	(7.30)	0.81	(7.17)
Avg loan rate (annualized %)	11.43	(4.06)	11.99	(4.77)	10.74	(2.83)
Real loan growth - C&I (%)	0.76	(24.13)	1.63	(24.32)	-0.33	(23.85)
Real loan growth - RE (%)	2.16	(15.08)	2.18	(16.77)	2.13	(12.66)
Real loan growth - Con (%)	0.46	(17.35)	1.04	(17.58)	-0.27	(17.03)
C&I Share of Lending	0.21	(0.14)	0.22	(0.14)	0.20	(0.13)
RE Share of Lending	0.40	(0.19)	0.34	(0.17)	0.47	(0.18)
Con share of lending	0.24	(0.14)	0.26	(0.14)	0.20	(0.13)
Assets ($)	173 mil	(2 bil)	122 mil	(1.6 bil)	235 mil	(2.5 bil)
Securities ($)	38 mil	(269 mil)	27 mil	(183 mil)	54 mil	(355 mil)
Liquidity Ratio	0.09	(0.23)	0.10	(0.06)	0.08	(0.34)
Equity Ratio	0.09	(0.03)	0.09	(0.03)	0.09	(0.04)
BHC Affiliation	0.53	(0.50)	0.39	(0.49)	0.70	(0.46)
Lerner Index	0.31	(0.09)	0.30	(0.08)	0.32	(0.09)
County HHI	0.33	(0.22)	0.31	(0.21)	0.35	(0.23)
State HHI	0.11	(0.11)	0.10	(0.10)	0.12	(0.12)
Number of banks	16,014		14,835		14,242	

Table 2: This table reports summary statistics for bank-level variables of interest. The first two columns have statistics for the entire sample (1976Q2 - 1994Q4). The third and fourth columns have statistics for the early part of the sample (when the majority of states had not deregulated). The fifth and sixth columns have statistics for the later part of the sample (when the majority of states had deregulated).

	Whole Sample		1976-1985		1986-1994	
Panel (a): small banks	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Real loan growth - Total (%)	1.15	(7.31)	1.40	(7.38)	0.83	(7.20)
Avg loan rate (annualized %)	11.43	(0.04)	11.98	(4.77)	10.74	(2.63)
Real loan growth - C&I (%)	0.78	(24.51)	1.66	(24.79)	-0.32	(24.12)
Real loan growth - RE (%)	2.20	(15.30)	2.24	(17.09)	2.16	(12.70)
Real loan growth - Con (%)	0.48	(17.54)	1.07	(17.85)	-0.26	(17.11)
C&I Share of Lending	0.21	(0.14)	0.22	(0.14)	0.20	(0.13)
RE Share of Lending	0.40	(0.19)	0.35	(0.17)	0.47	(0.18)
Con share of lending	0.24	(0.14)	0.27	(0.14)	0.20	(0.13)
Assets($)	51 mil	(58 mil)	38 mil	(40 mil)	68 mil	(72 mil)
Securities ($)	17 mil	(20 mil)	13 mil	(14 mil)	23 mil	(26 mil)
Liquidity Ratio	0.10	(0.24)	0.10	(0.06)	0.08	(0.35)
Equity Ratio	0.09	(0.03)	0.09	(0.03)	0.09	(0.04)
BHC Affiliation	0.51	(0.50)	0.37	(0.48)	0.69	(0.46)
Lerner Index	0.30	(0.09)	0.29	(0.08)	0.31	(0.09)
County HHI	0.33	(0.22)	0.31	(0.21)	0.35	(0.23)
State HHI	0.11	(0.11)	0.10	(0.10)	0.12	(0.12)
Number of banks	15,481		14,264		13,625	
Panel (b): large banks	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Real loan growth - Total (%)	0.86	(6.09)	1.13	(5.63)	0.52	(6.61)
Avg loan rate (annualized %)	11.53	(5.09)	12.17	(4.78)	10.74	(5.35)
Real loan growth - C&I (%)	0.39	(15.16)	1.15	(12.59)	-0.59	(17.86)
Real loan growth - RE (%)	1.30	(10.07)	1.09	(8.50)	1.58	(11.75)
Real loan growth - Con (%)	0.08	(13.35)	0.44	(11.42)	-0.38	(15.41)
C&I Share of Lending	0.30	(0.14)	0.32	(0.13)	0.27	(0.15)
RE Share of Lending	0.36	(0.17)	0.32	(0.14)	0.41	(0.19)
Con share of lending	0.24	(0.16)	0.25	(0.12)	0.23	(0.19)
Assets($)	2.5 bil	(8.7 bil)	1.7 bil	(6.8 bil)	3.4 bil	(10.5 bil)
Securities ($)	447 mil	(1.1 bil)	306 mil	(765 mil)	640 mil	(1.5 bil)
Liquidity Ratio	0.12	(0.08)	0.14	(0.08)	0.09	(0.07)
Equity Ratio	0.07	(0.02)	0.07	(0.02)	0.07	(0.03)
BHC Affiliation	0.83	(0.37)	0.75	(0.43)	0.94	(0.24)
Lerner Index	0.37	(0.11)	0.34	(0.09)	0.41	(0.12)
County HHI	0.33	(0.20)	0.31	(0.19)	0.35	(0.21)
State HHI	0.11	(0.11)	0.10	(0.10)	0.12	(0.12)
Number of banks	1,215		931		1,023	

Table 3: This table reports summary statistics for bank-level variables of interest. Panel (a) reports statistics for small banks, defined as all banks under the 95th percentile in total assets in a given quarter. Panel (b) reports statistics for large banks, defined as all banks above the 9th percentile in total assets in a given quarter. The first two columns have statistics for the entire sample (1976Q2 - 1994Q4). The third and fourth columns have statistics for the early part of the sample (when the majority of states had not deregulated). The fifth and sixth columns have statistics for the later part of the sample (when the majority of states had deregulated).

sum of coefficients	(1)	(2)	(3)	(4)	(5)
Panel (a): baseline results					
MP	-0.0111***	-0.0115***	-0.0121***	-0.0202***	-
	(0.0014)	(0.0013)	(0.0014)	(0.0021)	
Intra*MP	0.0023	0.0026	0.0022	-0.0005	-0.0010
	(0.0029)	(0.0027)	(0.0029)	(0.0030)	(0.0031)
Inter*MP	-0.0142***	-0.0139***	-0.0138***	-0.0208**	-0.0426***
	(0.0046)	(0.0043)	(0.0045)	(0.0094)	(0.0112)
Panel (b): interstate deregulation only					
MP	-0.0109***	-0.0109***	-0.0116***	-0.0203***	-
	(0.0014)	(0.0014)	(0.0015)	(0.0022)	
Inter*MP	-0.0126***	-0.0122***	-0.0124***	-0.0209**	-0.0424***
	(0.0041)	(0.0040)	(0.0042)	(0.0084)	(0.0113)
Panel (c): intrastate deregulation only					
MP	-0.0108***	-0.0112***	-0.0118***	-0.0205***	-
	(0.0013)	(0.0012)	(0.0012)	(0.0018)	
Intra*MP	-0.0013	-0.0008	-0.0012	-0.0023	-0.0032
	(0.0025)	(0.0024)	(0.0026)	(0.0027)	(0.0033)
Panel (d): fed funds rate as MP indicator					
MP	-0.0092***	-0.0091***	-0.0099***	-0.0037***	-
	(0.0007)	(0.0008)	(0.0009)	(0.0014)	
Intra*MP	0.0015	0.0014	0.0017	0.0006	0.0006
	(0.0011)	(0.0012)	(0.0012)	(0.0010)	(0.0010)
Inter*MP	0.0051***	0.0051***	0.0053***	-0.0066**	-0.0102***
	(0.0014)	(0.0014)	(0.0015)	(0.0028)	(0.0030)
observations	823,659	823,659	823,659	823,659	823,659
STATE	Yes	Yes	Yes	Yes	Yes
NATIONAL	Yes	Yes	Yes	Yes	-
State Fixed Effects	-	Yes	-	-	-
Bank Fixed Effects	-	-	Yes	Yes	Yes
Linear Time Trend	Yes	Yes	Yes	-	-
Year Dummies	-	-	-	Yes	-
Time Fixed Effects	-	-	-	-	Yes

Table 4: This table reports results from estimating equation 3.2. Panel (a) reports the baseline results. Row 1 reports $\sum_{j=0}^{4} \widehat{\mu}_j$, row 2 reports $\sum_{j=0}^{4} \widehat{\phi}_j$, row 3 reports $\sum_{j=0}^{4} \widehat{\varphi}_j$. Panel (b) reports results for estimating equation 3.2 with interstate deregulation only and panel (c) reports results for estimating equation 3.2 with intrastate deregulation only. Panel (d) reports results using the quarterly change in the fed funds rate as the monetary policy indicator, rather than the RR shocks. Robust standard errors clustered at the state-level are in parentheses. * indicates statistical significance at the 10% level. ** indicates statistical significance at the 5% level. *** indicates statistical significance at the 1% level.

Dependent variable: Real Loan Growth (1976Q2 - 1994Q4)							
Variable	Coefficient	Variable	Coefficient	Variable	Coefficient	Variable	Coefficient
Loan Growth (t-1)	0.100***	CRSP(t-4)	0.0491**	INTRA*MP	-0.000882	1983 Dummy	0.00975***
	(0.0126)		(0.0186)		(0.000764)		(0.00267)
Loan Growth (t-2)	0.0157	PI	0.000959***	INTRA*MP(t-1)	-0.000437	1984 Dummy	0.00646***
	(0.0105)		(0.000293)		(0.000745)		(0.00220)
Loan Growth (t-3)	0.0395***	PI(t-1)	0.00150***	INTRA*MP(t-2)	0.000659	1985 Dummy	-0.0129***
	(0.00487)		(0.000403)		(0.000844)		(0.00189)
Loan Growth (t-4)	0.166***	PI(t-2)	0.00187***	INTRA*MP(t-3)	0.000435	1986 Dummy	-0.00734***
	(0.0114)		(0.000299)		(0.000844)		(0.00138)
GDP	-4.85e-07	PI(t-3)	0.000437*	INTRA*MP(t-4)	-0.000322	1987 Dummy	-0.00888***
	(6.31e-06)		(0.000220)		(0.000927)		(0.00222)
GDP(t-1)	-1.64e-06	PI(t-4)	0.000708***	INTER*MP	-0.00878***	1988 Dummy	0.00219
	(8.31e-06)		(0.000209)		(0.00262)		(0.00259)
GDP(t-2)	-4.23e-05***	HPI	0.000477***	INTER*MP(t-1)	0.00108	1989 Dummy	-0.00105
	(6.47e-06)		(8.85e-05)		(0.00261)		(0.00245)
GDP(t-3)	3.73e-05***	HPI(t-1)	0.000588***	INTER*MP(t-2)	0.000507	1990 Dummy	-0.00739***
	(5.19e-06)		(0.000107)		(0.00243)		(0.00237)
GDP(t-4)	1.29e-05*	HPI(t-2)	0.000726***	INTER*MP(t-3)	-0.00653***	1991 Dummy	-0.00166
	(6.66e-06)		(8.75e-05)		(0.00213)		(0.00298)
PCE	-0.00388*	HPI(t-3)	0.000608***	INTER*MP(t-4)	-0.00713***	1992 Dummy	-0.00758**
	(0.00214)		(9.15e-05)		(0.00197)		(0.00305)
PCE(t-1)	-0.000401	HPI(t-4)	0.000333***	Q2 Dummy	0.0208***	1993 Dummy	-0.000698
	(0.00229)		(6.50e-05)		(0.00184)		(0.00392)
PCE(t-2)	0.0114***	MP	0.00224***	Q3 Dummy	0.00834***	1994 Dummy	0.0147***
	(0.00263)		(0.000685)		(0.00150)		(0.00495)
PCE(t-3)	-0.0229***	MP(t-1)	-0.00866***	Q4 Dummy	0.00400***	Constant	-0.00467
	(0.00295)		(0.000613)		(0.00137)		(0.00510)
PCE(t-4)	-0.00294	MP(t-2)	-0.00855***	1978 Dummy	-0.0120***		
	(0.00274)		(0.000600)		(0.00106)	Observations	823,659
CRSP	0.0156	MP(t-3)	-0.00286***	1979 Dummy	-0.0283***	Number of banks	15,990
	(0.0115)		(0.000456)		(0.00237)	R-squared	0.124
CRSP(t-1)	0.0553***	MP(t-4)	-0.00241***	1980 Dummy	-0.0296***		
	(0.0156)		(0.000440)		(0.00268)		
CRSP(t-2)	0.0552***	INTRA	-0.000335	1981 Dummy	0.0101**		
	(0.0143)		(0.00185)		(0.00420)		
CRSP(t-3)	0.102***	INTER	0.00172	1982 Dummy	0.00766***		
	(0.0144)		(0.00163)		(0.00192)		

Table 5: This table reports full results from estimating equation 3.2 with the baseline specification. Robust standard errors clustered at the state-level are in parentheses. * indicates statistical significance at the 10% level. ** indicates statistical significance at the 5% level. *** indicates statistical significance at the 1% level.

sum of coefficients	**(1)**	**(2)**
MP	-0.0171***	0.0239***
	(0.0022)	(0.0079)
Intra*MP	-0.0006	-0.0009
	(0.0030)	(0.0029)
Inter*MP	-0.0233**	-0.0340***
	(0.0093)	(0.0104)
NBR	-0.0048***	-0.0125***
	(0.0015)	(0.0018)
NBR*MP	-	-0.0406***
		(0.0074)
observations	823,659	823,659
STATE	Yes	Yes
NATIONAL	Yes	Yes
Bank Fixed Effects	Yes	Yes
Year Dummies	Yes	Yes

Table 6: This table reports results from estimating equation 3.2 with controls for the period of non-borrowed reserve (NBR) targeting from 1979-1982. Column (1) includes a dummy variable equalling 1 for quarters during the NBR regime and equalling 0 otherwise. Column (2) includes the NBR dummy and an interaction between the dummy and the monetary policy indicator. Robust standard errors clustered at the state-level are in parentheses. * indicates statistical significance at the 10% level. ** indicates statistical significance at the 5% level. *** indicates statistical significance at the 1% level.

	Dependent variable: Avg Loan Rate			
	1976-1994		**1983-1994**	
sum of coefficients	(1)	(2)	(3)	(4)
MP	0.0069***	-	0.0074	-
	(0.0008)		(0.0046)	
Intra*MP	0.0006	0.0005	0.0080***	0.0081***
	(0.0021)	(0.0011)	(0.0023)	-0.0014
Inter*MP	0.0113***	0.0047**	0.0055*	0.0036**
	(0.0020)	(0.0018)	(0.0028)	(0.0016)
observations	822,792	822,792	494,975	494,975
STATE	Yes	Yes	Yes	Yes
NATIONAL	Yes	-	Yes	-
Bank Fixed Effects	Yes	Yes	Yes	Yes
Year Dummies	Yes	-	Yes	-
Quarter Dummies	-	Yes	-	Yes

Table 7: This table reports results from estimating equation 3.2 with average loan rate as the dependent variable. Columns (1) and (2) report results for the full sample with missing Q1 and Q3 observations filled for 1976-1982. Columns (3) and (4) report reports with an abbreviated sample for robustness. Row 1 reports $\sum_{j=0}^{4} \widehat{\mu}_j$, row 2 reports $\sum_{j=0}^{4} \widehat{\phi}_j$, row 3 reports $\sum_{j=0}^{4} \widehat{\varphi}_j$. Robust standard errors clustered at the state-level are in parentheses. * indicates statistical significance at the 10% level. ** indicates statistical significance at the 5% level. *** indicates statistical significance at the 1% level.

By bank size						
Panel (a)						
	Small Banks		**Large Banks**		**Foreign Banks**	
sum of coefficients	(1)	(2)	(3)	(4)	(5)	(6)
MP	-0.0202***	-	-0.0216***	-	0.0157	-
	(0.0022)		(0.0037)		(0.0644)	
Intra*MP	0.0001	-0.0005	-0.0056	-0.0058*	-0.0997***	-0.0940***
	(0.0033)	(0.0032)	(0.0034)	(0.0032)	(0.0231)	(0.0252)
Inter*MP	-0.0212**	-0.0439***	-0.0092	-0.0081	-0.0467	-0.0417
	(0.0093)	(0.0110)	(0.0097)	(0.0131)	(0.0274)	(0.0390)
observations	787,027	787,027	36,632	36,632	12,679	12,679
STATE	Yes	Yes	Yes	Yes	Yes	Yes
NATIONAL	Yes	-	Yes	-	Yes	-
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	-	Yes	-	Yes	-
Time Fixed Effects	-	Yes	-	Yes	-	Yes

Table 8: Panel (a) reports results from estimating equation 3.2 broken into three categories: small banks (those under the 95th percentile in total assets), large banks (those above the 95th percentile in total assets), and branches of foreign banks. Row 1 reports $\sum_{j=0}^{4} \widehat{\mu_j}$, row 2 reports $\sum_{j=0}^{4} \widehat{\phi_j}$, row 3 reports $\sum_{j=0}^{4} \widehat{\varphi_j}$. Robust standard errors clustered at the state-level are in parentheses. * indicates statistical significance at the 10% level. ** indicates statistical significance at the 5% level. *** indicates statistical significance at the 1% level.

Dependent variable: Avg loan rate				
	Small		Large	
sum of coefficients	**(1)**	**(2)**	**(3)**	**(4)**
MP	0.0067***	-	0.0110***	-
	(0.0009)		(0.0014)	
Intra*MP	0.0010	0.0009	-0.0045*	-0.0045***
	(0.0022)	(0.0012)	(0.0022)	(0.0010)
Inter*MP	0.0111***	0.0042**	0.0129***	0.0011
	(0.0020)	(0.0019)	(0.0029)	(0.0020)
observations	786,207	786,207	36,585	36,585
STATE	Yes	Yes	Yes	Yes
NATIONAL	Yes	-	Yes	-
Bank Fixed Effects	Yes	Yes	Yes	Yes
Year Dummies	Yes	-	Yes	-
Quarter Dummies	-	Yes	-	Yes

Table 9: This table reports results from estimating equation 3.2 with average loan rate as the dependent variable. Columns (1) and (2) report results for small banks only (those under the 95th percentile in total assets). Columns (3) and (4) report reports for large banks only (those above the 95th percentile in total assets). Row 1 reports $\sum_{j=0}^{4} \widehat{\mu}_j$, row 2 reports $\sum_{j=0}^{4} \widehat{\phi}_j$, row 3 reports $\sum_{j=0}^{4} \widehat{\varphi}_j$. Robust standard errors clustered at the state-level are in parentheses. * indicates statistical significance at the 10% level. ** indicates statistical significance at the 5% level. *** indicates statistical significance at the 1% level.

All banks - by liquidity ratio quartile								
Panel (a):	**1st**		**2nd**		**3rd**		**4th**	
sum of coefficients	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
MP	-0.0194***	-	-0.0206***	-	-0.0207***	-	-0.0219***	-
	(0.0027)		(0.0027)		(0.0022)		(0.0030)	
Intra*MP	0.0064	0.0052	0.0023	0.0015	-0.0006	-0.0007	-0.0070	-0.0072**
	(0.0043)	(0.0049)	(0.0031)	(0.0030)	(0.0028)	(0.0023)	(0.0044)	(0.0036)
Inter*MP	-0.0332**	-0.0625***	-0.0200*	-0.0491***	-0.0127	-0.0259**	-0.0084	-0.0243
	(0.0128)	(0.0166)	(0.0109)	(0.0106)	(0.0090)	(0.0104)	(0.0100)	(0.0152)
observations	208,273	208,273	207,506	207,506	205,939	205,939	201,941	201,941
Small banks - by liquidity ratio quartile								
Panel (b):	**1st**		**2nd**		**3rd**		**4th**	
sum of coefficients	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
MP	-0.0196***	-	-0.0207***	-	-0.0208***	-	-0.0215***	-
	(0.0027)		(0.0027)		(0.0022)		(0.0033)	
Intra*MP	0.0067	0.0055	0.0025	0.0017	0.0007	0.0005	-0.00072	-0.0076*
	(0.0044)	(0.0048)	(0.0033)	(0.0030)	(0.0029)	(0.0024)	(0.0051)	(0.0038)
Inter*MP	-0.0340***	-0.0635***	-0.0200*	-0.0502***	-0.0121	-0.0257**	-0.0095	-0.0267*
	(0.0125)	(0.0172)	(0.0110)	(0.0106)	(0.0094)	(0.0107)	(0.0104)	(0.0151)
observations	204,559	204,559	201,126	201,126	195,307	195,307	186,035	186,035
Large banks - by liquidity ratio quartile								
Panel (c):	**1st**		**2nd**		**3rd**		**4th**	
sum of coefficients	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
MP	-0.0106	-	-0.0212***	-	-0.0195***	-	-0.0261***	-
	(0.0198)		(0.0073)		(0.0053)		(0.0054)	
Intra*MP	0.015	0.0115	0.0025	0.0033	-0.0111***	-0.0109***	-0.0044	-0.0048
	(0.0181)	(0.0168)	(0.0074)	(0.0072)	(0.0037)	(0.0034)	(0.0059)	(0.0041)
Inter*MP	-0.0308	-0.0460	-0.0169	0.0138	0.0018	0.0173	-0.0053	-0.0253
	(0.0311)	(0.0538)	(0.0234)	(0.0228)	(0.0120)	(0.0112)	(0.0157)	(0.0225)
observations	3,714	3,714	6,380	6,380	10,362	10,362	15,906	15,906
STATE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NATIONAL	Yes	-	Yes	-	Yes	-	Yes	-
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	-	Yes	-	Yes	-	Yes	-
Time Fixed Effects	-	Yes	-	Yes	-	Yes	-	Yes

Table 10: Panel (a) reports results from separately estimating equation 3.2 for all banks that fall into the 1st, 2nd, 3rd, and 4th quartiles of liquidity ratio within a given quarter. Panel (b) reports results for small banks only and panel (c) reports results for large banks only. Liquidity ratio is measured as total cash and reserves divided by total liabilities. Row 1 reports $\sum_{j=0}^{4} \widehat{\mu_j}$, row 2 reports $\sum_{j=0}^{4} \widehat{\phi_j}$, row 3 reports $\sum_{j=0}^{4} \widehat{\varphi_j}$. Robust standard errors clustered at the state-level are in parentheses. * indicates statistical significance at the 10% level. ** indicates statistical significance at the 5% level. *** indicates statistical significance at the 1% level.

All banks - by equity ratio quartile								
Panel (a)	**1st**		**2nd**		**3rd**		**4th**	
sum of coefficients	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MP	-0.0206***	-	-0.0190***	-	-0.0211***	-	-0.0200***	-
	(0.0025)		(0.0021)		(0.0029)		(0.0035)	
Intra*MP	-0.0009	-0.0009	0.0015	0.0008	-0.0032	-0.0037	0.0035	0.0026
	(0.0034)	(0.0028)	(0.0035)	(0.0034)	(0.0042)	(0.0033)	(0.0031)	(0.0039)
Inter*MP	-0.0219*	-0.0427***	-0.0235**	-0.0414***	-0.0134	-0.0354***	-0.0096	-0.0369**
	(0.0113)	(0.0109)	(0.0104)	(0.0108)	(0.0099)	(0.0117)	(0.0109)	(0.0165)
observations	204,740	204,740	208,100	208,100	209,731	209,731	201,088	201,088
Small banks - by equity ratio quartile								
Panel (b):	**1st**		**2nd**		**3rd**		**4th**	
sum of coefficients	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
MP	-0.0201***	-	-0.0189***	-	-0.0213***	-	-0.0200***	-
	(0.0027)		(0.0021)		(0.0029)		(0.0035)	
Intra*MP	-0.0014	-0.0017	0.0023	0.0018	-0.0020	-0.0025	0.0041	0.0032
	(0.0036)	(0.0029)	(0.0038)	(0.0034)	(0.0045)	(0.0034)	(0.0032)	(0.0040)
Inter*MP	-0.0211*	-0.0480**	-0.0250**	-0.0427***	-0.0142	-0.0359***	-0.0111	-0.0381**
	(0.0120)	(0.0103)	(0.0101)	(0.0107)	(0.0099)	(0.0118)	(0.0104)	(0.0165)
observations	181,399	181,399	200,779	200,779	206,024	206,024	198,825	198,825
Large banks - by equity ratio quartile								
Panel (c):	**1st**		**2nd**		**3rd**		**4th**	
sum of coefficients	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
MP	-0.0251***	-	-0.0251**	-	-0.0149	-	-0.0242	-
	(0.0038)		(0.0095)		(0.0135)		(0.0376)	
Intra*MP	-0.0009	-0.0007	-0.0056	-0.0064	-0.0285**	-0.0278***	-0.0111	-0.0141
	(0.0048)	(0.0040)	(0.0051)	(0.0064)	(0.0116)	(0.0078)	(0.0098)	(0.0136)
Inter*MP	-0.0182*	-0.0034	0.0120	0.0004	-0.0021	-0.0067	0.0603	-0.0166
	(0.0094)	(0.0129)	(0.0243)	(0.0307)	(0.0250)	(0.0398)	(0.0511)	(0.0731)
observations	23,341	23,341	7,321	7,321	3,707	3,707	2,263	2,263
STATE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NATIONAL	Yes	-	Yes	-	Yes	-	Yes	-
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	-	Yes	-	Yes	-	Yes	-
Time Fixed Effects	-	Yes	-	Yes	-	Yes	-	Yes

Table 11: Panel (a) reports results from separately estimating equation 3.2 for all banks that fall into the 1st, 2nd, 3rd, and 4th quartiles of equity ratio within a given quarter. Panel (b) reports results for small banks only and panel (c) reports results for large banks only. Equity ratio is measured as total equity divided by total assets. Row 1 reports $\sum_{j=0}^{4} \widehat{\mu_j}$, row 2 reports $\sum_{j=0}^{4} \widehat{\phi_j}$, row 3 reports $\sum_{j=0}^{4} \widehat{\varphi_j}$. Robust standard errors clustered at the state-level are in parentheses. * indicates statistical significance at the 10% level. ** indicates statistical significance at the 5% level. *** indicates statistical significance at the 1% level.

Panel (a)	Effect of deregulation on market structure		
Dependent Variable:	**Lerner Index**	**County HHI**	**State HHI**
Intra	-0.0020	0.0181***	-0.0055
	(0.0021)	(0.0018)	(0.0106)
Inter	0.0043*	0.0079***	-0.0193*
	(0.0023)	(0.0020)	(0.0104)
observations	853,404	857,525	3,825
State Fixed Effects	-	Yes	Yes
Bank Fixed Effects	Yes	-	-
Quarter Dummies	Yes	Yes	Yes

Panel (b)	Dependent variable: real loan growth					
sum of coefficients	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
MP	-0.0291***	-0.0287***	-0.0204***	-0.0200***	-0.0197***	-0.0193***
	(0.0034)	(0.0034)	(0.0020)	(0.0024)	(0.0023)	(0.0025)
LI*MP	0.0243***	0.0253***	-	-	-	-
	(0.0084)	(0.0081)				
County_HHI*MP	-	-	-0.0019	-0.0012	-	-
			(0.0031)	(0.0031)		
State_HHI*MP	-	-	-	-	-0.0272	-0.0245
					(0.0200)	(0.0203)
Inter*MP	-	-0.0206**	-	-0.0205**	-	-0.0199**
		(0.0085)		(0.0085)		(0.0085)
observations	819,992	819,992	823,659	823,659	823,659	823,659
STATE	Yes	Yes	Yes	Yes	Yes	Yes
NATIONAL	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes

Table 12: Panel (a) reports the effect of deregulation on the three bank market structure variables: Lerner index (proxy for market power), county-level HHI (concentration), and state-level HHI (concentration). Panel (b) reports results from estimating equation 5.5 with the three bank market structure variables. Odd columns include the interaction between the bank market structure and monetary policy only. Even columns include the interaction between interstate deregulation and monetary policy as well. Robust standard errors clustered at the state-level are in parentheses. * indicates statistical significance at the 10% level. ** indicates statistical significance at the 5% level. *** indicates statistical significance at the 1% level.

All banks - by lerner index quartile								
Panel (a):	**1st**		**2nd**		**3rd**		**4th**	
sum of coefficients	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
MP	-0.0184***	-	-0.0201***	-	-0.0214***	-	-0.0211***	-
	(0.0025)		(0.0025)		(0.0027)		(0.0032)	
Intra*MP	0.0027	0.0021	0.0015	0.0013	0.0006	0.0000	-0.0049	-0.0055
	(0.0038)	(0.0040)	(0.0037)	(0.0031)	(0.0030)	(0.0039)	(0.0036)	(0.0033)
Inter*MP	-0.0235*	-0.0537***	-0.0197**	-0.0355***	-0.0066	-0.0271**	-0.0160	-0.0405***
	(0.0129)	(0.0130)	(0.0075)	(0.0123)	(0.0080)	(0.0107)	(0.0122)	(0.0143)
observations	202,018	202,018	207,650	207,650	207,048	207,048	206,943	206,943
Small banks - by lerner index quartile								
Panel (b):	**1st**		**2nd**		**3rd**		**4th**	
sum of coefficients	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
MP	-0.0182***	-	-0.0199***	-	-0.0211***	-	-0.0216***	-
	(0.0025)		(0.0025)		(0.0028)		(0.0033)	
Intra*MP	0.0028	0.0022	0.0018	0.0016	0.0003	-0.0004	-0.0027	-0.0034
	(0.0040)	(0.0042)	(0.0038)	(0.0033)	(0.0032)	(0.0042)	(0.0041)	(0.0031)
Inter*MP	-0.0246*	-0.0567***	-0.0200***	-0.0363***	-0.0065	-0.0286***	-0.0180	-0.0434***
	(0.0129)	(0.0132)	(0.0075)	(0.0124)	(0.0082)	(0.0108)	(0.0125)	(0.0150)
observations	199,197	199,197	202,937	202,937	199,059	199,059	185,843	185,843
Large banks - by lerner index quartile								
Panel (c):	**1st**		**2nd**		**3rd**		**4th**	
sum of coefficients	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
MP	-0.0300**	-	-0.0304***	-	-0.0306***	-	-0.0177***	-
	(0.0142)		(0.0093)		(0.0059)		(0.0064)	
Intra*MP	0.0094	0.0084	-0.0020	-0.0020	0.0100*	0.0101**	-0.0172***	-0.0172**
	(0.0088)	(0.0090)	(0.0066)	(0.0050)	(0.0053)	(0.0042)	(0.0052)	(0.0071)
Inter*MP	-0.0238	0.0538	-0.0206	0.0063	-0.0056	-0.0043	-0.0076	-0.0148
	(0.0667)	(0.0931)	(0.0221)	(0.0285)	(0.0129)	(0.0152)	(0.0118)	(0.0153)
observations	2,821	2,821	4,713	4,713	7,989	7,989	21,109	21,109
STATE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NATIONAL	Yes	-	Yes	-	Yes	-	Yes	-
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	-	Yes	-	Yes	-	Yes	-
Time Fixed Effects	-	Yes	-	Yes	-	Yes	-	Yes

Table 13: This table reports results for estimating equation 3.2 across Lerner index quartile, where the 1st quartile has the lowest market power and the 4th has the highest market power. Panel (a) reports results for all banks, panel (b) reports results for small banks (below the 95th percentile in assets), and panel (c) reports results for large banks (above the 95th percentile in assets).

All banks - by HHI quartile								
Panel (a):	**1st**		**2nd**		**3rd**		**4th**	
sum of coefficients	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
MP	-0.0202***	-	-0.0178***	-	-0.0194***	-	-0.0232***	-
	(0.0030)		(0.0033)		(0.0022)		(0.0026)	
Intra*MP	0.0155	0.0129**	-0.0037	-0.0038	-0.0227	-0.0034	0.0018	0.0013
	(0.0091)	(0.0064)	(0.0032)	(0.0041)	(0.0042)	(0.0035)	(0.0026)	(0.0031)
Inter*MP	-0.0154	-0.0264*	-0.0205***	-0.0411**	-0.0207**	-0.0448***	-0.0210*	-0.0406***
	(0.0145)	(0.0148)	(0.0068)	(0.0182)	(0.0101)	(0.0133)	(0.0107)	(0.0130)
observations	204,761	204,761	206,920	206,920	206,337	206,337	205,641	205,641
Small banks - by HHI quartile								
Panel (b):	**1st**		**2nd**		**3rd**		**4th**	
sum of coefficients	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
MP	-0.0196***	-	-0.0178***	-	-0.0191***	-	-0.0238***	-
	(0.0030)		(0.0035)		(0.0023)		(0.0026)	
Intra*MP	0.0111	0.0122*	-0.0025	-0.0026	-0.0021	-0.0030	0.0021	0.0015
	(0.0089)	(0.0071)	(0.0037)	(0.0040)	(0.0046)	(0.0036)	(0.0028)	(0.0031)
Inter*MP	-0.0162	-0.0307*	-0.0176***	-0.0373**	-0.0207**	-0.0457***	-0.0224**	-0.0430***
	(0.0147)	(0.0156)	(0.0065)	(0.0184)	(0.0103)	(0.0132)	(0.0108)	(0.0132)
observations	196,482	196,482	197,437	197,437	196,086	196,086	197,022	197,022
Large banks - by HHI quartile								
Panel (c):	**1st**		**2nd**		**3rd**		**4th**	
sum of coefficients	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
MP	-0.0228***	-	-0.0258***	-	-0.0262***	-	-0.0099	-
	(0.0080)		(0.0064)		(0.0052)		(0.0094)	
Intra*MP	0.0008	0.0011	0.0018	0.0019	-0.0068	-0.0067	-0.0030	-0.0036
	(0.0187)	(0.0142)	(0.0071)	(0.0071)	(0.0045)	(0.0044)	(0.0091)	(0.0046)
Inter*MP	-0.0099	-0.0038	-0.0312	-0.0233	-0.0226	-0.0157	-0.0126	-0.0165
	(0.0378)	(0.0516)	(0.0200)	(0.0268)	(0.0142)	(0.0145)	(0.0158)	(0.0101)
observations	8,279	8,279	9,483	9,483	10,251	10,251	8,619	8,619
STATE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NATIONAL	Yes	-	Yes	-	Yes	-	Yes	-
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	-	Yes	-	Yes	-	Yes	-
Time Fixed Effects	-	Yes	-	Yes	-	Yes	-	Yes

Table 14: This table reports results for estimating equation 3.2 across county-level HHI quartile, where the 1st quartile has the lowest market concentration and the 4th has the highest market concentration. Panel (a) reports results for all banks, panel (b) reports results for small banks (below the 95th percentile in assets), and panel (c) reports results for large banks (above the 95th percentile in assets).

Effect of deregulation on category share of total loans			
Panel (a)			
	C&I Share	**RE Share**	**Con Share**
Intra	-0.0043***	-0.0060***	0.0017
	(0.0008)	(0.0020)	(0.0015)
Inter	-0.0064***	-0.0174***	0.0037*
	(00013)	(0.0023)	(0.0022)
observations	857,525	857,525	857,525
BANK	Yes	Yes	Yes
STATE	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes

By loan category						
Panel (b)						
	C&I Loans		**Real Estate Loans**		**Consumer Loans**	
sum of coefficients	(1)	(2)	(3)	(4)	(5)	(6)
MP	-0.0225***	-	-0.0158***	-	-0.0379***	-
	(0.0043)		(0.0031)		(0.0029)	
Intra*MP	-0.0141**	-0.0152***	0.0024	0.0012	0.0020	0.0007
	(0.0070)	(0.0055)	(0.0038)	(0.0030)	(0.0037)	(0.0045)
Inter*MP	-0.0230	-0.0434**	-0.0104	-0.0401***	0.0046	-0.0365***
	(0.0189)	(0.0194)	(0.0088)	(0.0102)	(0.0104)	(0.0127)
observations	737,753	737,753	795,076	795,076	778,630	778,630
STATE	Yes	Yes	Yes	Yes	Yes	Yes
NATIONAL	Yes	-	Yes	-	Yes	-
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	-	Yes	-	Yes	-
Time Fixed Effects	-	Yes	-	Yes	-	Yes

Table 15: Panel (a) reports the effect of deregulation on the share of total loans for each of the three major loan categories: commercial and industrial loans, real estate loans, and consumer loans. Panel (b) reports results from estimating equation 3.2 for the three loan categories. Row 1 reports $\sum_{j=0}^{4} \widehat{\mu}_j$, row 2 reports $\sum_{j=0}^{4} \widehat{\phi}_j$, row 3 reports $\sum_{j=0}^{4} \widehat{\varphi}_j$. Robust standard errors clustered at the state-level are in parentheses. * indicates statistical significance at the 10% level. ** indicates statistical significance at the 5% level. *** indicates statistical significance at the 1% level.

All banks - by BHC affiliation				
Panel (a)	**Stand Alone**		**Affiliated**	
sum of coefficients	(1)	(2)	(3)	(4)
MP	-0.0236***	-	-0.0151***	-
	(0.0020)		(0.0026)	
Intra*MP	0.0004	0.0003	-0.0018	-0.0032
	(0.0026)	(0.0026)	(0.0057)	(0.0047)
Inter*MP	-0.0057	-0.0252**	-0.0269***	-0.0516***
	(0.0098)	(0.0125)	(0.0098)	(0.0125)
observations	376,569	376,569	447,090	447,090
Small banks - by BHC affiliation				
Panel (b):	**Stand Alone**		**Affiliated**	
sum of coefficients	(1)	(2)	(1)	(2)
MP	-0.0236***	-	-0.0149***	-
	(0.0020)		(0.0028)	
Intra*MP	0.0004	0.0003	-0.00003	-0.0022
	(0.0026)	(0.0027)	(0.0072)	(0.0054)
Inter*MP	-0.0053	-0.0253**	-0.0283***	-0.0548***
	(0.0100)	(0.0126)	(0.0099)	(0.0125)
observations	370,452	370,452	416,575	416,575
Large banks - by BHC affiliation				
Panel (c):	**Stand Alone**		**Affiliated**	
sum of coefficients	(1)	(2)	(1)	(2)
MP	-0.0172	-	-0.0207***	-
	(0.0116)		(0.0040)	
Intra*MP	-0.0018	-0.0023	-0.0062*	-0.0063
	(0.0067)	(0.0037)	(0.0033)	(0.0042)
Inter*MP	-0.0394	-0.0389*	-0.0055	-0.0049
	(0.0266)	(0.0223)	(0.0114)	(0.0144)
observations	6,117	6,117	30,515	30,515
STATE	Yes	Yes	Yes	Yes
NATIONAL	Yes	-	Yes	-
Bank Fixed Effects	Yes	Yes	Yes	Yes
Year Dummies	Yes	-	Yes	-
Time Fixed Effects	-	Yes	-	Yes

Table 16: Panel (a) reports results from separately estimating equation 3.2 for stand alone banks and banks affiliated with a BHC. Panel (b) reports results for small banks only and panel (c) reports results for large banks only. A bank is affiliated with a BHC if they have a direct or regulatory holder identification number in a given quarter. Row 1 reports $\sum_{j=0}^{4} \widehat{\mu_j}$, row 2 reports $\sum_{j=0}^{4} \widehat{\phi_j}$, row 3 reports $\sum_{j=0}^{4} \widehat{\varphi_j}$. * indicates statistical significance at the 10% level. ** indicates statistical significance at the 5% level. *** indicates statistical significance at the 1% level.

Dependent Variable: Real Loan Growth				
Panel (a):	Small, BHC Affiliated - by liquidity ratio quartile			
Quartile:	**1st**	**2nd**	**3rd**	**4th**
Inter*MP	-0.0780***	-0.0683***	-0.0318**	-0.0235
	(0.0241)	(0.0124)	(0.0141)	(0.0169)
observations	110,076	106,942	103,685	95,872
Panel (b):	Small, Stand Alone - by liquidity ratio quartile			
Quartile:	**1st**	**2nd**	**3rd**	**4th**
Inter*MP	-0.0395***	-0.0143	-0.0132	-0.0265
	(0.0139)	(0.0119)	(0.0132)	(0.0181)
observations	94,483	94,184	91,622	90,163
Panel (c):	Large, BHC Affiliated - by liquidity ratio quartile			
Quartile:	**1st**	**2nd**	**3rd**	**4th**
Inter*MP	-0.0015	0.0260	0.0178	-0.0263
	(0.0586)	(0.0223)	(0.0131)	(0.0219)
observations	3,045	5,057	8,615	13,798
Panel (d):	Large, Stand Alone - by liquidity ratio quartile			
Quartile:	**1st**	**2nd**	**3rd**	**4th**
Inter*MP	-0.0820	-0.1319*	0.0562	-0.0221
	(0.2522)	(0.0774)	(0.0506)	(0.0561)
observations	669	1,323	2,017	2,108
Bank Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes

Table 17: This table reports results from estimating equation 3.2 by bank liquidity ratio quartile, with the 1st quartile being the least liquid and the 4th quartile being the most liquid. Panel (a) reports results for small banks affiliated with a bank holding company. Panel (b) reports results for small, stand alone banks. Panel (c) reports results for large banks affiliated with a bank holding company. Panel (d) reports results for large, stand alone banks.

Dependent Variable: Asset Growth				
Panel (a):	Small, BHC Affiliated - by liquidity quartile			
Quartile:	**1st**	**2nd**	**3rd**	**4th**
Inter*MP	-0.0165*	-0.0168*	-0.0253**	0.0197*
	(0.0093)	(0.0093)	(0.0100)	(0.0108)
Panel (b):	Small, Stand Alone - by liquidity ratio quartile			
Quartile:	**1st**	**2nd**	**3rd**	**4th**
Inter*MP	-0.0129	-0.0110	-0.0012	-0.0127
	(0.0111)	(0.0121)	(0.0124)	(0.0154)
observations	91,670	91,315	88,679	86,892

Dependent Variable: Securities Growth				
Panel (c):	Small, BHC Affiliated - by liquidity quartile			
Quartile:	**1st**	**2nd**	**3rd**	**4th**
sum of coefficients	(2)	(2)	(2)	(2)
Inter*MP	0.0617*	0.0698**	-0.0626**	0.0773*
	(0.0371)	(0.0283)	(0.0298)	(0.0456)
Panel (d):	Small, stand alone - by alternate liquidity ratio quartile			
Quartile:	**1st**	**2nd**	**3rd**	**4th**
Inter*MP	0.0161	-0.0368	0.0037	0.0456
	(0.0371)	(0.0403)	(0.0397)	(0.0448)
Bank Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes

Table 18: Panels (a) and (b) reports results from estimating equation 3.2 with asset growth as the dependent variable. Panel (a) reports results for small banks affiliated with a BHC. Panel (b) reports results for small, stand alone banks. Panels (c) and (d) reports results from estimating equation 3.2 with securities growth as the dependent variable. Panel (c) reports results for small banks affiliated with a BHC. Panel (d) reports results for small, stand alone banks. The sample is split by liquidity quartile, with the 1st quartile including the least liquid banks and the 4th quartile including the most liquid.

Share of Total Loans (National)			
	Whole Sample	1976 - 1985	1986 - 1994
Small Affiliated	0.16	0.13	0.18
Small Stand Alone	0.12	0.16	0.08
Large Affiliated	0.61	0.60	0.62
Large Stand Alone	0.11	0.11	0.12

Table 19: This table reports the share of total loans at the national level for four categories of banks: small banks (below the 95th percentile in assets) affiliated with a bank holding company (BHC), small stand alone banks, large banks (above the 95th percentile in assets) affiliated with a BHC, and large stand alone banks. Column 1 presents average share for the entire sample (1976-1994), column 2 presents average share for the early part of the sample (when the majority of states had not deregulated), and column 3 presents average share for the later part of the sample (when the majority of states had deregulated).

State-Level Results			
sum of coefficients	**All Banks**	**Small Affiliated**	**Small Stand Alone**
Intra*MP	0.0047	-0.0162	0.0241
	(0.0090)	(0.0259)	(0.0266)
Inter*MP	-0.0189	-0.0801*	0.1372
	(0.0399)	(0.0424)	(0.1092)
observations	3,621	3,539	3,621
	Large Affiliate	**Large Stand Alone**	
Intra*MP	0.0386	-0.0613	
	(0.0300)	(0.0617)	
Inter*MP	-0.0174	0.1382	
	(0.0536)	(0.1206)	
observations	3,367	1,639	
Bank Fixed Effects	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes

Table 20: This table reports results from estimating equation 3.2 with data aggregated at the state-level. The dependent variables for each respective column are real loan growth for all loans within a state, real loan growth for all small BHC affiliated banks within a state, real loan growth for all small stand alone banks within a state, real loan growth for all large BHC affiliated banks within a state, and real loan growth for all large stand alone banks within a state.

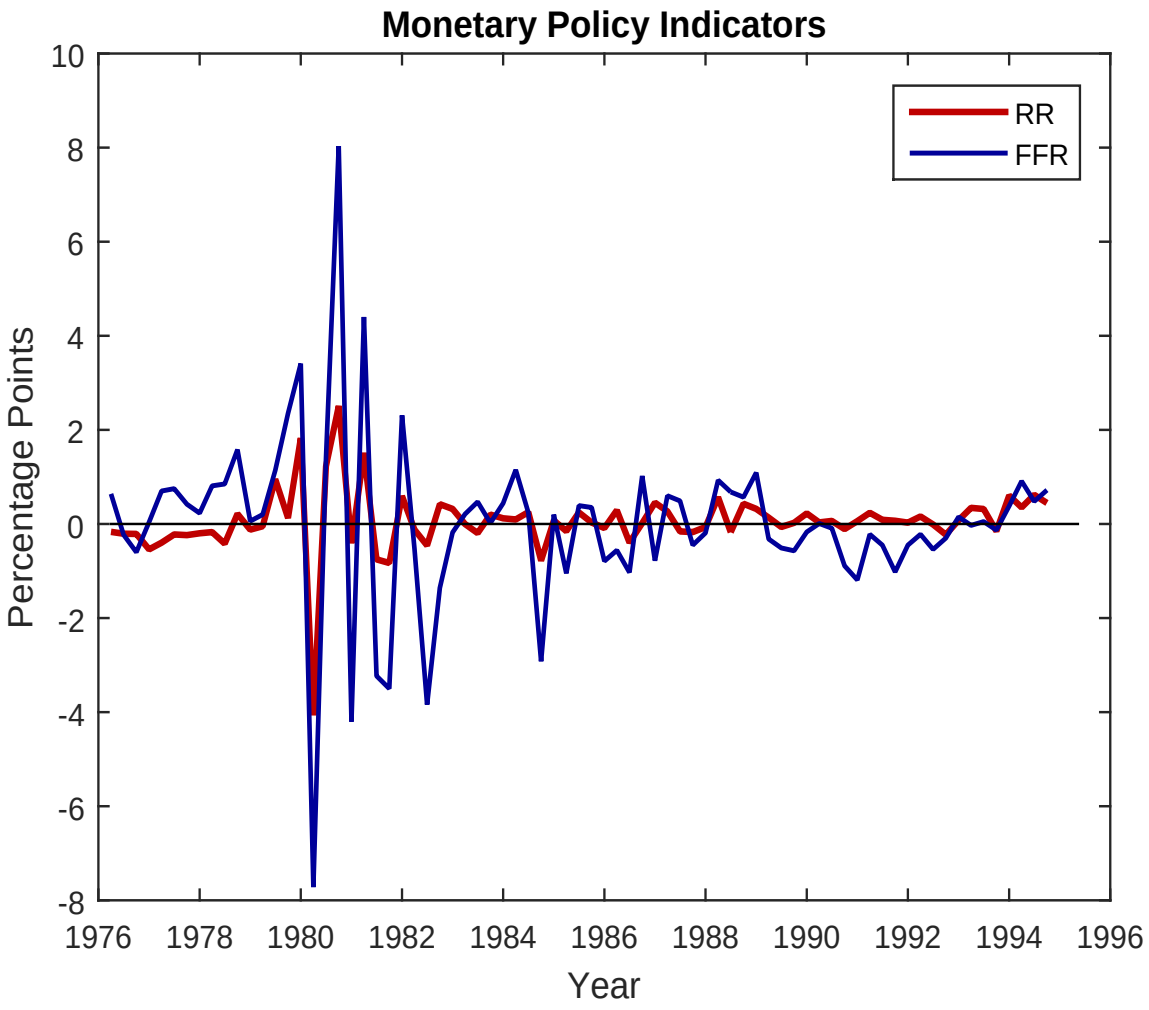

Figure 1: This figure plots the RR shock series in red and the quarterly change in the fed funds rate in blue from 1976-1994.

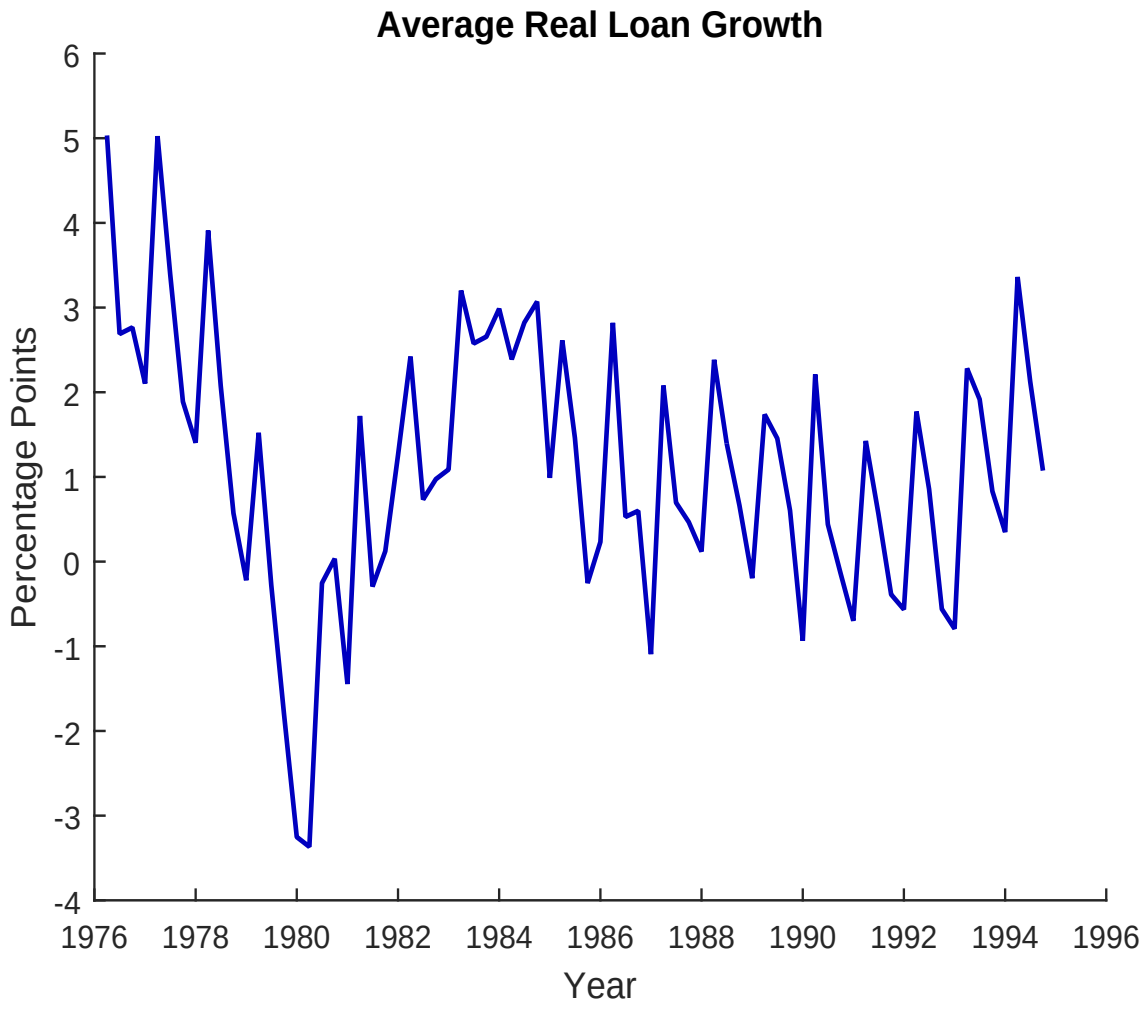

Figure 2: This figure plots average real loan growth from 1976-1994.

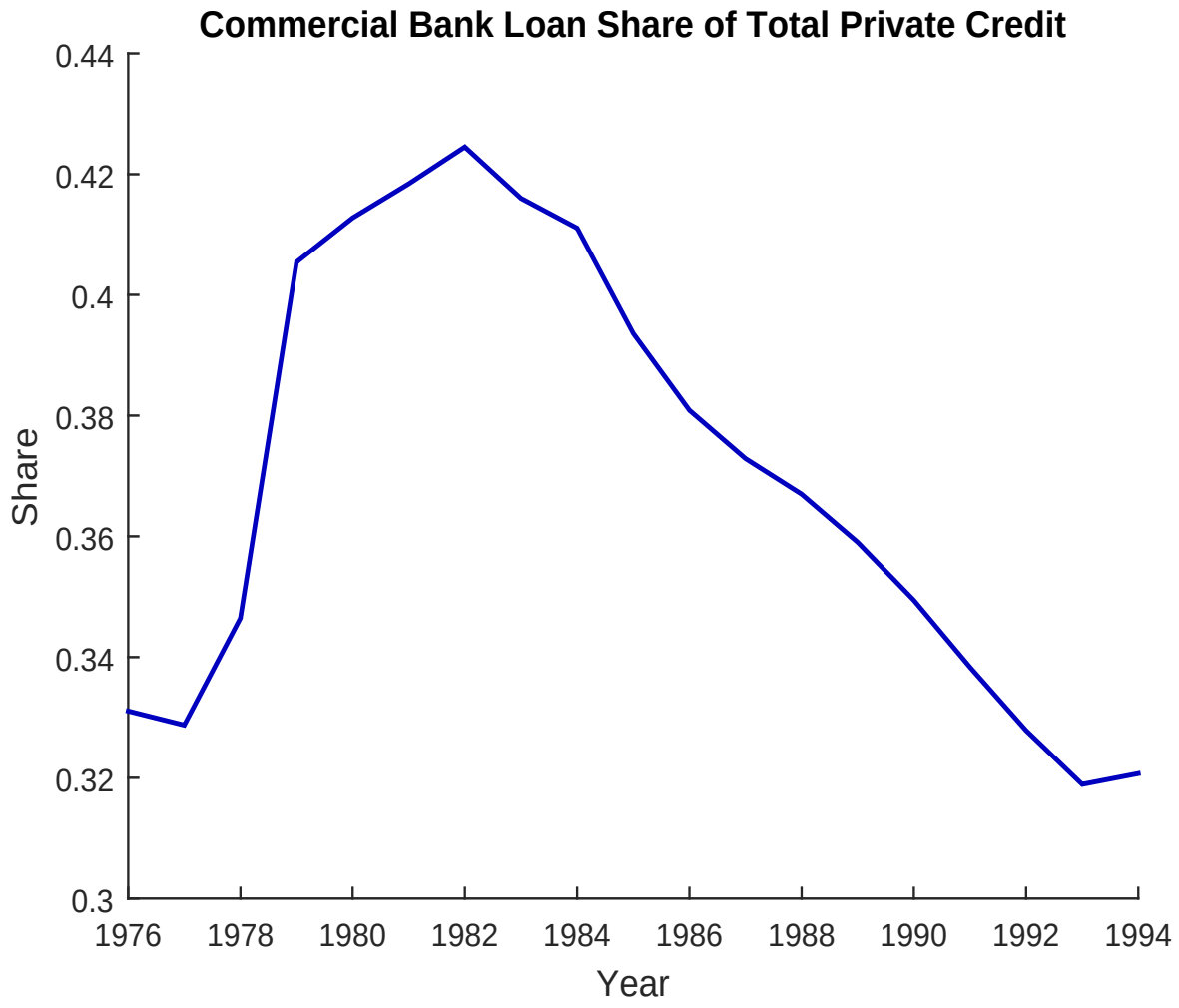

Figure 3: This figure plots aggregate bank lending in our sample as a share of total private credit in the U.S. from 1976-1994.

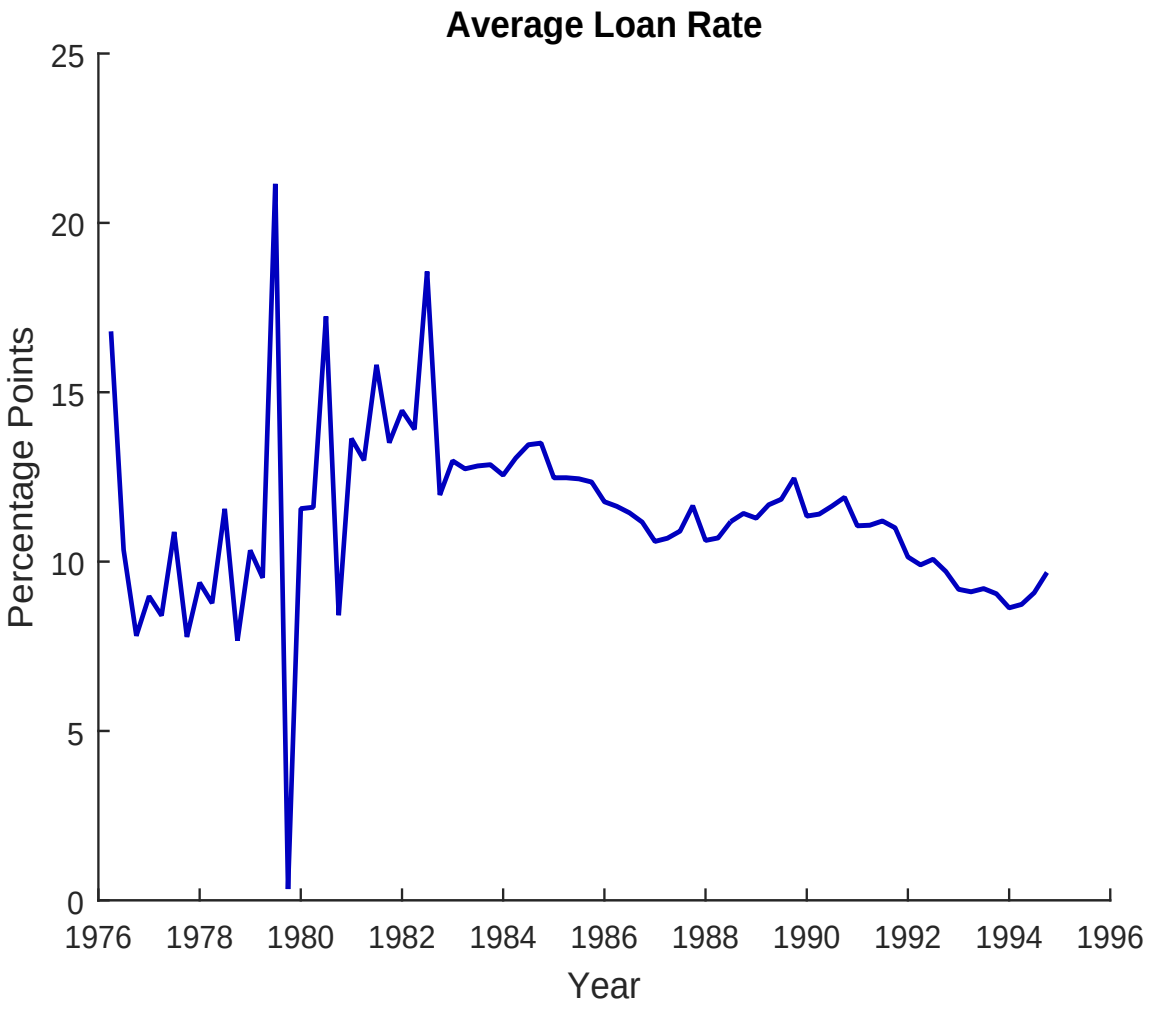

Figure 4: This figure plots the average ratio of interest and fee income on loans to total loans (average loan rate) for 1976-1994.

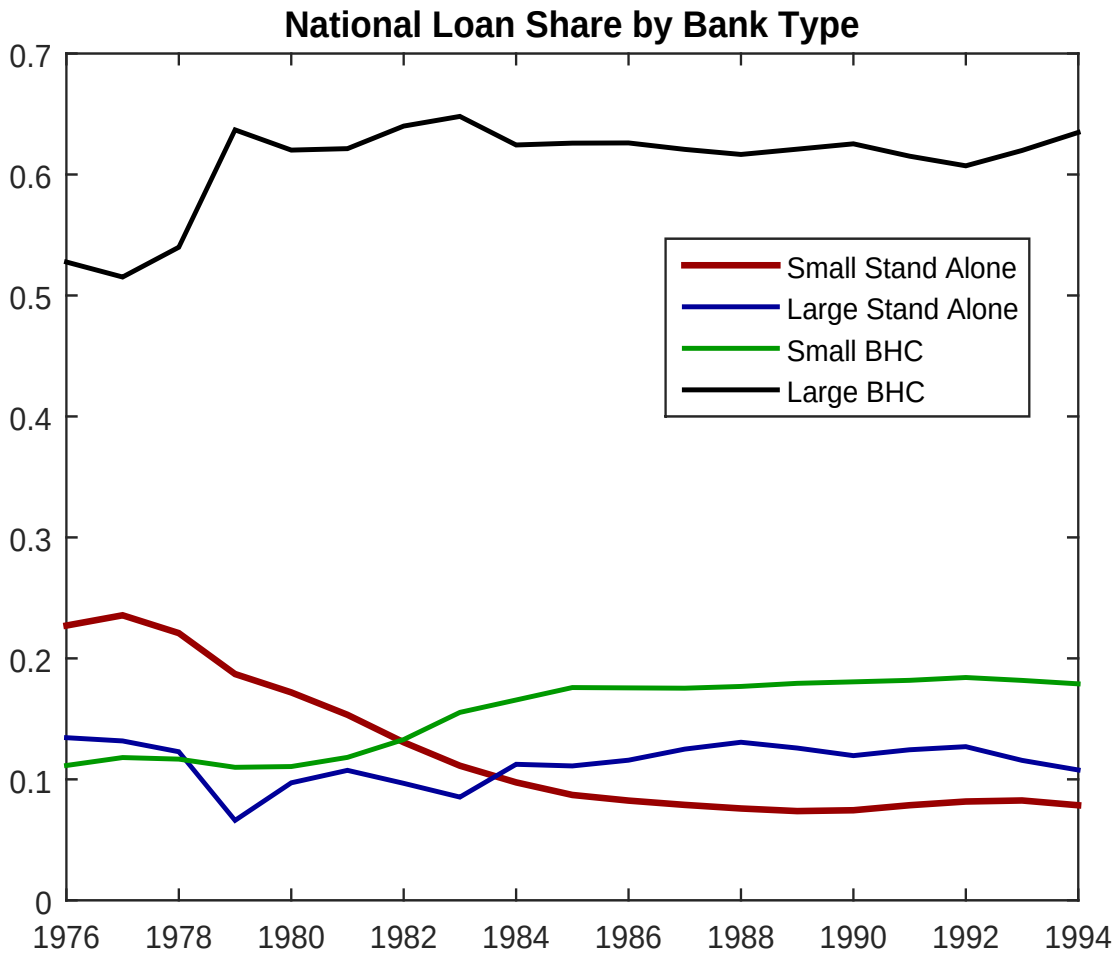

Figure 5: This figure plots the share of national lending for four types of banks from 1976-1994: small stand alone banks (unaffiliated with a BHC), small banks affiliated with a BHC, large stand alone banks, and large banks affiliated with a BHC.