How does the strength of monetary policy transmission depend on real economic activity?

Horacio Sapriza and Judit Temesvary

How does the strength of monetary policy transmission depend on real economic activity?[1]

Horacio Sapriza[2]

Federal Reserve Board

Judit Temesvary[3]

Federal Reserve Board

This version: February 2019

First version: November 2017

Abstract

We study the relationship between the strength of the bank credit channel (BCC) of monetary policy and real GDP growth in the United States using quarterly commercial bank level data between 1986 and 2008. We find that the BCC was significantly stronger during periods of low economic growth. Monetary policy is more effective through this channel in spurring economic activity during periods of low growth, rather than in cooling the economy when growth is high. Furthermore, we find that the BCC operated through a broader range of loan categories and banks than previously documented, underscoring this channel's economic relevance.

JEL codes: E3, E5, G2

Keywords: Bank lending channel; Monetary policy transmission; Bank balance sheet; GDP growth

1. Introduction

In understanding the behavior of the macro economy, it is critical to understand the channels through which monetary policy operates. To what extent does the rise in interest rates impact the lending of U.S. banks? Does the strength of this lending effect depend on economic growth? In this paper, we address these questions in detail. Our findings may provide useful insights into the strength of the bank credit channel in the coming years.

To address the above questions, we simultaneously investigate (1) if the bank credit channel was operational in U.S. banks' domestic lending during the period from 1986 to 2008, and (2) whether *economic activity* affects the strength of the bank credit channel of monetary policy. Regarding (1), we document that the bank lending channel, identified by Kashyap and Stein (2000) in the total and C&I lending of smaller banks from 1976 to 1993, was also present in other major lending categories. In addition, we find that the bank balance sheet channel of monetary policy operated not only through small banks, but also through US banks with the largest market shares in lending, which highlights the economic importance of this transmission mechanism.

Regarding (2), the main contribution of our paper is that we shed light on how *economic activity* affects the strength of the bank credit channel of monetary policy. What would such an effect look like? As the value of bank assets is more pro-cyclical than the value of liabilities, bank net worth is pro-cyclical. As a result, the external finance premium that "riskier" banks face during a monetary policy tightening is counter-cyclical. Therefore, *we expect the bank credit channel to be stronger during times of weak economic growth*. Indeed, our analysis finds that the underlying transmission mechanism of monetary policy is stronger when output growth is low, suggesting that the bank credit channel of monetary policy is a more potent tool when economic conditions

are weak. Moreover, our results suggest that for some of the major lending categories, the bank credit channel is operative almost exclusively in a low-growth environment. Interestingly, we do not find evidence of the relevance of the bank credit channel and the effect of economic activity on its strength in the post-2007 period, suggesting an important post-financial crisis change in the transmission mechanism of monetary policy through bank lending in the United States.

The paper proceeds as follows. In the remainder of this section, we develop our hypotheses and results in the context of the related literature. In Section 2 we describe our bank-level data and controls. We present our estimation methodology in Section 3, and we discuss the empirical results in Section 4. In Section 5 we show additional specifications and conduct robustness tests, and we conclude in Section 6.

1.1 Hypothesis development and literature review

One of our main findings is that the bank credit channel worked actively through U.S. banks' domestic lending from 1986 to 2008 – i.e., that a tightening in U.S. monetary policy reduced the lending of U.S. commercial banks, and monetary policy easing expanded such lending. The result derives from two simultaneous mechanisms. First, a tightening in monetary policy reduces the availability of funding to banks (Kashyap and Stein, 2000; Kishan and Opiela, 2000, 2006), causing (smaller) banks with less balance sheet liquidity to cut their lending – i.e., the bank lending channel of monetary policy (Kashyap and Stein, 1995). Second, the monetary effects on lending act through the net worth of banks, the bank balance sheet channel – i.e., because less capitalized banks (which investors judge to be riskier) find it increasingly expensive to replenish their liabilities in a higher interest rate environment, and thus reduce their lending.

The extensive literature on the bank credit channel dates back to Bernanke and Gertler (1995), who argued that changes in monetary policy impact the real economy in part by affecting banks' lending decisions. Kashyap and Stein (2000) established empirically the existence of the bank lending channel in the U.S. – one of the mechanisms through which the credit channel operates: a tightening in monetary policy makes reservable liabilities less available to banks, and hence reduces banks' lending. Kashyap and Stein (2000) also showed that this bank lending channel is the strongest amongst those banks with the most limited access to non-reservable liabilities such as wholesale funding: smaller banks, and among those, banks with less balance sheet liquidity (proxied with low securities to assets ratios).

In our analysis, we extend the period of the Kashyap and Stein (2000) study up to the global financial crisis and we show that the bank lending channel they identified continued to hold in the lending of smaller U.S. banks.[4] This finding is consistent with other studies in the bank lending channel literature. For instance, Altunbas et al (2009) showed that access to securitization is negatively related to the strength of the bank lending channel. Motivated by den Haan et al (2007), who find differences in the strength of the bank lending channel across target sectors, we study C&I, residential real estate (RRE) and consumer lending in addition to total lending flows. We find that the lending channel operates through smaller U.S. banks' RRE and consumer lending, even more strongly than via C&I lending.[5]

---

[4] Smaller U.S. banks are those below the 95th percentile of the cross-sectional distribution of asset size in each period. Cetorelli and Goldberg (2012) also extended the analysis through the 2000s and found evidence of the continued existence of the bank lending channel, using an alternative measure of balance sheet liquidity: the liquid assets ratio.
[5] In recent years, several new papers have studied the bank credit channel in a non-US context. Some papers focused on the strength of domestic monetary transmission in a foreign country (Jimenez et al, 2012; Ioannidou et al, 2015) while others examined the strength of the credit channel in an international context (Correa et al, 2015; Correa et al, 2017; Temesvary et al, 2018, among others).

The second mechanism underlying the bank credit channel is the bank balance sheet channel: following a tightening in monetary policy, investors judge financially "weaker", less capitalized (lower net worth), banks to be riskier (Bernanke, Gertler, and Gilchrist, 1999; Halvorsen and Jacobsen, 2016). As a result, such banks face a relatively larger increase in funding costs in funding markets (the external finance premium), which limits their lending. Temesvary et al (2018) show evidence of the bank balance sheet channel for total lending in the U.S. domestic context and in U.S. banks' cross-border lending, as do Correa et al (2017).[6]

We document the presence of the *bank balance sheet channel* of monetary policy for total, C&I, residential and consumer lending of smaller U.S. banks from 1986 to 2008. We find strong evidence that the lending of smaller U.S. banks with *lower equity capital ratios* (net worth) is significantly *more* affected by changes in U.S. monetary policy than the lending of better capitalized U.S. banks (Kishan and Opiela, 2000). In addition, we extend the study of the bank credit channel for lending by *all* U.S. banks, including larger banks, in contrast to most of the literature on monetary policy transmission via bank lending, which focuses on smaller banks. Weighing each observation by the lending bank's market share in each market segment, we find strong evidence that the bank balance sheet channel indeed affects the lending of *all* U.S. banks, even when we account for banks' market shares. This finding is policy relevant, as it provides evidence of the bank credit channel in the lending of the economically most significant banks with the highest market shares.

---

[6] A key challenge in identifying both mechanisms of the bank credit channel is to disentangle the effect of monetary policy on credit supply from its effects on credit demand (Bernanke and Blinder, 1992). Kashyap and Stein (2000) address this issue by including controls for macroeconomic developments, while comparing the impact of monetary policy on the lending of smaller banks with lower vs. higher securities ratios. Temesvary et al (2018) use extensive sets of fixed effects in their analysis of the bank credit channel in U.S. banks' domestic and cross-border lending to fully control for time-varying shocks to the demand for bank credit – while comparing the impact of monetary policy changes on the lending of more vs. less funding-constrained U.S. banks as Kashyap and Stein (2000) –.

Together with studying the credit channel in U.S. banks' domestic lending, our main research question focuses on: to what extent does the strength of this credit channel depend on aggregate, non-bank specific, factors – namely, economic activity? While earlier papers with micro data have investigated the role of various bank-specific variables, only a few studies have looked at the cyclicality in the transmission of monetary policy.[7] Aikman et al (2017) study how the "credit cycle" affects the impact of monetary policy on real economic activity, and find that monetary policy is more potent when credit conditions are tighter.

We investigate (to our knowledge, for the first time in the literature) how cyclicality in *economic activity* affects the relationship between monetary policy and credit conditions, i.e., the strength of the bank credit channel. The works of Bernanke et al (1999) and Matsuyama (2007) suggest that since bank net worth is pro-cyclical, the external finance premium that "riskier" banks face during a period of monetary policy tightening is counter-cyclical. Therefore, we expect the bank credit channel to be more potent during times of weak economic growth. Indeed, we show that the strength of the bank credit channel is significantly *stronger* both statistically and economically when the growth rate of real GDP is lower, and that the difference in the effectiveness of the channel is present even in the (market share-weighted) lending of all U.S. commercial banks; that is, we find the effect also for large banks.

Finally, we do not find strong evidence of the bank credit channel for the period after 2007, which is consistent with previous work suggesting that there has been a regime shift in the domestic

---

[7] Kashyap and Stein (2000) examine the role of bank size, and find that the lending channel is the strongest for smaller U.S. banks, which are more limited in their ability to obtain external funding. Cetorelli and Goldberg (2012) study whether "globally active" U.S. banks respond differently to changes in U.S. monetary policy. They find that "globalness" insulates U.S. banks from monetary policy, as they draw on the liquidity of foreign affiliates as a buffer.

transmission mechanism of US monetary policy through bank lending since the financial crisis (Civelli et al, 2018).

2. Data description

2.1. Lending flows and balance sheet controls

We use bank-level data on U.S. commercial banks from a merger-adjusted version of the publicly available Call Reports (Reports of Conditions and Income). Our dataset contains detailed balance sheet information for all U.S. commercial banks, with quarterly frequency between 1986 and 2008.

Our dependent variables, i.e., our measures of lending, are total, C&I, residential, and consumer lending flows. As is standard in the related literature, for each market segment we define lending flows as the quarterly change in the natural logarithm of each bank's stock of loans, multiplied by 100. Our main explanatory variables of interest are measures of how sensitive is a bank to changes in monetary policy. First, we use the securities to assets ratio (in accordance with the definition in Kashyap and Stein, 2000) as a proxy of "funding constraint" in our study of the bank lending channel. Second, we employ the equity capital ratio (as in Temesvary et al, 2018) to proxy banks' "funding constraint" when we study the bank balance sheet channel.

We also control for the effects of changes in banks' balance sheet conditions on credit supply that are unrelated to changes in monetary policy. We do so by using a set of balance sheet controls that include real net income, return on assets, level and growth of real total assets, and the deposits to assets ratio (which proxies for a bank's access to short-term liquid liabilities). We provide detailed definitions of the dependent and control variables, as well as summary statistics, in Table 1. We also include bank and, when possible, time (year:quarter)-specific fixed effects.

These fixed effects capture unobservable shocks to the demand and supply of credit that are specific to individual banks but invariant over time (such as banks' business model), and which vary over time but affect banks similarly (such as macroeconomic developments).

2.2. Monetary policy and real economic activity measures

The main macroeconomic variables of interest are our measure of changes in U.S. monetary policy, and a proxy for real economic activity. For the former, in line with the related literature (Kashyap and Stein; Correa et al, 2015; Temesvary et al, 2018; among others) we employ quarterly changes (expressed as percentage points) in the effective federal (fed) funds rate. Positive changes correspond to monetary tightening, while negative values indicate monetary easing. In robustness checks, we use monetary policy forecast errors as exogenous proxies of changes in monetary policy. In order to proxy real economic activity (economic growth) in the United States, we use quarterly changes in the real U.S. gross domestic product as our main measure. In additional specifications, we also use the GDP (output) gap and forecast values of GDP growth as exogenous proxies.

2.3. Controls for changes in credit demand

As discussed above, an important task we face is to control for macroeconomic changes that may affect banking clients' *demand* for credit in the United States. It is important to control for these effects, which are otherwise unobservable, to ensure our identification of the relationship between changes in U.S. monetary policy and banks' credit *supply* decisions. We include several *Macro Controls* to address this issue: the unemployment rate, a recession dummy, quarterly inflation and real aggregate investment. In addition, as *Demand Controls* we include weighted aggregated

controls for credit demand and standards from banks' responses to the quarterly Senior Loan Officer Opinion Surveys (SLOOS). In some specifications, we also replace such macro-level controls with time fixed effects to capture those time-varying macro-level shocks that are common across all commercial banks in our sample. These fixed effects also control for non-monetary policy related factors such as regulations, which might affect banks' lending (Frame et al, 2018).

3. Estimation methodology

We employ a continuous diff-in-diff estimation method to identify the bank lending and bank balance sheet channels of monetary policy, which has become standard in the related literature (see Kashyap and Stein, 2000; Cetorelli and Goldberg, 2012; among others). We take important steps beyond the estimation methodology of these earlier papers, however, by (1) examining the bank credit channel's interaction with economic activity, and (2) including fixed effects and extensive sets of controls (as described in the previous section) to eliminate non-monetary policy related confounding effects on lending flows.

Our main specification describes U.S. banks' quarterly lending flows as follows. Let $Y_{j,t}^n$ denote bank j's holdings of loans of type n (where n is one of total, C&I, CRE, RRE, and consumer) at time t. Then $\Delta \ln(Y)_{j,t}^n$ captures the quarterly change (from time $t\text{-}1$ to time t) of the natural logarithm of bank j's stock of loans of type n. Our specification is as follows:

(1) $\Delta \ln(Y)_{j,t}^n =$

$$\alpha + \sum_{k=1}^{4} \eta \Delta \ln(Y)_{j,t-k}^{n} + \sum_{k=1}^{4} \beta_k MP_{t-k}^{us} + \sum_{k=1}^{4} \gamma_k MP_{t-k}^{us} \times C_{j,t-k} + \sum_{k=1}^{4} \delta_k C_{j,t-k}$$

$$+ \sum_{k=1}^{4} \zeta \binom{Bank}{Controls}_{j,t-k} + (\sum_{k=1}^{4} \theta_k MP_{t-k}^{us} + \sum_{k=1}^{4} \lambda_k MP_{t-k}^{us} \times C_{j,t-k}$$

$$+ \sum_{k=1}^{4} \pi_k C_{j,t-k}) \times \Delta GDP_t + \eta \binom{Demand}{Controls}_{t-1}^{n} + \varepsilon_{j,t}^{n}$$

In Equation (1), $\Delta \ln(Y)_{j,t}^{n}$ denotes the quarter-to-quarter lending flow at the bank level as described above. The monetary policy variable *MP* is the quarterly change in the fed funds rate from time *t-1* to *t*. Furthermore, *C* denotes the bank's securities to assets ratio, later replaced by the equity capital to assets ratio.[8] As in Kashyap and Stein (2000) and Cetorelli and Goldberg (2012), we focus on the cumulative impact of monetary policy changes over the four preceding quarters.[9] Therefore, we include four lags of the monetary policy measure, the funding constraint proxy, and their interactions.[10] Furthermore, ΔGDP_t is the quarterly change (from *t-1* to *t)* in the U.S. real gross domestic product, as described above. The sets of *Bank Controls* and *Demand Controls* contains the variables described in the previous section. In addition, these vectors also include combinations of bank and time fixed effects to control for unobservable time-invariant bank-specific, and bank-invariant time-varying shocks, respectively, which impact lending flows.

Our strategy for identifying the bank credit channel of U.S. monetary policy focuses on the sign of the cumulative coefficients on the interaction term of the bank's funding ratio and the U.S.

---

[8] A potential concern is the feedback effect that may exist from domestic economic conditions to monetary policy changes. Given our identification strategy we are less concerned about domestic macroeconomic feedback effects into monetary policy (Acharya et al, 2016). Indeed, we identify monetary transmission from the *differential* response of funding-constrained vs. funding-abundant banks. Even if macro shocks simultaneously affect all banks' flows through monetary policy, the cross-bank *differences* in the strength of transmission should not be impacted.

[9] Our use of lagged values of the bank funding ratios ensures that these ratios may at most reflect *past* strategic choices of banks. The inclusion of four lags of the quarterly interest rate changes (as is standard in the related literature) ensures that we capture the cumulative effect of monetary policy changes throughout the previous year.

[10] Since a bank can choose its funding ratio strategically, the inclusion of lags of the funding ratio that are in time similar to those of the monetary policy changes (in their levels and interactions) reduces concerns that the funding ratio may be endogenous to the interest rate changes.

monetary policy change: $\sum_{k=1}^{4} \gamma_k$.[11] If U.S. banks that are flush with securities or equity capital reduce their lending flows *less* in response to a tightening in U.S. monetary policy than banks which have lower securities or equity capital ratios, we expect to find $\sum_{k=1}^{4} \gamma_k > 0$. Lastly, expectations as to the sign of $\sum_{k=1}^{4} \delta_k$ are mixed. In the international context, Temesvary (2014) finds that funding-constrained banks maintain higher (foreign) lending flows, suggesting a negative sum of coefficients. However, the results of Basset and Berrospide (2017) in the domestic context suggests a positive relationship between bank capitalization and lending for the CCAR banks over the past five years.

The key focus of our paper is on the role of real economic activity on the strength of the bank credit channel. The bank credit channel of monetary policy rests on frictions in banks' access to external funding, either due to inelastic supply of such funding (as in the bank lending channel) or agency costs (as in the bank balance sheet channel). Since bank net worth is pro-cyclical and thus the external finance premium is counter-cyclical (Bernanke et al 1999; Matsuyama, 2007), we expect both these frictions to be more pronounced when economic (and thus, market funding) conditions are tight, due to subdued economic activity. Therefore, we expect *the bank credit channel to be stronger in times of low economic* growth: $\sum_{k=1}^{4} \theta_k > 0$ and $\sum_{k=1}^{4} \lambda_k < 0$. In other words, we expect that higher GDP growth attenuate the strength of the bank credit channel of monetary policy by reducing the market frictions that the bank credit channel rests on.

4. Estimation results

---

[11] In Equation (1), the operation of the bank credit channel would suggest the direct effect of a tightening in U.S. monetary policy on bank flows to be negative: $\sum_{k=1}^{4} \beta_k < 0$, but such a result is not needed for our identification scheme. In fact, for C&I lending, den Haan et al (2007) and Civelli et al (2018) document an increase in business loans in response to monetary tightening.

Between the two prongs of the bank credit channel, we first examine the bank lending channel and its interaction with economic activity, as laid out in the Introduction. In Table 2, we consider smaller US banks' all-encompassing, total core lending.[12] Columns 1 to 4 examine the role of banks' securities holdings in mitigating the impact of monetary policy, as in Kasyhap and Stein (2000). In these estimations, we interact the bank lending channel strength measures with the U.S. real GDP growth rate.

We find strong evidence of the existence of the bank lending channel: the cumulative interaction of the securities to assets ratio (SEC) with quarterly changes in the fed funds rate is consistently statistically significant at the 1 percent level. Furthermore, the results also strongly confirm that this monetary transmission effect is particularly potent when economic growth is low: the coefficients on the double interaction terms are consistently negative and highly statistically significant. These effects are robust to the inclusion of extensive sets of macroeconomic and credit demand controls (Columns 2 and 3) as well as to the most stringent specification with time fixed effects (Column 4).

The calculations at the bottom of the table illustrate the role of economic activity. For instance in Column 1, a marginal increase in a bank's SEC ratio mitigates the impact of a change in monetary policy on total lending by 0.05 percentage points (pp) when economic growth is low (at the 10th percentile of the distribution of real GDP growth over time, which corresponds to a quarterly growth rate of 0.6 percent). However, this impact is infinitesimal when growth is high (at the 90th percentile, or 1.85 percent per quarter). These results are also economically significant. For instance, for the specification in Column 1, our calculations (not shown in the table) reveal

---

[12] Smaller U.S. banks are those below the 95th percentile of the cross-sectional distribution of asset size per period.

that in times of low economic growth, a funding constrained bank (at the 10th percentile of the

SEC distribution, which in our sample is zero) would reduce its total lending flows by 1.94 pp

more in response to a 100 bps tightening in U.S. monetary policy than would a funding abundant

bank (at the 90th percentile, which corresponds to a near 38 percent SEC ratio). However, the

relative magnitudes are much smaller, at 0.17 pp, during times of high economic growth.

These findings, which are qualitatively consistent across specifications, suggest that in total

lending the bank lending channel operates strongly when GDP growth is low, but does not operate

when GDP growth is high. Note that in periods of low economic growth, we tend to think of

monetary policy as typically easing, not tightening. Thus, the interpretation of our results through

this lens is that monetary policy is likely to be more effective through the bank credit channel when

it is trying to spur growth during periods of low growth, rather than in trying to cool down the

economy in periods of high growth.

We study the strength of the other mechanism of the bank credit channel, the bank balance

sheet channel of monetary transmission, in Columns 5 to 8 of Table 2. To do so, we consider the

interaction of changes in monetary policy with each bank's equity capital to assets ratio (CAR).

Therefore, this measure of funding constraint now replaces the SEC ratio, the funding constraint

measure we used in Columns 1 to 4. These specifications, which examine the bank balance sheet

channel of monetary policy in smaller banks' lending over the 1986-2008 period, are related to the

work of Kishan and Opiela (2000) – which focused on the 1980-1995 era.

The results in Columns 5 through 8 confirm the existence of the bank balance sheet channel

in U.S. banks' total lending flows – especially in low growth periods. The coefficients on the

(simple) the cumulative interaction of the fed funds rate changes and CAR are consistently positive

and significant at the 1 percent level. In addition, the double interaction of this term with the GDP

growth rate is negative and statistically significant. Calculations based on the coefficients in Column 6 reveal that a 100 bps tightening in the fed funds rate would lower the total lending flows of a bank with median CAR by 0.47 pp during a period of low growth, but the comparable negative effect in a high growth environment would be a lower reduction by 0.34 pp.

As before, the simple interaction term is significantly higher (at 0.09) when evaluated during a period of low growth, than in a high growth period (near zero). The economic effects are significant as well. A 100 bps increase in the fed funds rate would lower the total lending of a low capitalized bank (at the 10th percentile of the CAR distribution, which corresponds to 7.38 percent) by 0.51 pp more than the lending of a high capitalized bank (at the 90th percentile of CAR, which is 13.27 percent), in a low-growth environment. In contrast, when economic growth is high, this differential impact would be substantially smaller, at 0.03 pp.

The results discussed so far have focused on smaller US banks, weighing each bank equally – that is, without taking into account each bank's credit market share. However, in the highly concentrated US banking markets, the behavior of the largest banks can provide important insight about aggregate lending patterns. Thus, next we turn to studying the presence of the bank lending channel and the bank balance sheet channel in the weighted total lending flows of all U.S. commercial banks. The weighted estimations include *all* U.S. banks (the largest banks as well as the smaller banks we have studied thus far) and weigh each bank's lending flows by that bank's market share in the given market segment.

As expected based on the hypotheses laid out in the Introduction, we find no evidence of the presence of the bank lending channel in the weighted results (not shown).[13] In contrast, as

---

[13] That is, the assertion from Kashyap and Stein (2000) that the bank lending channel operates only on the lending of smaller banks that have more limited access to outside funding markets.

shown in Columns 9 through 12 of Table 2, we document the presence of the bank balance sheet channel in the weighted total lending flows regressions. The coefficients on the relevant simple interaction term show that in response to a 100 bps increase in the fed funds rate over four quarters, a 1 pp higher capital ratio would correspond to a 0.73 to 0.78 pp weaker lending decline. The double interaction terms reveal that even a 1 pp increase in the GDP growth rate would attenuate this differential impact by 0.79 to 0.88 pp. These relative magnitudes imply that in the weighted estimations, the bank balance sheet channel of monetary policy transmission is present only when economic growth is very low – notably, below the 25th percentile of the distribution of economic growth rates over our sample period. For instance, in terms of economic significance, the monetary transmission-mitigating impact of a higher CAR is 0.24 to 0.28 pp when economic growth is very low (at the 10th percentile, bottom rows of Table 2).

Our strong evidence of the bank credit channel for banks' total lending in Table 2 leads us to hone in on each of the economically more relevant core lending categories. We first evaluate the presence of the bank lending channel both in business financing, where we consider C&I and commercial real estate (CRE) lending, and in household financing, where we consider residential real estate (RRE) and consumer lending. Then, we perform a similar set of econometric exercises by lending category to assess the presence of the bank balance sheet channel.

Table 3 shows the results for C&I lending flows, estimated from the same specifications that we used for total lending. Columns 1 through 4 evaluate the bank lending channel, and we see that most of the relevant interaction coefficient estimates are larger during periods of low economic activity. For instance, in Column 1 the interaction of cumulative monetary policy changes with the SEC ratio (the simple interaction term) is 0.06 in a low growth environment, but is only 0.03 when economic growth is high. Furthermore, calculations also reveal that in response to a 100 bps

tightening in the fed funds rate (over four quarters), the lending of a funding-constrained bank would respond by 2.32 pp more than the lending of a funding-abundant bank – when economic growth is low. In a high-growth environment, this differential is only 1.18 pp. The results of the fourth column, which is our most complete fixed effects specification, suggest that the bank lending channel was operative during our sample period. However, this channel was not significantly stronger in periods of weak output growth, which highlights the importance of other lending categories in driving the differential effectiveness of monetary policy documented for total lending. Columns 5 to 8 provide the results for CRE lending. However, the lack of significance and change in signs of the coefficients of interest across specifications indicate that the bank lending channel did not operate through CRE lending during our sample period.

The lack of significance for CRE lending, the weak result obtained for the fixed effects specification in C&I lending, and the sole focus of earlier work (Kashyap and Stein, 2000, Cetorelli and Goldberg, 2012) on total and C&I lending flows, suggest that our disaggregated analysis (evaluating all the major loan type categories separately) can be quite helpful to better explain how the bank lending channel of monetary policy operates in the United States. Therefore, in Table 4 we run the same specifications as in Table 3, now for lending to households: residential and consumer lending flows. Importantly, we find evidence of the bank lending channel of monetary policy both in residential (Columns 1 through 4) and consumer lending (Columns 5 through 8).

Looking at residential flows first, the simple and double interaction terms are consistently positive and negative, respectively, and significant at the 1 percent level throughout. For instance, in Column 1, the value of the simple interaction term (the mitigating effect of a higher SEC ratio on the direct impact of monetary policy) is 0.06 when evaluated at low economic growth, but is much smaller near zero, when evaluated in a high growth environment (as show in the calculations

at the bottom of the table). Furthermore, this same column also reveals that a 100 bps tightening in the fed funds rate over four quarters would reduce the residential lending of a funding constrained bank by 1.47 pp more than the lending of a more funding abundant bank, in a low economic growth environment. However, this differential effect is substantially lower, at 0.06 pp, in a high growth environment.

Turning to consumer lending in Columns 5 through 8, the magnitudes of the coefficients of interest are somewhat smaller, but the simple and double interaction coefficients are consistently and significantly positive and negative, respectively, as before. As shown for example in Column 5, the simple interaction term is 0.04 in a low growth environment, but infinitesimal in a high-growth environment. Accordingly, a 100 bps tightening in U.S. monetary policy over four quarters would reduce the consumer lending of a funding-constrained U.S. bank by 1.59 pp more than the consumer lending flows of a funding-abundant bank, in a low-growth environment. This differential effect is smaller, at near 0.41 pp, in a high-growth environment. The results (also in Tables 2 and 3) reveal that banks with higher SEC ratios lend substantially more, all else equal, than their more funding-constrained counterparts.

For each major lending category, we now turn to analyze the strength of the second mechanism of the bank credit channel, the bank balance sheet channel of monetary transmission. In Table 5 we repeat the specifications in Table 3, now interacting changes in monetary policy with each bank's capital ratio. As expected, Columns 1 through 4 show that C&I lending by low capitalized banks responds more strongly to changes in U.S. monetary policy, and the differential is larger when economic growth is low. For instance, Column 2 reveals that a 100 bps tightening in the fed funds rate would lower the C&I lending growth of a low capitalized bank 0.63 pp more than that of a high capitalized bank when economic growth is low – but by much less (0.03 pp)

when growth is high. Importantly, the specifications for C&I lending throughout Table 5 consistently show that well-capitalized banks maintain significantly higher lending growth than low capitalized ones.[14] In contrast, as shown in Columns 5 to 8, there is neither evidence of higher CRE lending growth for higher capitalized banks, nor evidence supporting the presence of a bank balance sheet channel operating through this lending category during the period.

In Table 6 we repeat the Table 5 specifications, studying the bank balance sheet channel of monetary policy by using the equity capital to assets ratio as a measure of a bank's funding constraint. However, instead of focusing on C&I and CRE, we run the analysis for the major household financing categories, i.e., RRE and consumer lending. We find some evidence that lower capitalized banks' residential lending flows respond stronger to changes in U.S. monetary policy, especially in lower growth periods. The coefficients on the simple and double interaction terms are always positive and negative, respectively, and generally statistically significant, including in the most stringent specification that includes bank and time fixed effects. In Column 2, for instance, the differential response of a low capitalized bank to a 100 bps tightening in the fed funds rate is 0.36 pp greater than that of a low capitalized bank when growth is low, but this differential response is near zero when economic growth is high. There is no evidence of the bank balance sheet channel in consumer lending (Columns 5 through 8 of Table 6). However, the result that better capitalized banks lend significantly more, prevails throughout all specifications.

In Tables 7 and 8, we use the weighted estimations to analyze the presence of the bank balance sheet channel in each of the major lending categories. To this end, as we did for total lending, we include all U.S. banks and weigh each bank's lending flows by that bank's market

---

[14] Basset and Berrospide (2017) find similar effects for the CCAR banks for the 2012-2016 period.

share in the given market segment. In Table 7 we study the bank balance sheet channel for business financing, looking at the C&I and CRE lending flows of all U.S. commercial banks. We find significant and large coefficient estimates in our analysis of weighted C&I lending flows (Columns 1 through 4). The simple interaction coefficient estimates range from 1.10 to 1.25 in magnitude, and the double interaction coefficients are in the 1.08 to 1.13 range – all significant at the 1 percent level. The relative magnitudes of these coefficients suggest that, as in the case of total lending flows, the bank balance sheet channel of monetary policy transmission is present in C&I lending flows only in times of low economic growth. Additionally, the strong positive relationship between capitalization and lending growth that we highlighted when discussing non-weighted results, no longer holds in our weighted estimations for either C&I or CRE lending. The CRE lending results, shown in Columns 5 to 8, also suggest that the bank balance sheet channel was not present during our sample period.

In Table 8, we examine the strength of the bank balance sheet channel in all U.S. banks' weighted residential and consumer lending flows. There is no evidence of the existence of the bank balance sheet channel of monetary policy transmission in residential lending flows (Columns 1 through 4). However, we do find strong and consistent evidence in consumer lending flows (Columns 5 through 8) – where the coefficients on the interaction terms are large and significant at the 1 percent level throughout. The economic significance of these results is notable: for instance, calculations based on the coefficient estimates in Column 7 imply that for a bank with the median capital to assets ratio, a 100 bps increase in the fed funds rate would reduce consumer lending flows by 1.14 pp, at the median economic growth rate. The negative and significant coefficients on the double interaction terms suggest that these negative lending effects are significantly larger in periods of low economic growth. Indeed, a 100bps increase in the fed funds

rate lowers the lending growth of a low capitalized bank substantially more than that of a high capitalized bank when economic growth is low – but this differential reverses sign when growth is high, suggesting the lack of a bank balance sheet channel.

4.2. Alternative specifications

To alleviate concerns about potential endogeneity of GDP growth to monetary policy actions driving our results, we also repeat our estimations instrumenting actual concurrent GDP growth with one-quarter lagged forecast values. This instrumental variable is yesterday's prediction of today's GDP growth rate, and thus it is not correlated with today's macro indicators.

Table 9 repeats the most stringent specification, with fixed effects, for smaller US banks and each major loan category, using the IV formulation.[15] Our IV results confirm the presence of the bank lending and bank balance sheet channels for total lending and all the core lending categories except CRE. The findings are consistent in magnitude and statistical significance with the main outcomes we described earlier, suggesting that our benchmark findings are robust to correcting for potential endogeneity bias. The last five columns of Table 9 repeats the IV regressions testing the bank balance sheet channel, now including all banks and weighing each observation by the bank's market share in each lending segment. The relevant coefficients have the expected signs but are not statistically significant, except for RRE lending. The bank balance sheet channel has only been present in this lending category, and has operated largely during periods of low output growth.

---

[15] The first column in Table 9 corresponds to the Column 4 specification of Table 2; Column 2 is the Column 4 specification of Table 3, and so forth. In this way, for each loan type we repeat the most complete specification, which uses bank and time fixed effects.

We also extend our analysis to the crisis/post-crisis period of 2008-2016. Earlier papers established the substantial reduction in banks' loan supply following the large crisis-induced reduction in the availability of liquid funding to banks (Altunbas et al, 2011; Cetorelli and Goldberg, 2012). Importantly, in this exercise our goal is to examine the crisis effect on the *relationship* between monetary policy and bank lending, rather than studying the direct lending effect of the crisis which these earlier papers focused on.

In Table 10, we repeat the most complete specifications for each loan type from Tables 2 through 8 for the 2008-2016 period using Krippner (2016)'s shadow short-term interest rate as our measure of the stance of the post-2007 "nonconventional" monetary policy actions (that is, the period during which the effective lower bound was binding). During this period, we do not find consistently significant evidence of the existence of either the bank lending or the bank balance sheet channel of monetary policy transmission. Banks' lending incentives may be different during this period due to the large quantities of reserves they hold. Still, it is an interesting finding in the domestic context, seeing as Morais et al (2017) and Temesvary et al (2018) found some evidence of the bank credit channel in U.S. banks' lending in foreign countries.

5. Robustness

5.1. Using monetary policy forecast errors

In Table 1A, we repeat our benchmark specifications, now using the Romer and Romer monetary policy forecast residuals as our monetary policy measures (as updated by Wieland and Yang, 2015) in place of the quarterly change in the fed funds rate. In these estimations (which are select specifications from Tables 2 through 8) we continue to find evidence of the bank lending channel in smaller banks' lending: the simple and double interactions in specifications using the SEC ratio

are significantly positive and negative, respectively. However, we do not find consistent evidence of the balance sheet channel using the Romer residuals as our measures of monetary policy (Columns 6 through 15).

5.2. Bank credit channel in an underperforming economy – When GDP growth is below trend

In Table 2A, we examine the bank credit channel when the US economy is operating "below trend" – that is, when the output gap (as defined by the Congressional Budget Office, or CBO) is below zero.[16] Regarding the bank lending channel (Columns 1 through 5), results suggests that this channel operates stronger when the economy is under-performing. This finding is in line with the literature which shows that the funding cost-alleviating role of banks' net worth is particularly expressed when economic activity is low (Bernanke, Gertler and Gilchrist, 1999). Regarding the bank balance sheet channel, this channel also operates stronger through *smaller* banks' lending when economic activity is weak (Columns 6 through 10) – however, in weighted estimations such ranking is not consistently observable (Columns 11 through 15). This finding is in line with the implications from our benchmark results: the bank balance sheet channel is more cyclical in the lending of smaller US banks.

5.3. Asymmetries: Bank credit channel during monetary policy tightening vs. easing

Another interesting question to examine is the extent to which there may be asymmetries in the operation of the bank credit channel, depending on whether the Federal Reserve is tightening or easing monetary policy. Kishan and Opiela (2000) has established evidence of such asymmetries

---

[16] The CBO calculates GDP growth trend, and therefore GDP gaps, over the 1949-2017 period. As result of using a different "reference period", there are notably higher number of "below trend" observations during our 1986-2008 period than "above trend". However, we believe that using the CBO's longer reference period is more representative than calculating the GDP growth trend over our sample.

during the first part of our sample, for both the bank lending and bank balance sheet channels. In addition to expanding the study of such asymmetries through 2008, more importantly we also examine how asymmetries may be related to real economic conditions.

In Table 3A, we repeat the most complete specifications (including bank and time fixed effects) from Tables 2 through 4. We now separately examine our results during quarters of monetary policy easing (that is, when the cumulative change in the fed funds rate over the preceding four quarters is negative, in Columns 1 through 5) and monetary policy tightening (when the cumulative change in the fed funds rate is positive, in Columns 6 through 10). Similarly, in Tables 4A and 5A we repeat the most complete specifications from Tables 2, 5 and 6 (the bank balance sheet channel in smaller banks' lending) and Tables 2, 7 and 8 (the bank balance sheet channel in weighted estimations), respectively.

These results show that the cyclicality of the bank lending channel (Table 3A, second row) is somewhat more detectable during periods of monetary policy easing. Similarly, Table 4A shows that the bank balance sheet channel is substantially stronger during periods of monetary policy easing (Columns 1 through 5). Such ranking is less clear when looking at the bank balance sheet channel in weighted estimations (Table 5A). The general policy implication of these asymmetries is that during periods of low economic growth, expansionary monetary policy's operation through the bank credit channel through smaller banks' lending is especially potent.

5.4. Bank credit channel and the business cycle

In additional estimations (available from the authors upon request), we also examine the strength of the bank credit channel at various points along the business cycle. We do so by replacing real GDP growth with the CBO output gap in Equation (1) – thus, now studying both "above trend"

and "below trend" periods. These results confirm our earlier evidence that the bank credit channel is counter-cyclical – however, there are notable differences across sectors in this cyclicality.

5.5. Bank credit channel and the business cycle – Using monetary policy forecast errors

We also re-examine the relationship between the bank credit channel and the business cycle, now using monetary policy forecast errors as our monetary policy measure. Specifically, we repeat our benchmark specifications using the CBO's output gap as measures of the business cycle, and we also replace the quarterly change in the fed funds rate with the Romer and Romer monetary policy forecast residuals. Doing so, we strongly confirm our benchmark results that (1) the bank credit channel operates strongly, and (2) the bank credit channel is counter-cyclical (that is, particularly strong when economic activity is weak).

5.6. Bank balance sheet channel of monetary policy in "smaller" banks' lending

In our analysis, we focused on the subset of smaller banks to examine the bank lending channel and bank balance sheet channels of monetary policy. We then proceeded to conduct weighted estimations to study the bank balance sheet channel in all banks' lending. In our benchmark hypotheses and results we did not focus on the bank lending channel in all bank's lending, because the work of Kashyap and Stein (2000) suggests such channel operates only in the lending of the (more funding access-constrained) smaller banks. However, for completeness in additional specifications we also carry out these estimations, and as expected, do not find evidence of the bank lending channel in weighted estimations on all banks' lending.

6. Conclusions

We study the bank credit channel of monetary transmission in U.S. commercial banks' lending flows. We find that monetary policy is more effective through the bank credit channel when it is trying to spur growth during periods of low growth, rather than in trying to moderate economic activity in periods of high growth. Our results are fourfold: first, we provide evidence of the bank lending channel in various types of lending by smaller U.S. banks from 1986 to 2008, and we show that this channel is significantly stronger in times of low economic growth. Second, we show that the bank balance sheet channel is also present in these banks' lending flows, and it is also stronger in a low growth environment. Third, when we consider *all* U.S. commercial banks' weighted lending flows, we find strong evidence of the bank balance sheet channel. Fourth, we do not detect a bank credit channel post-2007.

In understanding the behavior of the macro economy, it is critical to understand the channels through which monetary policy operates. Our estimates, based on historical analysis, may provide insight into the strength of the bank credit channel in the coming years.

References

Aikman, David, Andreas Lehnert, Nellie Liang and Michele Modugno (2017). "Credit, financial conditions, and monetary policy transmission," *Brookings Institution Working Paper* 39.

Acharya, V.V., T. Eisert, C. Eufinger and C.W. Hirsch (2016). Whatever it Takes: The Real Effects of Unconventional Monetary Policy. New York University, New York NY.

Altunbas, Yener, Leonardo Gambacorta and David Marques-Ibanez (2009). "Securitization and the bank lending channel," *European Economic Review* 53, pp. 996-1029.

___ (2011). "The bank lending channel: Lessons from the crisis," *Economic Policy* 26(66), pp. 135-182.

Basset, William and Jose Berrospide (2017). "The Impact of Stress Tests on Bank Lending," Working paper.

Bernanke, B.S. and A.S. Blinder (1992). "The Federal Funds Rate and the Channels of Monetary Transmission, *American Economic Review* 82, pp. 901-921.

Bernanke, B.S. and M. Gertler (1995). "Inside the Black Box: The Credit Channel of Monetary Policy Transmission," *Journal of Economic Perspectives* 9, pp. 27-48.

Bernanke, B. S., Mark Gertler and Simon Gilchrist (1996). "The Financial Accelerator and the Flight to Quality," *Review of Economics and Statistics* 78(1), pp. 1–15.

Cetorelli, Nicola and Linda S. Goldberg (2012a). "Banking Globalization and Monetary Transmission," *Journal of Finance* 67, pp. 1811-1843.

Civelli, A., S. Barraza and N. Zaniboni (forthcoming). "Business loans and the transmission of monetary policy," *Journal of Financial & Quantitative Analysis*.

Correa, Ricardo, Linda S. Goldberg and Tara Rice (2015). "International Banking and Liquidity Risk Transmission: Evidence from the United States," *IMF Economic Review* 63, pp. 626–643.

den Haan, Wouter J., Steven W. Sumner and Guy M. Yamashiro (2007). "Bank loan portfolios and the monetary transmission mechanism," *Journal of Monetary Economics* 54(3), pp. 904-924.

Frame, W. Scott, Atanas Mihov and Leandro Sanz (forthcoming). "Foreign Investment, Regulatory Arbitrage, and the Risk of U.S. Banking Organizations," *Journal of Financial & Quantitative analysis.*

Halvorsen, Jorn and Dag Henning Jacobsen (2016). "The bank lending channel empirically revisited," *Journal of Financial Stability* 27, 95-105.

Ioannidou, V.P., Steven Ongena and Jose-Luis Peydró (2015). "Monetary Policy, Risk-Taking and Pricing: Evidence from a Quasi-Natural Experiment," *Review of Finance* 19, pp. 95-144.

Jiménez, G., Steven Ongena, S., Jose-Luis Peydró and J. Saurina (2012). "Credit Supply and Monetary Policy: Identifying the Bank Balance-Sheet Channel with Loan Applications," *American Economic Review* 102, pp. 2301-2326.

Kashyap, Anil K. and Jeremy C. Stein, Jeremy (1995). "The impact of monetary policy on bank balance sheets," *Carnegie-Rochester Conference Series on Public Policy* 42, pp. 151-195.

___ (2000). "What Do A Million Observations on Banks Say About the Transmission of Monetary Policy?" *American Economic Review* 90, 407-428.

Kishan, Ruby P. and Timothy P. Opiela (2000). "Bank size, bank capital and the bank lending channel," *Journal of Money, Credit and Banking* 32(1), 121-141.

___ (2006). "Bank capital and loan asymmetry in the transmission of monetary policy," *Journal of Banking & Finance* 30, 259-285.

Krippner, Leo (2016). "Documentation for United States Measures of Monetary Policy," Reserve Bank of New Zealand.

Morais, Bernardo, Jose-Luis Peydró and Claudia Ruiz (2017). "The International Bank Lending Channel of Monetary Policy Rates and QE: Credit Supply, Reach-for-Yield, and Real Effects," *International Finance Discussion Papers* 1137.

Temesvary, Judit (2014). "The Determinants of U.S. Banks' International Activities," *Journal of Banking and Finance* 44, pp. 233-247.

Temesvary, Judit, Steven Ongena and Ann L. Owen (2018). "A Global Lending Channel Unplugged? Does U.S. Monetary Policy Affect Cross-border and Affiliate Lending by Global U.S. Banks?" *Journal of International Economics* 112, pp. 50-69.

Wieland, J.F. and M.-J. Yang (2017). "Financial Dampening," Working paper.

Table 1: Summary statistics and definitions of model variables

Variables	Units	Definition	[1] mean	[2] sd	[3] min	[4] p25	[5] p50	[6] p75	[7] max	[8] N
Lending flows										
Total	%	Quarterly change in the natural logarithm of each bank's stock of total loans, multiplied by 100	2.088	5.637	-49.75	-0.73	1.845	4.621	49.96	523,517
Commercial & Industrial (C&I)	%	Defined as above, for C&I loans	1.708	12.47	-49.99	-4.638	1.388	8.008	50	512,551
Residential	%	Defined as above, for residential loans	1.869	8.312	-50	-1.841	1.372	5.066	49.98	519,370
Other categories	%	Defined as above, for "other" loans	0.888	9.789	-49.98	-3.629	0.74	5.271	49.98	517,041
Measures of funding constraint										
Leverage ratio	%	Total equity capital divided by total assets, multiplied by 100	9.835	2.344	6.366	8.092	9.244	11.02	18.21	519,323
Securities to assets ratio	%	Total securities holdings divided by total assets, multiplied by 100	12.51	16.21	0	0	4.39	21.36	65.47	523,516
Bank characteristics										
Log of real net income	Integers	Natural logarithm of each bank's net income, deflated using the PCE of 2016 Q3	5.872	1.673	-1.184	5.123	6.04	6.918	11.57	523,517
Return on assets	%	Total income divided by total assets, multiplied by 100	0.686	0.539	-3.434	0.336	0.629	0.992	2.58	523,517
Log of real total assets	Integers	Natural logarithm of each bank's total assets, deflated using the PCE of 2016 Q3	11.11	1.009	7.275	10.4	11.08	11.78	14.12	523,517
Growth of real total assets	%	Quarterly change in the natural logarithm of each bank's real total assets, times 100	1.775	4.713	-11.99	-0.808	1.352	3.789	30.78	523,517
Deposits to assets ratio	%	Total deposits divided by total assets, multiplied by 100	0.857	0.063	0.0391	0.834	0.872	0.897	0.947	523,517
Macro controls										
Unemployment rate	%	Number of unemployed divided by the labor force	5.537	1.011	3.9	4.7	5.5	6.2	7.6	523,517
Recession dummy	0/1	Indicator variable which takes a value of 1 in quarters where the U.S. economy is in a recession as characterized by the NBER, and 0 otherwise	0.0939	0.292	0	0	0	0	1	523,517
Quarterly change in the fed funds rate	%	Quarterly change in the effective federal funds rate	-0.0951	0.503	-1.424	-0.242	-0.013	0.226	0.701	523,517
Quarterly real GDP growth	%	Quarterly change in the natural logarithm of total U.S. GDP, deflated using the PCE of 2016 Q3	1.247	0.587	-1.994	1.017	1.232	1.612	2.436	523,517
Quarterly inflation	%	Quarterly change in the natural logarithm of the U.S. PCE	0.425	0.297	-1.451	0.332	0.431	0.532	1.037	523,517
Log of real investment	Integers	Natural logarithm of total U.S. investment, deflated by the PCE of 2016 Q3	7.309	0.328	6.726	7.039	7.389	7.533	7.797	523,517
Demand and risk controls										
Excess bond premium	%	Excess bond premium (monthly averaged to quarterly)	-0.00618	0.56	-0.832	-0.408	-0.092	0.159	2.528	523,517
SLOOS demand index	Integers	Macro weighted SLOOS variable - demand across all loan categories	-0.0168	0.201	-0.568	-0.139	-0.0371	0.132	0.389	497,328
SLOOS standards index	Integers	Macro weighted SLOOS variable - standards across all loan categories	0.0806	0.219	-0.196	-0.0814	0.0384	0.178	0.873	514,728

Table 2: The impact of changes in U.S. monetary policy on the **total** lending of U.S. banks with different securities to assets or leverage ratios: 1986-2008

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
Lending flows:	*Total*	*Total*	*Total*	*Total*	*Total*	*Total*	*Total*	*Total*	*Total*	*Total*	*Total*	*Total*
Ratio	*Securities to Assets*	*Securities to Assets*	*Securities to Assets*	*Securities to Assets*	*Leverage*	*Leverage*	*Leverage*	*Leverage*	*Leverage*	*Leverage*	*Leverage*	*Leverage*
Variables												
Quarterly Change in the Fed Funds Rate {t-1 to t-4}	0.108 [0.0745]	0.324 [0.0948]***	0.912 [0.115]***		-0.798 [0.269]***	-0.878 [0.28]***	-1.838 [0.29]***		-5.385 [3.046]*	-2.99 [2.937]	-2.991 [3.261]	
Quarterly Change in the Fed Funds Rate * GDP Growth {t-1 to t-4}	-0.070 [0.0546]	-0.473 [0.0641]***	-0.668 [0.0707]***		0.525 [0.19]***	0.147 [0.195]	1.174 [0.201]***		6.246 [2.502]**	3.872 [2.397]	3.798 [2.787]	
Quarterly Change in the Fed Funds Rate * Ratio {t-1 to t-4}	**0.074 [0.00378]***	**0.027 [0.00393]***	**0.034 [0.00398]***	**0.023 [0.00464]***	**0.090 [0.0268]***	**0.131 [0.0268]***	**0.125 [0.0268]***	**0.158 [0.0268]***	**0.750 [0.339]**	**0.735 [0.332]**	**0.718 [0.329]**	**0.729 [0.329]**
Quarterly Change in the Fed Funds Rate * Ratio * GDP Growth {t-1 to t-4}	**-0.038 [0.0025]***	**-0.019 [0.00261]***	**-0.024 [0.00265]***	**-0.020 [0.00323]***	**-0.047 [0.019]**	**-0.074 [0.0191]***	**-0.073 [0.0191]***	**-0.095 [0.0191]***	**-0.789 [0.303]***	**-0.809 [0.292]***	**-0.793 [0.291]***	**-0.815 [0.295]***
Ratio {t-1 to t-4}	0.024 [0.00269]***	0.020 [0.00303]***	0.027 [0.0031]***	0.029 [0.00358]***	0.188 [0.0233]***	0.152 [0.0235]***	0.141 [0.0235]***	0.142 [0.0235]***	-0.013 [0.391]	-0.188 [0.394]	-0.186 [0.393]	-0.171 [0.388]
Ratio * GDP Growth {t-1 to t-4}	-0.010 [0.00181]***	0.012 [0.00201]***	0.007 [0.00206]***	0.008 [0.00243]***	-0.033 [0.0165]**	-0.034 [0.0165]**	-0.027 [0.0165]	-0.030 [0.0165]*	0.143 [0.329]	0.178 [0.323]	0.174 [0.321]	0.166 [0.316]
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro Controls	No	Yes	Yes	n/p	No	Yes	Yes	n/p	No	Yes	Yes	n/p
Demand Controls	No	No	Yes	n/p	No	No	Yes	n/p	No	No	Yes	n/p
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes
R-squared	0.20	0.21	0.20	0.22	0.20	0.21	0.21	0.21	0.14	0.16	0.16	0.17
Number of Observations	821,146	821,146	787,422	821,146	523,517	523,517	523,167	523,517	544,999	544,999	544,636	544,999

Interaction of changes in the federal funds rate with the securities to assets or leverage ratio, cumulative over four quarters, at the 10th percentile of GDP growth

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
	0.051	0.015	0.020	0.011	0.062	0.087	0.081	0.101	0.277	0.250	0.242	0.240

Interaction of changes in the federal funds rate with the securities to assets or leverage ratio, cumulative over four quarters, at the 90th percentile of GDP growth

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
	0.004	-0.009	-0.010	-0.015	0.004	-0.005	-0.009	-0.017	-0.702	-0.754	-0.741	-0.771

Note: The table above shows the impact of U.S. monetary policy on U.S. banks' total lending, between 1986 and 2008. The dependent variable is the quarterly change in the natural logarithm of each bank's stock of total loans. Columns 1 through 8 shows results for the lending of "small" banks, where "small" indicates a bank whose total asset size is below the 95th percentile of the cross-sectional size distribution of all U.S. banks in a given quarter. "Ratio" indicates the securities to assets ratio in Columns 1 through 4, and the Leverage Ratio in Columns 5 through 12. The coefficients show the cumulative effect (over the preceding four quarters) of a one unit change in the explanatory variable (as listed in the leftmost column) on percentage point changes in lending flows (as indicated at the top of each column). Variable definitions and summary statistics are shown in Table 1. Standard errors, clustered at the bank level, are shown below the coefficients. Stars indicate the significance of the coefficients: *** p<0.01, ** p<0.05, * p<0.1.

Table 3: The impact of changes in U.S. monetary policy on the **business** lending of "small" U.S. banks with different securities to assets ratios: 1986-2008

Lending flows: Variables	[1] Commercial & Industrial	[2] Commercial & Industrial	[3] Commercial & Industrial	[4] Commercial & Industrial	[5] Commercial Real Estate	[6] Commercial Real Estate	[7] Commercial Real Estate	[8] Commercial Real Estate
Quarterly Change in the Fed Funds Rate {t-1 to t-4}	1.637 [0.163]***	1.014 [0.213]***	0.684 [0.265]***		-0.812 [0.0178]***	-1.103 [0.0174]***	-0.064 [0.0221]***	
Quarterly Change in the Fed Funds Rate * GDP Growth {t-1 to t-4}	-0.778 [0.118]***	-0.491 [0.141]***	-0.425 [0.161]***		0.581 [0.0143]***	0.909 [0.0121]***	1.318 [0.0133]***	
Quarterly Change in the Fed Funds Rate * Securities to Assets Ratio {t-1 to t-4}	**0.076** **[0.0083]***	**0.043** **[0.00883]***	**0.055** **[0.00904]***	**0.022** **[0.0102]**	**0.045** **[0.000848]***	**-0.001** **[0.000843]**	**-0.027** **[0.00125]***	**0.000** **[0.000518]**
Quarterly Change in the Fed Funds Rate * Securities to Assets Ratio * GDP Growth {t-1 to t-4}	**-0.024** **[0.00551]***	**-0.014** **[0.00583]**	**-0.021** **[0.00596]***	**-0.009** **[0.00701]**	**-0.019** **[0.000604]***	**0.004** **[0.000528]***	**0.013** **[0.000754]***	**0.000** **[0.000367]**
Securities to Assets Ratio {t-1 to t-4}	0.026 [0.00603]***	0.031 [0.00667]***	0.027 [0.00685]***	0.032 [0.00782]***	-0.035 [0.000603]***	0.015 [0.000558]***	0.033 [0.000601]***	-0.001 [0.000457]
Securities to Assets Ratio * GDP Growth {t-1 to t-4}	-0.024 [0.00406]***	-0.005 [0.00445]	-0.003 [0.00457]	-0.005 [0.00533]	0.003 [0.000382]***	-0.022 [0.000374]***	-0.032 [0.000418]***	0.001 [0.000314]***
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro Controls	No	Yes	Yes	n/p	No	Yes	Yes	n/p
Demand Controls	No	No	Yes	n/p	No	No	Yes	n/p
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	No	No	No	Yes	No	No	No	Yes
R-squared	0.06	0.06	0.05	0.06	0.31	0.53	0.59	0.78
Number of Observations	743,255	743,255	714,507	743,255	823,290	823,290	789,422	823,290
Interaction of changes in the federal funds rate with the securities to assets ratio, cumulative over four quarters, at the 10th percentile of GDP growth								
	0.061	0.035	0.043	0.017	0.034	0.001	-0.019	0.000
Interaction of changes in the federal funds rate with the securities to assets ratio, cumulative over four quarters, at the 90th percentile of GDP growth								
	0.031	0.017	0.017	0.005	0.010	0.006	-0.003	0.000

Note: The table above shows the impact of U.S. monetary policy on U.S. banks' business (C&I and CRE) lending, between 1986 and 2008. The dependent variable is the quarterly change in the natural logarithm of each "small" bank's stock of C&I (Columns 1 through 4) and CRE (Columns 5 through 8) loans, where "small" indicates a bank whose total asset size is below the 95th percentile of the cross-sectional size distribution of all U.S. banks in a given quarter. The coefficients show the cumulative effect (over the preceding four quarters) of a one unit change in the explanatory variable (as listed in the leftmost column) on percentage point changes in lending flows (as indicated at the top of each column). Variable definitions and summary statistics are shown in Table 1. Standard errors, clustered at the bank level, are shown below the coefficients. Stars indicate the significance of the coefficients: *** p<0.01, ** p<0.05, * p<0.1.

Table 4: The impact of changes in U.S. monetary policy on the **household** lending of "small" U.S. banks with different securities to assets ratios: 1986-2008

Lending flows: Variables	[1] Residential Real Estate	[2] Residential Real Estate	[3] Residential Real Estate	[4] Residential Real Estate	[5] Consumer	[6] Consumer	[7] Consumer	[8] Consumer
Quarterly Change in the Fed Funds Rate {t-1 to t-4}	-1.293 [0.114]***	-0.706 [0.143]***	-0.337 [0.179]*		1.675 [0.122]***	1.476 [0.158]***	1.261 [0.193]***	
Quarterly Change in the Fed Funds Rate * GDP Growth {t-1 to t-4}	0.548 [0.0837]***	-0.229 [0.0987]**	0.037 [0.112]		-0.450 [0.0895]***	-0.380 [0.107]***	-0.067 [0.12]	
Quarterly Change in the Fed Funds Rate * Securities to Assets Ratio {t-1 to t-4}	**0.096** **[0.00521]***	**0.065** **[0.00553]***	**0.055** **[0.00562]***	**0.052** **[0.00639]***	**0.057** **[0.0056]***	**0.015** **[0.00596]**	**0.024** **[0.00608]***	**0.015** **[0.00684]**
Quarterly Change in the Fed Funds Rate * Securities to Assets Ratio * GDP Growth {t-1 to t-4}	**-0.053** **[0.00348]***	**-0.041** **[0.00369]***	**-0.036** **[0.00375]***	**-0.035** **[0.0045]***	**-0.025** **[0.00373]***	**-0.017** **[0.00395]***	**-0.022** **[0.00402]***	**-0.012** **[0.00471]**
Securities to Assets Ratio {t-1 to t-4}	0.046 [0.00395]***	0.024 [0.0044]***	0.044 [0.00449]***	0.040 [0.00526]***	0.019 [0.00405]***	-0.008 [0.00455]*	-0.004 [0.00464]	0.027 [0.00527]***
Securities to Assets Ratio * GDP Growth {t-1 to t-4}	-0.025 [0.00265]***	-0.006 [0.00293]**	-0.017 [0.00299]***	-0.013 [0.00358]***	-0.002 [0.00272]	0.032 [0.00306]***	0.029 [0.00311]***	0.005 [0.00362]
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro Controls	No	Yes	Yes	n/p	No	Yes	Yes	n/p
Demand Controls	No	No	Yes	n/p	No	No	Yes	n/p
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	No	No	No	Yes	No	No	No	Yes
R-squared	0.08	0.08	0.08	0.09	0.08	0.09	0.08	0.10
Number of Observations	781,190	781,190	752,037	781,190	780,257	780,257	749,836	780,257
Interaction of changes in the federal funds rate with the securities to assets ratio, cumulative over four quarters, at the 10th percentile of GDP growth								
	0.064	0.040	0.033	0.031	0.042	0.005	0.011	0.008
Interaction of changes in the federal funds rate with the securities to assets ratio, cumulative over four quarters, at the 90th percentile of GDP growth								
	-0.002	-0.012	-0.012	-0.013	0.011	-0.016	-0.016	-0.006

Note: The table above shows the impact of U.S. monetary policy on U.S. banks' household (residential and consumer) lending, between 1986 and 2008. The dependent variable is the quarterly change in the natural logarithm of each "small" bank's stock of residential real estate (Columns 1 through 4) and consumer (Columns 5 through 8) loans, where "small" indicates a bank whose total asset size is below the 95th percentile of the cross-sectional size distribution of all U.S. banks in a given quarter. The coefficients show the cumulative effect (over the preceding four quarters) of a one unit change in the explanatory variable (as listed in the leftmost column) on percentage point changes in lending flows (as indicated at the top of each column). Variable definitions and summary statistics are shown in Table 1. Standard errors, clustered at the bank level, are shown below the coefficients. Stars indicate the significance of the coefficients: *** p<0.01, ** p<0.05, * p<0.1.

Table 5: The impact of changes in U.S. monetary policy on the **business** lending of "small" U.S. banks with different leverage ratios: 1986-2008

Lending flows: Variables	[1] Commercial & Industrial	[2] Commercial & Industrial	[3] Commercial & Industrial	[4] Commercial & Industrial	[5] Commercial Real Estate	[6] Commercial Real Estate	[7] Commercial Real Estate	[8] Commercial Real Estate
Quarterly Change in the Fed Funds Rate {t-1 to t-4}	0.211 [0.633]	0.241 [0.664]	-0.060 [0.703]		0.424 [0.0755]***	0.775 [0.0649]***	-0.140 [0.0651]**	
Quarterly Change in the Fed Funds Rate * GDP Growth {t-1 to t-4}	0.752 [0.457]*	0.121 [0.471]	0.440 [0.494]		0.372 [0.0546]***	0.185 [0.0443]***	1.223 [0.0455]***	
Quarterly Change in the Fed Funds Rate * Leverage Ratio {t-1 to t-4}	**0.132** **[0.0638]****	**0.162** **[0.0639]****	**0.150** **[0.0639]****	**0.170** **[0.0641]*****	**-0.097** **[0.00745]*****	**-0.022** **[0.0062]*****	**-0.005** **[0.00609]**	**0.008** **[0.00599]**
Quarterly Change in the Fed Funds Rate * Leverage Ratio * GDP Growth {t-1 to t-4}	**-0.085** **[0.0463]***	**-0.091** **[0.0464]***	**-0.086** **[0.0465]***	**-0.095** **[0.0466]****	**0.080** **[0.0054]*****	**0.020** **[0.00431]*****	**0.009** **[0.00427]****	**0.004** **[0.00422]**
Leverage Ratio {t-1 to t-4}	0.282 [0.0531]***	0.243 [0.0536]***	0.220 [0.0536]***	0.208 [0.0538]***	0.070 [0.00587]***	-0.040 [0.00399]***	-0.012 [0.00358]***	-0.002 [0.00337]
Leverage Ratio * GDP Growth {t-1 to t-4}	-0.097 [0.0379]**	-0.105 [0.0381]***	-0.091 [0.0381]**	-0.087 [0.0383]**	0.024 [0.00406]***	0.025 [0.00298]***	0.009 [0.00264]***	0.000 [0.00249]
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro Controls	No	Yes	Yes	n/p	No	Yes	Yes	n/p
Demand Controls	No	No	Yes	n/p	No	No	Yes	n/p
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	No	No	No	Yes	No	No	No	Yes
R-squared	0.06	0.06	0.06	0.06	0.48	0.71	0.74	0.77
Number of Observations	482,104	482,104	481,815	482,104	524,617	524,617	524,264	524,617
Interaction of changes in the federal funds rate with the leverage ratio, cumulative over four quarters, at the 10th percentile of GDP growth								
	0.081	0.108	0.099	0.113	-0.050	-0.010	0.001	0.011
Interaction of changes in the federal funds rate with the leverage ratio, cumulative over four quarters, at the 90th percentile of GDP growth								
	-0.024	-0.005	-0.008	-0.005	0.049	0.015	0.012	0.015

Note: The table above shows the impact of U.S. monetary policy on U.S. banks' business (C&I and CRE) lending, between 1986 and 2008. The dependent variable is the quarterly change in the natural logarithm of each "small" bank's stock of C&I (Columns 1 through 4) and CRE (Columns 5 through 8) loans, where "small" indicates a bank whose total asset size is below the 95th percentile of the cross-sectional size distribution of all U.S. banks in a given quarte. The coefficients show the cumulative effect (over the preceding four quarters) of a one unit change in the explanatory variable (as listed in the leftmost column) on percentage point changes in lending flows (as indicated at the top of each column). Variable definitions and summary statistics are shown in Table 1. Standard errors, clustered at the bank level, are shown below the coefficients. Stars indicate the significance of the coefficients: *** p<0.01, ** p<0.05, * p<0.1.

Table 6: The impact of changes in U.S. monetary policy on the **household** lending of "small" U.S. banks with different leverage ratios: 1986-2008

Lending flows: Variables	[1] Residential Real Estate	[2] Residential Real Estate	[3] Residential Real Estate	[4] Residential Real Estate	[5] Consumer	[6] Consumer	[7] Consumer	[8] Consumer
Quarterly Change in the Fed Funds Rate {t-1 to t-4}	-1.106	-0.081	-1.022		1.471	1.022	-0.416	
	[0.399]***	[0.415]	[0.441]**		[0.457]***	[0.482]**	[0.509]	
Quarterly Change in the Fed Funds Rate * GDP	0.653	-0.431	0.715		-0.204	-0.572	0.986	
Growth {t-1 to t-4}	[0.293]**	[0.301]	[0.315]**		[0.318]	[0.33]*	[0.348]***	
Quarterly Change in the Fed Funds Rate * Leverage	**0.061**	**0.091**	**0.073**	**0.099**	**0.024**	**0.057**	**0.036**	**0.052**
Ratio {t-1 to t-4}	**[0.0396]**	**[0.0397]****	**[0.0397]***	**[0.0397]****	**[0.045]**	**[0.0451]**	**[0.0452]**	**[0.0452]**
Quarterly Change in the Fed Funds Rate * Leverage	**-0.045**	**-0.050**	**-0.043**	**-0.056**	**-0.002**	**-0.003**	**0.008**	**-0.005**
Ratio * GDP Growth {t-1 to t-4}	**[0.0292]**	**[0.0293]***	**[0.0293]**	**[0.0294]***	**[0.0315]**	**[0.0317]**	**[0.0317]**	**[0.0317]**
Leverage Ratio {t-1 to t-4}	0.128	0.169	0.132	0.133	0.163	0.181	0.145	0.130
	[0.0348]***	[0.035]***	[0.0351]***	[0.0352]***	[0.038]***	[0.0383]***	[0.0383]***	[0.0383]***
Leverage Ratio * GDP Growth {t-1 to t-4}	-0.016	-0.049	-0.026	-0.030	-0.032	-0.058	-0.037	-0.031
	[0.0247]	[0.0248]**	[0.0248]	[0.0248]	[0.0273]	[0.0274]**	[0.0274]	[0.0274]
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro Controls	No	Yes	Yes	n/p	No	Yes	Yes	n/p
Demand Controls	No	No	Yes	n/p	No	No	Yes	n/p
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	No	No	No	Yes	No	No	No	Yes
R-squared	0.08	0.09	0.09	0.09	0.09	0.10	0.10	0.11
Number of Observations	507,201	507,201	506,876	507,201	503,045	503,045	502,713	503,045
Interaction of changes in the federal funds rate with the leverage ratio, cumulative over four quarters, at the 10th percentile of GDP growth								
	0.034	0.061	0.047	0.066	0.023	0.055	0.041	0.049
Interaction of changes in the federal funds rate with the leverage ratio, cumulative over four quarters, at the 90th percentile of GDP growth								
	-0.021	-0.001	-0.005	-0.003	0.020	0.051	0.051	0.043

the quarterly change in the natural logarithm of each "small" bank's stock of residential (Columns 1 through 4) and consumer (Columns 5 through 8) loans, where "small" indicates a bank whose total asset size is below the 95th percentile of the cross-sectional size distribution of all U.S. banks in a given quarter. The coefficients show the cumulative effect (over the preceding four quarters) of a one unit change in the explanatory variable (as listed in the leftmost column) on percentage point changes in lending flows (as indicated at the top of each column). Variable definitions and summary statistics are shown in Table 1. Standard errors, clustered at the bank level, are shown below the coefficients. Stars indicate the significance of the coefficients: *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Weighted regressions: The impact of changes in U.S. monetary policy on the **business** lending of U.S. banks with different leverage ratios: 1986-2008

Lending flows: Variables	[1] Commercial & Industrial	[2] Commercial & Industrial	[3] Commercial Real Estate	[4] Commercial & Industrial	[5] Commercial Real Estate	[6] Commercial Real Estate	[7] Commercial Real Estate	[8] Commercial Real Estate
Quarterly Change in the Fed Funds Rate {t-1 to t-4}	-8.346	-7.541	-6.962		0.774	2.786	2.124	
	[3.015]***	[2.893]***	[3.405]**		[2.098]	[2.278]	[2.123]	
Quarterly Change in the Fed Funds Rate * GDP Growth {t-1 to t-4}	9.784	7.460	7.070		0.082	-0.557	-0.120	
	[2.975]***	[2.948]**	[3.278]**		[1.23]	[1.194]	[1.148]	
Quarterly Change in the Fed Funds Rate * Leverage Ratio {t-1 to t-4}	**1.129**	**1.100**	**1.083**	**1.107**	**-0.151**	**-0.158**	**-0.158**	**-0.118**
	[0.325]* **	**[0.284]*** **	**[0.282]*** **	**[0.288]*** **	**[0.201]**	**[0.201]**	**[0.209]**	**[0.22]**
Quarterly Change in the Fed Funds Rate * Leverage Ratio * GDP Growth {t-1 to t-4}	**-1.130**	**-1.134**	**-1.114**	**-1.121**	**0.109**	**0.059**	**0.059**	**0.039**
	[0.304]* **	**[0.287]*** **	**[0.285]*** **	**[0.274]*** **	**[0.127]**	**[0.127]**	**[0.129]**	**[0.131]**
Leverage Ratio {t-1 to t-4}	0.078	-0.139	-0.146	-0.136	-0.116	-0.287	-0.241	-0.205
	[0.474]	[0.395]	[0.395]	[0.371]	[0.19]	[0.21]	[0.211]	[0.219]
Leverage Ratio * GDP Growth {t-1 to t-4}	-0.261	-0.184	-0.184	-0.207	0.0417	0.105	0.0845	0.059
	[0.353]	[0.295]	[0.294]	[0.278]	[0.138]	[0.151]	[0.152]	[0.159]
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro Controls	No	Yes	Yes	n/p	No	Yes	Yes	n/p
Demand Controls	No	No	Yes	n/p	No	No	Yes	n/p
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	No	No	No	Yes	No	No	No	Yes
R-squared	0.15	0.17	0.17	0.18	0.13	0.15	0.15	0.16
Number of Observations	499,935	499,935	499,637	499,935	543,903	543,903	543,537	543,903
Interaction of changes in the federal funds rate with the leverage ratio, cumulative over four quarters, at the 10th percentile of GDP growth								
	0.451	0.420	0.415	0.434	-0.086	-0.123	-0.123	-0.095
Interaction of changes in the federal funds rate with the leverage ratio, cumulative over four quarters, at the 90th percentile of GDP growth								
	-0.950	-0.987	-0.967	-0.956	0.050	-0.050	-0.050	-0.047

Note: The table above shows the impact of U.S. monetary policy on U.S. banks' business (C&I and CRE) lending, between 1986 and 2008. The dependent variable is the quarterly change in the natural logarithm of each bank's stock of C&I (Columns 1 through 4) and CRE (Columns 5 through 8) loans. Each observation is weighted by the given bank's share in the total market segment. The coefficients show the cumulative effect (over the preceding four quarters) of a one unit change in the explanatory variable (as listed in the leftmost column) on percentage point changes in lending flows (as indicated at the top of each column). Variable definitions and summary statistics are shown in Table 1. Standard errors, clustered at the bank level, are shown below the coefficients. Stars indicate the significance of the coefficients: *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Weighted regressions: The impact of changes in U.S. monetary policy on the **household** lending of U.S. banks with different leverage ratios: 1986-2008

Lending flows: Variables	[1] Residential Real Estate	[2] Residential Real Estate	[3] Residential Real Estate	[4] Residential Real Estate	[5] Consumer	[6] Consumer	[7] Consumer	[8] Consumer
Quarterly Change in the Fed Funds Rate {t-1 to t-4}	7.409 [4.198]*	13.950 [6.356]**	15.180 [7.703]**		-17.090 [4.788]***	-15.780 [4.686]***	-19.380 [4.819]***	
Quarterly Change in the Fed Funds Rate * GDP Growth {t-1 to t-4}	-2.770 [3.159]	-6.674 [4.838]	-8.447 [6.402]		15.230 [3.939]***	13.060 [3.591]***	15.870 [3.456]***	
Quarterly Change in the Fed Funds Rate * Leverage Ratio {t-1 to t-4}	**-0.885** **[0.407]****	**-1.015** **[0.554]***	**-0.981** **[0.529]***	**-0.740** **[0.456]**	**2.329** **[0.525]*****	**2.216** **[0.515]*****	**2.142** **[0.515]*****	**1.958** **[0.533]*****
Quarterly Change in the Fed Funds Rate * Leverage Ratio * GDP Growth {t-1 to t-4}	**0.345** **[0.315]**	**0.329** **[0.385]**	**0.315** **[0.378]**	**0.146** **[0.325]**	**-1.980** **[0.454]*****	**-1.901** **[0.459]*****	**-1.854** **[0.45]*****	**-1.733** **[0.467]*****
Leverage Ratio {t-1 to t-4}	-1.047 [0.552]*	-1.451 [0.735]**	-1.420 [0.713]**	-1.273 [0.6]**	-0.027 [0.528]	-0.119 [0.527]	-0.163 [0.54]	-0.200 [0.544]
Leverage Ratio * GDP Growth {t-1 to t-4}	1.140 [0.417]***	1.331 [0.535]**	1.298 [0.514]**	1.174 [0.42]***	0.151 [0.414]	0.166 [0.402]	0.201 [0.408]	0.263 [0.414]
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro Controls	No	Yes	Yes	n/p	No	Yes	Yes	n/p
Demand Controls	No	No	Yes	n/p	No	No	Yes	n/p
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	No	No	No	Yes	No	No	No	Yes
R-squared	0.18	0.20	0.20	0.22	0.20	0.21	0.21	0.23
Number of Observations	525,036	525,036	524,702	525,036	522,153	522,153	521,808	522,153
Interaction of changes in the federal funds rate with the leverage ratio, cumulative over four quarters, at the 10th percentile of GDP growth								
	-0.678	-0.818	-0.792	-0.652	1.141	1.075	1.030	0.918
Interaction of changes in the federal funds rate with the leverage ratio, cumulative over four quarters, at the 90th percentile of GDP growth								
	-0.250	-0.410	-0.401	-0.471	-1.314	-1.282	-1.269	-1.231

Note: The table above shows the impact of U.S. monetary policy on U.S. banks' household (residential real estate and consumer) lending, between 1986 and 2008. The dependent variable is the quarterly change in the natural logarithm of each bank's stock of RRE (Columns 1 through 4) and consumer (Columns 5 through 8) loans. Each observation is weighted by the given bank's share in the total market segment. The coefficients show the cumulative effect (over the preceding four quarters) of a one unit change in the explanatory variable (as listed in the leftmost column) on percentage point changes in lending flows (as indicated at the top of each column). Variable definitions and summary statistics are shown in Table 1. Standard errors, clustered at the bank level, are shown below the coefficients. Stars indicate the significance of the coefficients: *** p<0.01, ** p<0.05, * p<0.1.

Table 9: IV estimations: The impact of changes in U.S. monetary policy on the lending of U.S. banks with different securities to assets or leverage ratios: 1986-2008

Lending flows:	[1] Total	[3] Commercial & Industrial	[2] Commercial Real Estate	[4] Residential Real Estate	[5] Consumer	[6] Total	[7] Commercial & Industrial	[8] Commercial Real Estate	[9] Residential Real Estate	[10] Consumer	[11] Total	[12] Commercial & Industrial	[13] Commercial Real	[14] Residential Real Estate	[15] Consumer
Sample of banks:	Small	Small	Small	Small	Small	Small	Small	Small	Small	Small	All	All	All	All	All
Ratio	Securities to Assets	Securities to Assets	Securities to Assets	Securities to Assets	Securities to Assets	Leverage	Leverage	Leverage	Leverage	Leverage	Leverage	Leverage	Leverage	Leverage	Leverage
Variables															
Quarterly Change in the Fed Funds Rate * Ratio {t-1 to t-4}	**0.134** [0.00613]***	**0.124** [0.0144]***	**-0.023** [0.00154]***	**0.058** [0.00936]***	**0.202** [0.0102]***	**0.003** [0.00989]	**0.138** [0.0219]***	**-0.006** [0.00311]*	**-0.011** [0.0146]	**0.118** [0.0175]***	**0.040** [0.129]	**0.027** [0.0885]	**0.075** [0.187]	**-0.508** [0.463]	**0.597** [0.322]*
Quarterly Change in the Fed Funds Rate * Ratio * GDP Growth {t-1 to t-4}	**-0.099** [0.00424]***	**-0.090** [0.01]***	**0.003** [0.000916]***	**-0.046** [0.00652]***	**-0.140** [0.00715]***	**-0.030** [0.00643]***	**-0.045** [0.0143]***	**0.007** [0.00204]***	**-0.034** [0.00941]***	**-0.087** [0.0115]***	**-0.137** [0.0875]	**-0.009** [0.0649]	**-0.118** [0.158]	**-0.008** [0.164]	**-0.523** [0.22]**
Ratio {t-1 to t-4}	0.088 [0.0105]***	0.098 [0.0239]***	-0.098 [0.00292]***	-0.027 [0.0166]	0.106 [0.0174]***	0.088 [0.086]	0.610 [0.192]***	-0.054 [0.0216]**	0.220 [0.131]*	0.969 [0.153]***	5.068 [2.508]**	0.346 [1.511]	1.103 [2.048]	23.130 [13.65]*	-4.489 [3.458]
Ratio * GDP Growth {t-1 to t-4}	-0.021 [0.00123]***	0.020 [0.00272]***	0.036 [0.000357]***	-0.013 [0.00181]***	-0.015 [0.00197]***	0.022 [0.00236]***	0.004 [0.00521]	0.034 [0.000732]***	0.017 [0.00354]***	0.017 [0.00414]***	0.037 [0.0358]	0.007 [0.0334]	-0.017 [0.0385]	-0.137 [0.0852]	0.196 [0.118]*
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro Controls	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p
Demand Controls	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.09	0.01	0.46	-0.01	0.02	-0.06	0.00	0.19	-0.05	-0.20	-0.64	0.00	-0.05	-3.85	-0.38
Number of Observations	683,236	623,385	697,873	657,835	652,807	523,297	481,841	528,907	506,970	502,802	544,780	543,687	499,678	524,808	521,908

Interaction of changes in the federal funds rate with the securities to assets or leverage ratio, cumulative over four quarters, at the 10th percentile of GDP growth

	0.075	0.070	-0.021	0.030	0.118	-0.015	0.111	-0.002	-0.031	0.066	-0.042	0.022	0.004	-0.513	0.283

Interaction of changes in the federal funds rate with the securities to assets or leverage ratio, cumulative over four quarters, at the 90th percentile of GDP growth

	-0.048	-0.042	-0.017	-0.027	-0.057	-0.051	0.056	0.006	-0.074	-0.042	-0.212	0.010	-0.143	-0.523	-0.365

Note: The table above shows the results of IV estimations of the impact of U.S. monetary policy on U.S. banks' lending to various market segments, between 1986 and 2008. The instruments for GDP growth are the one-quarter lagged GDP growth forecast values, and year and quarter fixed effects. Each column represents the most complete specification for each loan type (that is, including bank and time fixed effects as well as bank balance sheet controls) from Tables 2 through 8. The coefficients show the cumulative effect (over the preceding four quarters) of a one unit change in the explanatory variable (as listed in the leftmost column) on percentage point changes in lending flows (as indicated at the top of each column). Standard errors, clustered at the bank level, are shown below the coefficients. Stars indicate the significance of the coefficients: *** p<0.01, ** p<0.05, * p<0.1.

Table 10: Post-2007 period: The impact of changes in U.S. monetary policy on the lending of U.S. banks with different securities to assets or leverage ratios: 2008-2016

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]
Lending flows:	Total	Commercial & Industrial	Commercial Real Estate	Residential Real Estate	Consumer	Total	Commercial & Industrial	Commercial Real Estate	Residential Real Estate	Consumer	Total	Commercial & Industrial	Commercial Real Estate	Residential Real Estate	Consumer
Sample of banks:	Small Securities to Assets	Small Securities to Assets	Small Securities to Assets	Small Securities to Assets	Small Securities to Assets	Small Leverage	Small Leverage	Small Leverage	Small Leverage	Small Leverage	All Leverage	All Leverage	All Leverage	All Leverage	All Leverage
Ratio Variables															
Quarterly Change in the Short-term Shadow Rate * Ratio {t-1 to t-4}	**0.003**	**-0.014**	**0.002**	**-0.003**	**-0.013**	**0.031**	**0.033**	**0.008**	**0.017**	**-0.043**	**-0.075**	**-0.062**	**0.088**	**-0.193**	**0.000**
	[0.00837]	[0.0205]	[0.00065]***	[0.00885]	[0.0145]	[0.0304]	[0.0749]	[0.0039]**	[0.0433]	[0.0563]	[0.205]	[0.211]	[0.146]	[0.512]	[0.382]
Quarterly Change in the Short-term Shadow Rate * Ratio * GDP Growth {t-1 to t-4}	**-0.003**	**-0.003**	**-0.001**	**-0.012**	**-0.009**	**-0.027**	**-0.091**	**-0.001**	**-0.059**	**-0.053**	**0.223**	**0.084**	**-0.016**	**0.505**	**0.126**
	[0.00901]	[0.0202]	[0.000613]**	[0.00912]	[0.0136]	[0.0297]	[0.0712]	[0.00366]	[0.0428]	[0.0551]	[0.197]	[0.192]	[0.129]	[0.346]	[0.329]
Ratio {t-1 to t-4}	0.038	0.031	0.001	0.023	0.029	0.268	0.400	-0.004	0.215	0.091	0.116	0.218	0.004	0.013	-0.290
	[0.00765]***	[0.0154]**	[0.000676]	[0.00997]**	[0.0118]**	[0.0264]***	[0.0552]***	[0.00424]	[0.037]***	[0.0456]**	[0.157]	[0.247]	[0.132]	[0.225]	[0.229]
Ratio * GDP Growth {t-1 to t-4}	-0.004	0.004	0.000	0.001	-0.001	-0.022	-0.028	0.000	0.011	-0.018	-0.001	-0.174	0.041	-0.063	0.327
	[0.00429]	[0.00967]	[0.000318]	[0.0054]	[0.00682]	[0.0146]	[0.0355]	[0.00182]	[0.0207]	[0.0259]	[0.129]	[0.148]	[0.0861]	[0.166]	[0.233]
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro Controls	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p
Demand Controls	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.27	0.09	0.86	0.14	0.13	0.26	0.09	0.87	0.13	0.13	0.26	0.23	0.35	0.27	0.36
Number of Observations	177,257	167,032	179,235	173,327	164,957	160,753	152,098	161,842	157,447	150,546	168,637	159,278	168,856	163,921	156,933

Interaction of changes in the short-term shadow interest rate with the securities to assets or leverage ratio, cumulative over four quarters, at the 10th percentile of GDP growth

| | 0.001 | -0.016 | 0.002 | -0.010 | -0.018 | 0.015 | -0.021 | 0.008 | -0.019 | -0.074 | 0.058 | -0.012 | 0.079 | 0.110 | 0.076 |

Interaction of changes in the short-term shadow interest rate with the securities to assets or leverage ratio, cumulative over four quarters, at the 90th percentile of GDP growth

| | -0.002 | -0.020 | 0.000 | -0.024 | -0.029 | -0.019 | -0.134 | 0.007 | -0.093 | -0.140 | 0.335 | 0.092 | 0.058 | 0.736 | 0.232 |

Note: The table above shows the impact of U.S. monetary policy on U.S. banks' lending to various market segments, between 2008 and 2016. Each column represents the most complete specification for each loan type (that is, including bank and time fixed effects as well as bank balance sheet controls) from Tables 2 through 8. The coefficient show the cumulative effect (over the preceding four quarters) of a one unit change in the explanatory variable (as listed in the leftmost column) on percentage point changes in lending flows (as indicated at the top of each column). Standard errors, clustered at the bank level, are shown below the coefficients. Stars indicate the significance of the coefficients: *** p<0.01, ** p<0.05, * p<0.1.

Table 1A: The impact of changes in U.S. monetary policy on the lending of U.S. banks with different securities to assets or leverage ratios: 1986-2008

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]
Lending flows:	Total	Commercial & Industrial	Commercial Real Estate	Residential Real Estate	Consumer	Total	Commercial & Industrial	Commercial Real Estate	Residential Real Estate	Consumer	Total	Commercial & Industrial	Commercial Real Estate	Residential Real Estate	Consumer
Sample of Banks:	Small	Small	Small	Small	Small	Small	Small	Small	Small	Small	All	All	All	All	All
Ratio Variables	Securities to Assets	Securities to Assets	Securities to Assets	Securities to Assets	Securities to Assets	Leverage	Leverage	Leverage	Leverage	Leverage	Leverage	Leverage	Leverage	Leverage	Leverage
Romer and Romer Residual {t-1 to t-4}	-0.436	1.982	-0.447	-1.050	2.442	-0.625	1.763	-0.335	0.172	0.623	-13.860	-14.840	2.300	-7.610	-34.220
	[0.144]***	[0.321]***	[0.0262]***	[0.222]***	[0.237]***	[0.542]	[1.305]	[0.0904]***	[0.819]	[0.869]	[7.018]**	[6.847]**	[4.096]	[12.17]	[12.39]***
Romer and Romer Residual * GDP Growth {t-1 to t-4}	-0.126	-1.533	-0.086	0.251	-1.164	-0.433	-1.556	-0.335	-1.079	0.393	11.620	16.380	0.189	6.296	25.740
	[0.108]	[0.238]***	[0.0199]***	[0.165]	[0.175]***	[0.414]	[0.995]	[0.0689]***	[0.625]*	[0.659]	[6.528]*	[5.002]***	[2.888]	[5.944]	[9.779]***
Romer and Romer Residual * Ratio {t-1 to t-4}	**0.093**	**0.078**	**-0.008**	**0.083**	**0.076**	**-0.003**	**0.084**	**0.006**	**-0.014**	**0.141**	**1.945**	**2.427**	**-0.395**	**0.409**	**4.704**
	[0.00758]*	**[0.0175]***	**[0.00095]***	**[0.0105]***	**[0.0117]***	**[0.0546]**	**[0.132]**	**[0.00814]**	**[0.081]**	**[0.0853]***	**[0.833]****	**[0.736]***	**[0.407]**	**[1.321]**	**[1.332]***
Romer and Romer Residual * Ratio * GDP Growth {t-1 to t-4}	**-0.039**	**-0.016**	**0.012**	**-0.041**	**-0.033**	**0.083**	**0.001**	**0.009**	**0.098**	**-0.084**	**-1.593**	**-2.260**	**0.151**	**-0.410**	**-3.439**
	[0.00564]*	**[0.013]**	**[0.000682]***	**[0.00779]***	**[0.0087]***	**[0.0416]****	**[0.1]**	**[0.00616]**	**[0.0616]**	**[0.0648]**	**[0.792]****	**[0.552]***	**[0.305]**	**[0.681]**	**[1.037]***
Ratio {t-1 to t-4}	0.017	-0.009	-0.013	0.038	-0.003	0.166	0.277	0.056	0.110	0.188	0.332	0.392	-0.066	-0.658	0.371
	[0.00201]***	[0.00453]**	[0.000271]***	[0.00299]***	[0.00308]	[0.0196]***	[0.0456]***	[0.00349]***	[0.0297]***	[0.0317]***	[0.241]	[0.365]	[0.153]	[0.426]	[0.439]
Ratio * GDP Growth {t-1 to t-4}	-0.008	-0.007	0.001	-0.022	0.008	-0.012	-0.072	-0.018	-0.012	-0.030	-0.093	-0.483	0.016	0.878	-0.148
	[0.00136]***	[0.00313]**	[0.000168]***	[0.00203]***	[0.00211]***	[0.0133]	[0.0319]**	[0.00215]***	[0.0205]	[0.0221]	[0.172]	[0.278]*	[0.113]	[0.349]**	[0.326]
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro Controls	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Demand Controls	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
R-squared	0.20	0.06	0.63	0.08	0.09	0.21	0.06	0.66	0.08	0.10	0.15	0.16	0.13	0.17	0.22
Number of Observations	801,708	725,451	818,486	762,592	762,359	506,014	465,926	511,473	490,306	486,711	526,638	482,979	525,484	507,414	505,096

Interaction of changes in the Romer and Romer residual with the securities to assets or leverage ratio at the 10th percentile of GDP growth

| | 0.069 | 0.068 | -0.002 | 0.058 | 0.056 | 0.046 | 0.085 | 0.012 | 0.045 | 0.091 | 0.989 | 1.071 | -0.304 | 0.163 | 2.641 |

Interaction of changes in the Romer and Romer residual with the securities to assets or leverage ratio at the 90th percentile of GDP growth

| | 0.020 | 0.049 | 0.013 | 0.007 | 0.015 | 0.150 | 0.087 | 0.023 | 0.167 | -0.013 | -0.986 | -1.731 | -0.117 | -0.345 | -1.624 |

Note: The table above shows the impact of U.S. monetary policy on U.S. banks' lending to various market segments, between 1986 and 2008. Each column represents the baseline specification for each loan type (that is, including bank fixed effects as well as bank balance sheet controls) from Tables 2 through 8. Four lags of each independent variables are included in the IV regressions. The coefficients show the effect (over the preceding quarter) of a one unit change in the explanatory variable (as listed in the leftmost column) on percentage point changes in lending flows (as indicated at the top of each column). Standard errors, clustered at the bank level, are shown below the coefficients. Stars indicate the significance of the coefficients: *** p<0.01, ** p<0.05, * p<0.1.

Table 2A: The impact of changes in U.S. monetary policy on the lending of U.S. banks with different securities to assets or leverage ratios when GDP is "below trend": 1986-2008

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]
Lending flows:	Total	Commercial & Industrial	Commercial Real Estate	Residential Real Estate	Consumer	Total	Commercial & Industrial	Commercial Real Estate	Residential Real Estate	Consumer	Total	Commercial & Industrial	Commercial Real Estate	Residential Real Estate	Consumer
Sample of banks:	Small Securities to Assets	Small Securities to Assets	Small Securities to Assets	Small Securities to Assets	Small Securities to Assets	Small Leverage	Small Leverage	Small Leverage	Small Leverage	Small Leverage	All Leverage	All Leverage	All Leverage	All Leverage	All Leverage
Ratio Variables															
Quarterly Change in the Fed Funds Rate {t-1 to t-4}	-0.0731	1.445	-0.163	-1.707	0.825	-0.957	-0.15	0.593	-1.449	0.599	-3.375	-9.6	-0.00437	4.677	-7.245
	[0.0856]	[0.186]***	[0.0162]***	[0.131]***	[0.141]***	[0.3]***	[0.709]	[0.072]***	[0.443]***	[0.513]	[3.507]	[3.533]***	[2.25]	[3.399]	[5.842]
Quarterly Change in the Fed Funds Rate * GDP Growth {t-1 to t-4}	0.153	-0.381	-0.15	0.764	0.329	0.639	1.096	-0.24	0.802	0.424	3.969	8.996	0.217	-2.056	6.228
	[0.0644]**	[0.138]***	[0.0119]***	[0.0979]***	[0.105]***	[0.211]***	[0.511]**	[0.0481]***	[0.329]**	[0.357]	[1.922]**	[2.61]***	[1.416]	[2.54]	[4.82]
Quarterly Change in the Fed Funds Rate * Ratio {t-1 to t-4}	**0.076**	**0.083**	**0.040**	**0.106**	**0.070**	**0.132**	**0.171**	**-0.040**	**0.088**	**0.084**	**0.399**	**1.137**	**-0.063**	**-0.736**	**0.986**
	[0.00417]***	[0.00907]***	[0.00064]***	[0.00563]***	[0.00615]***	[0.03]***	[0.0713]**	[0.007]***	[0.044]**	[0.0507]*	[0.388]	[0.398]***	[0.229]	[0.317]**	[0.645]
Quarterly Change in the Fed Funds Rate * Ratio * GDP Growth {t-1 to t-4}	**-0.035**	**-0.029**	**-0.024**	**-0.055**	**-0.032**	**-0.068**	**-0.097**	**0.032**	**-0.052**	**-0.031**	**-0.476**	**-0.962**	**0.078**	**0.368**	**-0.791**
	[0.0029]***	[0.0062]***	[0.000422]***	[0.00384]***	[0.00423]***	[0.0213]***	[0.0518]*	[0.00485]***	[0.033]	[0.0354]	[0.244]*	[0.285]***	[0.139]	[0.244]	[0.53]
Ratio {t-1 to t-4}	0.015	0.013	-0.007	0.051	0.010	0.211	0.286	0.036	0.108	0.175	-0.104	0.086	-0.158	-0.753	-0.165
	[0.00299]***	[0.00668]**	[0.000391]***	[0.0044]***	[0.0045]**	[0.0276]***	[0.0629]***	[0.00405]***	[0.0412]***	[0.0445]***	[0.5]	[0.369]	[0.23]	[0.45]*	[0.601]
Ratio * GDP Growth {t-1 to t-4}	0.004	-0.008	-0.001	-0.024	0.013	-0.049	-0.100	-0.002	-0.005	-0.049	0.228	-0.307	0.072	0.958	0.298
	[0.00208]*	[0.0046]*	[0.000273]***	[0.00304]***	[0.00311]***	[0.0202]**	[0.0463]**	[0.00328]	[0.0299]	[0.0327]	[0.438]	[0.275]	[0.163]	[0.378]**	[0.472]
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro Controls	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Demand Controls	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
R-squared	0.20	0.07	0.67	0.09	0.09	0.21	0.07	0.67	0.09	0.11	0.17	0.18	0.16	0.24	0.24
Number of Observations	627,260	564,790	639,942	593,918	594,950	380,295	348,236	384,402	367,727	365,061	395,600	360,763	394,384	380,413	378,779

Interaction of changes in the federal funds rate with the securities to assets or leverage ratio, cumulative over four quarters, at the 10th percentile of GDP growth

	0.055	0.066	0.026	0.073	0.050	0.091	0.113	-0.021	0.057	0.065	0.113	0.560	-0.016	-0.515	0.511

Interaction of changes in the federal funds rate with the securities to assets or leverage ratio, cumulative over four quarters, at the 90th percentile of GDP growth

	0.011	0.030	-0.004	0.005	0.010	0.007	-0.008	0.018	-0.008	0.027	-0.477	-0.633	0.080	-0.059	-0.469

Note: The table above shows the impact of U.S. monetary policy on U.S. banks' lending to various market segments, between 1986 and 2008. Each column represents the first specification for each loan type (that is, including time fixed effects as well as bank balance sheet controls) from Tables 2 through 8. The coefficient show the cumulative effect (over the preceding four quarters) of a one unit change in the explanatory variable (as listed in the leftmost column) on percentage point changes in lending flows (as indicated at the top of each column). Standard errors, clustered at the bank level, are shown below the coefficients. Stars indicate the significance of the coefficients: *** p<0.01, ** p<0.05, * p<0.1.

Table 3A: The impact of changes in U.S. monetary policy on the lending of "small" U.S. banks with different securities to assets ratios: 1986-2008

Monetary easing vs. tightening

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Monetary Policy Environment:	Monetary Policy Easing					Monetary Policy Tightening				
Lending flows:	Total	Commercial & Industrial	Commercial Real Estate	Residential Real Estate	Consumer	Total	Commercial & Industrial	Commercial Real Estate	Residential Real Estate	Consumer
Variables										
Quarterly Change in the Fed Funds Rate * Securities to Assets Ratio {t-1 to t-4}	**0.042** [0.00744]***	**0.016** [0.016]	**-0.001** [0.000816]	**0.036** [0.0109]***	**0.006** [0.0109]	**0.047** [0.00904]***	**0.024** [0.0214]	**0.002** [0.00104]*	**0.056** [0.0128]***	**0.037** [0.0142]***
Quarterly Change in the Fed Funds Rate * Securities to Assets Ratio * GDP Growth {t-1 to t-4}	**-0.035** [0.00431]***	**-0.010** [0.0094]	**0.000** [0.000496]	**-0.028** [0.00633]***	**-0.016** [0.00647]**	**-0.026** [0.00604]***	**-0.007** [0.0146]	**0.000** [0.000684]	**-0.041** [0.00884]***	**-0.005** [0.00975]
Securities to Assets Ratio {t-1 to t-4}	0.042 [0.00517]***	0.045 [0.0112]***	0.000 [0.000627]	0.029 [0.00782]***	0.029 [0.00751]***	0.019 [0.00708]***	0.023 [0.0162]	0.000 [0.000912]	0.059 [0.0105]***	0.008 [0.0113]
Securities to Assets Ratio * GDP Growth {t-1 to t-4}	-0.001 [0.00334]	-0.013 [0.00728]*	0.001 [0.000402]**	-0.005 [0.00509]	0.002 [0.00494]	0.006 [0.00455]	-0.006 [0.0105]	0.000 [0.000592]	-0.028 [0.00675]***	0.006 [0.00729]
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro Controls	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p
Demand Controls	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.24	0.08	0.83	0.11	0.12	0.24	0.09	0.57	0.11	0.12
Number of Observations	473,987	428,398	483,852	449,522	450,607	347,159	314,857	354,575	331,668	329,650
Interaction of changes in the federal funds rate with the securities to assets ratio, cumulative over four quarters, at the 10th percentile of GDP growth										
	0.022	0.010	-0.001	0.019	-0.004	0.031	0.019	0.002	0.031	0.034
Interaction of changes in the federal funds rate with the securities to assets ratio, cumulative over four quarters, at the 90th percentile of GDP growth										
	-0.022	-0.002	0.000	-0.016	-0.024	-0.001	0.010	0.002	-0.021	0.028

Note: The table above shows the impact of U.S. monetary policy on U.S. banks' lending to various market segments, between 1986 and 2008, during periods of monetary policy easing (Columns 1 through 5) and monetary tightening (Columns 6 throug 10). Each column represents the most complete specification for each loan type (that is, including bank and time fixed effects as well as bank balance sheet controls) from Tables 2 through 4. The coefficient show the cumulative effect (over the preceding four quarters) of a one unit change in the explanatory variable (as listed in the leftmost column) on percentage point changes in lending flows (as indicated at the top of each column). Standard errors, clustered at the bank level, are shown below the coefficients. Stars indicate the significance of the coefficients: *** p<0.01, ** p<0.05, * p<0.1.

Table 4A: The impact of changes in U.S. monetary policy on the lending of "small" U.S. banks with different leverage ratios: 1986-2008

Monetary easing vs. tightening

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Monetary Policy Environment:		*Monetary Policy Easing*					*Monetary Policy Tightening*			
Lending flows:	*Total*	*Commercial & Industrial*	*Commercial Real Estate*	*Residential Real Estate*	*Consumer*	*Total*	*Commercial & Industrial*	*Commercial Real Estate*	*Residential Real Estate*	*Consumer*
Variables										
Quarterly Change in the Fed Funds Rate * leverage Ratio {t-1 to t-4}	**0.212**	**0.074**	**0.013**	**0.004**	**-0.025**	**0.159**	**0.069**	**0.002**	**0.016**	**0.179**
	[0.00744]***	[0.00744]***	[0.00744]***	[0.00744]***	[0.00744]***	[0.00744]***	[0.00744]***	[0.00744]***	[0.00744]***	[0.00744]***
Quarterly Change in the Fed Funds Rate * Leverage Ratio * GDP Growth {t-1 to t-4}	**-0.151**	**-0.109**	**-0.002**	**-0.046**	**0.011**	**-0.062**	**-0.038**	**0.007**	**0.045**	**-0.084**
	[0.00744]***	[0.00744]***	[0.00744]***	[0.00744]***	[0.00744]***	[0.00744]***	[0.00744]***	[0.00744]***	[0.00744]***	[0.00744]***
Leverage Ratio {t-1 to t-4}	0.141	0.075	0.003	0.053	0.084	0.159	0.204	-0.009	0.193	0.018
	[0.00744]***	[0.00744]***	[0.00744]***	[0.00744]***	[0.00744]***	[0.00744]***	[0.00744]***	[0.00744]***	[0.00744]***	[0.00744]***
Leverage Ratio * GDP Growth {t-1 to t-4}	-0.037	-0.028	-0.003	0.020	-0.010	-0.057	-0.067	0.005	-0.086	0.032
	[0.00744]***	[0.00744]***	[0.00744]***	[0.00744]***	[0.00744]***	[0.00744]***	[0.00744]***	[0.00744]***	[0.00744]***	[0.00744]***
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro Controls	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p
Demand Controls	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.23	0.08	0.79	0.11	0.13	0.24	0.09	0.65	0.12	0.14
Number of Observations	316,477	289,886	319,898	305,580	304,175	207,040	192,218	209,235	201,621	198,870
Interaction of changes in the federal funds rate with the leverage ratio, cumulative over four quarters, at the 10th percentile of GDP growth										
	0.121	0.008	0.011	-0.024	-0.018	0.122	0.046	0.006	0.043	0.129
Interaction of changes in the federal funds rate with the leverage ratio, cumulative over four quarters, at the 90th percentile of GDP growth										
	-0.067	-0.128	0.009	-0.082	-0.004	0.044	-0.002	0.014	0.100	0.024

Note: The table above shows the impact of U.S. monetary policy on U.S. banks' lending to various market segments, between 1986 and 2008, during periods of monetary policy easing (Columns 1 through 5) and monetary tightening (Columns 6 throug 10). Each column represents the most complete specification for each loan type (that is, including bank and time fixed effects as well as bank balance sheet controls) from Tables 2, 5 and 6. The coefficient show the cumulative effect (over the preceding four quarters) of a one unit change in the explanatory variable (as listed in the leftmost column) on percentage point changes in lending flows (as indicated at the top of each column). Standard errors, clustered at the bank level, are shown below the coefficients. Stars indicate the significance of the coefficients: *** p<0.01, ** p<0.05, * p<0.1.

Table 5A: The impact of changes in U.S. monetary policy on the lending of U.S. banks with different leverage ratios: 1986-2008

Monetary easing vs. tightening

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Monetary Policy Environment:	*Monetary Policy Easing*					*Monetary Policy Tightening*				
Lending flows:	*Total*	*Commercial & Industrial*	*Commercial Real Estate*	*Residential Real Estate*	*Consumer*	*Total*	*Commercial & Industrial*	*Commercial Real Estate*	*Residential Real Estate*	*Consumer*
Variables										
Quarterly Change in the Fed Funds Rate *	0.382	1.304	0.069	-2.457	2.526	0.995	2.006	-1.418	0.770	1.475
Leverage Ratio {t-1 to t-4}	[0.577]	[0.613]**	[0.257]	[1.065]**	[0.815]***	[0.655]	[0.884]**	[0.721]**	[1.249]	[1.354]
Quarterly Change in the Fed Funds Rate *	-0.651	-1.011	-0.146	0.862	-1.695	-1.089	-1.372	0.709	-1.004	-1.136
Leverage Ratio * GDP Growth {t-1 to t-4}	[0.279]**	[0.303]***	[0.148]	[0.496]*	[0.529]***	[0.617]*	[0.657]**	[0.318]**	[0.862]	[0.988]
Leverage Ratio {t-1 to t-4}	-0.352	-0.121	-0.174	-1.607	0.366	-0.386	-0.893	-0.637	-2.007	-2.411
	[0.527]	[0.529]	[0.212]	[0.713]**	[0.711]	[0.518]	[0.938]	[0.838]	[1.458]	[1.129]**
Leverage Ratio * GDP Growth {t-1 to t-4}	0.258	-0.154	0.024	1.350	-0.033	0.306	0.230	0.454	1.383	1.731
	[0.373]	[0.349]	[0.14]	[0.466]***	[0.484]	[0.34]	[0.64]	[0.595]	[0.983]	[0.831]**
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro Controls	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p
Demand Controls	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.22	0.23	0.22	0.32	0.28	0.22	0.19	0.21	0.26	0.30
Number of Observations	328,961	300,050	327,843	315,855	315,320	216,038	199,885	216,060	209,181	206,833
Interaction of changes in the federal funds rate with the leverage ratio, cumulative over four quarters, at the 10th percentile of GDP growth										
	-0.009	0.697	-0.019	-1.940	1.509	0.342	1.183	-0.993	0.168	0.793
Interaction of changes in the federal funds rate with the leverage ratio, cumulative over four quarters, at the 90th percentile of GDP growth										
	-0.822	-0.566	-0.201	-0.862	-0.610	-1.020	-0.532	-0.106	-1.087	-0.627

Note: The table above shows the impact of U.S. monetary policy on U.S. banks' lending to various market segments, between 1986 and 2008, during periods of monetary policy easing (Columns 1 through 5) and monetary tightening (Columns 6 throug 10). Each column represents the most complete specification for each loan type (that is, including bank and time fixed effects as well as bank balance sheet controls) from Tables 2, 7 and 8. The coefficient show the cumulative effect (over the preceding four quarters) of a one unit change in the explanatory variable (as listed in the leftmost column) on percentage point changes in lending flows (as indicated at the top of each column). Standard errors, clustered at the bank level, are shown below the coefficients. Stars indicate the significance of the coefficients: *** p<0.01, ** p<0.05, * p<0.1.