Monetary Policy in the Age of Universal Banking

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Abstract

In this paper, we establish that universal banks reduce the efficacy of the monetary policy pass-through to the economy. Universal banks have access to a variety of funding sources, beyond retail deposits, which enable them to maintain a higher credit supply when the monetary policy tightens. We show that this has positive real effects on the economy as the higher credit supply by universal banks leads to lower unemployment rates in areas where they lend more. This channel is distinct from existing theories of monetary policy transmission, and we validate that the findings hold beyond a variety of alternative explanations. The results shed new light on the Fed's execution of monetary policy, as well as how it should regulate the banking system.

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The banking system plays a central role in the transmission of monetary policy. Significant changes in the asset composition of banks affect not only the banks themselves, but also how monetary policy is transmitted to the economy. Over the last few decades, one prominent change in the U.S. is the movement toward universal banking. Commercial banks have increasingly expanded into non-lending activities such as trading, wealth management, and other advisory services. By 2017, 72% of U.S. banks engage in these activities. In this paper, we explore the effect of increased universal banking on monetary policy transmission. This development has implications not only for the Fed's execution of monetary policy, but how the Fed should regulate the banking system.

We establish that universal banks reduce the efficacy of monetary policy. As banks expand into non-commercial banking activities, they gain access to a variety of funding sources, beyond retail deposits, and specifically wholesale funding. When the monetary policy tightens, utilizing the additional funding sources enables universal banks to maintain a higher credit supply. This in turn reduces the monetary policy pass-through to the economy. The higher credit supply in counties with more universal banks leads to lower unemployment rates. This channel provides an explanation for how monetary policy affects the supply of bank lending in the economy. It is distinct from existing theories of monetary policy transmission, and holds beyond a variety of alternative explanations.

Our main measure of a bank's universality is its engagement with trading activities. The principal explanatory variable in the analysis is the interaction term of the bank's exposure to trading activity, measured as the amount of its trading assets as a share of total assets, with changes in the Fed funds rate. We conduct a bank-county level analysis, in which the outcome variable is small business lending (SBL). As small businesses are both highly bank-dependent and economically important, monetary policy pass-through is particularly salient for these firms. Because this type of lending is reported at a granular county-level, we can better gauge to what extent lending activity is a result of bank capital supply, and not just variation in loan demand (Khwaja and Mian, 2008). The sample includes all banks with relevant small business lending data between 1997-2021 (the latest available data).

First, we find evidence that small business lending declines with a rise in the Fed funds rate. However, we show that universal banks have an economically and statistically meaningful effect on credit supply. For a one percentage point (pp) increase in the Fed funds rate, banks with a one standard deviation higher exposure to trading maintain 5.2% higher SBL levels. This suggests that universal banks reduce the efficacy of the transmission of the monetary policy to the economy.

We argue that banks with higher trading activity lend more when the monetary policy tightens because they gain more access to other sources of funding—beyond retail deposits—and especially to wholesale funding. Banks that engage more in trading develop relationships with other financial institutions which allow them to tap into borrowing when needed. Trading assets can also serve as collateral in borrowing agreements. Thus, banks utilize these pre-established sources when retail deposits are getting scarce following monetary tightening, with depositors reaching for higher yields.

We show that this mechanism holds by performing a bank-level analysis, in which we test how universal banks' total funding, and wholesale funding in particular, adjusts following changes in monetary policy. We find that banks with higher trading assets experience higher funding growth when monetary policy tightens. Splitting between different sources of funding, we find that banks with more trading assets indeed tap more into wholesale funding when the Fed funds rate goes up. A natural question that arises is why these banks use more wholesale funding specifically following monetary policy tightening. We find that as the Fed funds rate increases, and banks exhibit outflows of retail deposits, these banks utilize wholesale funding to continue lending.

Next, we explore the aggregate effects on the bank and county level. The bank-county level analysis enables us to analyze bank credit supply decisions following monetary policy changes, separate from their effect on the demand for bank loans. Aggregating the bank-county level data to the bank level, we find similar results. For a given bank and year, one standard deviation higher expansion into trading assets is associated with 0.9% higher SBL following a one pp increase in the Fed funds rate. This indicates that the effect of universal banking on the origination of loans at the aggregate bank level following changes in monetary policy remains meaningful.

Then, we show that this aggregates to a positive change on the bank's total lending. As debt repayments might also exhibit a response following changes in monetary policy, the observed loan originations can be purely a substitution from other types of lending. We find that the bank's total credit supply is positively affected by monetary policy tightening for banks that are engaged more in trading activities. This means that credit origination is indeed higher than the debt repayments.

While banks that are more engaged with non-traditional activities maintain higher levels of lending following monetary tightening, it may not necessarily translate to an overall increase in lending. If this increase is coming entirely at the expense of the lending of other banks, total lending may not be meaningfully affected. To understand the effect on total lending, we aggregate bank activity to the county level and compare lending dynamics across counties. We find 0.4% higher SBL levels in counties with more universal banks (measured by one standard deviation more trading activity) following a one pp rise in the Fed funds rate. Universal banks have a meaningful effect on credit cycles following changes in monetary policy.

The more stable credit supply after a rise in the Fed funds rate also benefit the real economy, contributing to subsequent lower unemployment rates in counties where universal banks maintain credit supply, relative to other counties. Following a one pp increase in the Fed funds rate, we estimate that counties with one standard deviation more exposure to banks with trading activities have 2.3 basis points lower unemployment rates.

Next, we discuss a variety of alternative explanations to the results. First, we verify that the results are not driven by other known channels of monetary policy[1] by adding relevant

[1]Other prominent theories include: the bank lending channel (e.g., Bernanke and Blinder, 1988; Kashyap and Stein, 1995, 2000); the deposits channel (Drechsler, Savov, and Schnabl, 2017; Wang, Whited, Wu, and Xiao, 2021); The balance sheet channel (Bernanke and Gertler, 1989; Kiyotaki and Moore, 1997; Gertler and Kiyotaki,

variables and interactions to our main specification. Further, the specifications include rigorous fixed effects, such as county by time fixed effects to control for variation in local loan demand and bank by county fixed effects to capture persistent differences in a bank's county-specific lending activity not related to monetary policy. We also account for other bank factors that may influence lending through other means than universal banking. Thus, the interpretation of the observed effect is that the reduced efficacy of monetary policy is due to banks expanding into non-traditional banking activities, separate from other potential influencing factors.

One may claim that as some of the changes in Fed fund rates are anticipated, the results are driven by heterogeneity in banks' expectations rather than by their expansion into non-commercial banking activities. Although this cannot fully explain why differences in lending behavior correlate with exposure to trading, we address this concern directly by instead using monetary policy shocks as the measure of changes in monetary policy. Specifically, we use a measure of changes in the Fed Funds futures rate around FOMC meetings as in Kuttner (2001) and Gertler and Karadi (2015). Consistent with the previous results, we find that in response to an unexpected increase in the Fed funds rate, banks with more trading activities maintain higher SBL levels.

Further, the monetary policy transmission might be affected by factors that are correlated with trading activities but are distinct from them, and especially the size of the bank. As larger banks are potentially more likely to engage in trading, the size factor could be partially picked up by our main specification. To verify that the funding mechanism does not stem exclusively from the size of the bank, we verify that the results hold after adding the interaction between the bank size with the change in the Fed funds rate, and after adding an indicator for banks in the top 5% of banks by assets in each year-quarter. This indicates that the mechanism presented in this paper holds beyond the size of the bank. As bank size is used by Choi and Choi (2021) to proxy access to wholesale funding, we show that trading assets are rather the main driver of

2010; He and Krishnamurthy, 2013; Brunnermeier and Sannikov, 2014); the interest rate risk channel (Gomez, Landier, Sraer, and Thesmar, 2021).

this effect. This leads to the consequential positive real effects on employment, as well as the weakening of the monetary policy transmission to the economy.

Finally, our argument regarding the mechanism behind the results is that banks expanding into trading activities gather access to additional sources of funding. This might raise the concern of reverse causality, i.e., that access to wholesale funding leads banks to engage more with trading. To address this concern, we analyze the response of banks around the Volcker Rule implementation. The Volcker Rule is a regulation implemented after the 2008 financial crisis in the U.S. as part of the Dodd-Frank Wall Street Reform and Consumer Protection Act. The rule aims to prevent banks from making risky speculative investments that could potentially endanger their solvency and harm depositors. As part of the new regulation, banks were restricted from engaging in short-term proprietary trading of certain securities, derivatives, commodity futures, and options on these instruments. It also imposed limits on their investments in hedge funds and private equity funds, aiming to prevent excessive risk-taking and conflicts of interest.

We utilize the Volcker Rule as a negative shock to a bank's engagement with trading to perform a difference-in-differences analysis. As the rule did not impose any restrictions on wholesale funding, nor lending, the only reason for a bank to change its usage of wholesale funding following the new regulation is through the effect of the reduction of its trading activity. Less access to funding would lead these banks to reduce lending. We utilize a threshold that requires the strictest compliance with the rule, where banks are required to compute daily quantitative measures of their trading activities. The treated group are the banks that are subject to this reporting, namely those banks with more than $10 billion in total trading assets and liabilities. The control group consists of banks with total trading assets and liabilities below this threshold.

We first verify that this aspect of the Volcker Rule has a meaningful effect on the engagement of banks with trading. Otherwise, this is not a suitable shock to our purpose. We find that the treated banks indeed reduced trading activities in response to the rule relative to the control group. Then, we show that the treated banks reduced total funding growth, and specifically wholesale funding growth, following the new regulation. This indicates that the decrease in the treated banks' trading assets following Volcker Rule leads banks to reduce reliance on these sources of funding. At the same time, we do not observe an increase in retail deposits that can explain the decreased utilization of wholesale funding. Finally, we show that the regulation led the treated banks to scale back to lending behavior similar to the control group when the Fed funds rate increases.

Next, we study the effect of universal banks in a tightening versus easing monetary policy environment. Ex-ante, this channel is expected to affect a bank's credit supply symmetrically in response to changes in the Fed funds rate. However, when we split between positive and negative changes, we find that the effect is concentrated in increases in the Fed funds rate. This suggests that banks are much more responsive to increases in the Fed funds rate when it comes to non-traditional commercial lending activities and their effect on lending. Analyzing our mechanism with the split in the changes in the Fed funds rate, we do not find similar effects. This indicates that universal banks' likelihood to tap into wholesale funding does not differ in a similar way to lending. Thus, other factors, that might relate to the overall economy and the banking system explain the asymmetric response in bank lending, rather than the extent of how universal the bank is.

As our main goal is to show the effect of universal banks on the transmission of the monetary policy and the associated effects on the real economy, our focus is small business lending and aggregate bank lending. However, another major source of bank lending is mortgages. The housing market represents an incremental component of the economic activity, affecting inflation and welfare of households. To this end, we focus on this lending segment and utilize the granularity of the HMDA dataset as it also allows us to identify the location of the borrower at the county level. We show that one standard deviation of more trading assets leads to a bank to originate 4.8% more mortgages for a one pp increase in the Fed funds rate

Finally, we extend the proxy of universal banking and analyze expansion into advisory services.[2] As there is no clean way to assess a bank's advisory services assets, we measure the advisory services activity as the number of broker-dealer subsidiaries in the bank's organizational structure (following Gelman, Goldstein, and MacKinlay, 2021). Performing our bank-county baseline specification, we find that for a one pp increase in the Fed funds rate, banks with one standard deviation more advisory services subsidiaries maintain 3.7% higher SBL levels. This provides evidence for a consistent pattern of banks expanding into non-lending activities on the efficacy of the monetary policy transmission to the economy.

Our paper sheds new light on the tensions inherent in the Fed's regulation of the banking system and its execution of monetary policy. There is a long-standing debate in the literature and among policy makers about how far banks should be permitted to expand (Yellen, 2013). Banks that operate in more areas and across multiple types of assets contribute to the credit supply and the local competition in the credit market, with a positive impact especially on households and small businesses. However, higher interdependence among banks caused by similarity of asset composition may lead to risk contagion and a rise in systemic risk.[3] We add a new dimension to this debate, by showing that universal banks weaken the transmission of monetary policy to the economy. Taken together, the potentially conflicting effects on monetary and macroprudential policy may provide an argument for the Fed to limit bank expansion into non-lending activities.

Related, in the United States, there have been many significant regulatory reforms regarding the nature of banks and their activities. Three recent reforms include the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994, the Gramm–Leach–Bliley Act in 1999, and the Dodd-Frank Wall Street Reform and Consumer Protection Act in 2010. So far, the literature has discussed the optimal combination between macroprudential policy, bank capital regulation, and monetary policy (e.g., Angeloni and Faia, 2013; Repullo and Suarez, 2013; Collard, Dellas, Diba, and Loisel, 2017). In this paper, we present the direct implications of the regulatory

[2] The main services included in this category are: wealth management, advisory and underwriting fees and commissions, and securities brokerage.

[3] Ibragimov, Jaffee, and Walden (2011); Wagner (2010); Allen, Babus, and Carletti (2012); Berger, El Ghoul, Guedhami, and Roman (2017); Chu, Deng, and Xia (2019); Goldstein, Kopytov, Shen, and Xiang (2020).

reforms of banks' non-lending activities on the efficacy of the monetary policy pass-through.

We contribute to the literature on the expansion of banks into non-lending activities. Previous studies focused on the implications of this expansion on the banking system, such as on securities underwriting, credit supply, bank performance, and productivity (Kroszner and Rajan, 1994; Puri, 1996; Cornett, Ors, and Tehranian, 2002; Drucker and Puri, 2005; Neuhann and Saidi, 2018). Within the non-lending activities, trading is among the riskiest (De Jonghe, 2010), and banks with more exposure to trading securities had higher losses during the 1998 and 2008 crises (Fahlenbrach, Prilmeier, and Stulz, 2012). Gelman, Goldstein, and MacKinlay (2021) show that a more diversified stream of earnings enables banks to better absorb negative shocks, leading to increased and more stable lending, and positive spillovers to the economy. Our results on the effect of universal banks on the transmission of the monetary policy show a new element of how banks' expansion influences the real economy.

This paper also relates the bank's non-lending activities, non-retail deposits—and specifically wholesale funding—to the transmission of monetary policy to the economy though the banking system. Past papers on wholesale funding present its "dark side" and fragility (e.g., Demirgüç-Kunt and Huizinga, 2010; Pérignon, Thesmar, and Vuillemey, 2018; Huang and Ratnovski, 2011), the effect on the bank's risk (López-Espinosa, Moreno, Rubia, and Valderrama, 2012), and how liquidity regulation and the bank's liquidity needs affect its usage of wholesale funds (e.g., Sundaresan and Xiao, 2024). Choi and Choi (2021) show that large banks are more likely to substitute from retail deposits to wholesale funding during monetary tightening. We establish that the effect is driven by the universality of the bank, and show the consequential effects on lending and the real economy.

Finally, the paper relates to the literature on the effect of shadow banks on the efficacy of the monetary policy pass-through, and the increasing role of shadow banks in the financial system (Elliott, Meisenzahl, Peydró, and Turner, 2019; Xiao, 2020). They show that shadow banks weaken monetary policy pass-through. Conceptually, the increased role of shadow banking and the shift toward more universal banking both lessen the importance of traditional commercial banking activity in the financial system. Both shadow banks and universal banks lead to reduction in the efficacy of the monetary policy pass-through.

The rest of the paper proceeds as follows. In Section I, we discuss the sources of data and our measures of monetary policy rates and bank expansion into non-lending activities. In Section II.A, we conduct the main analysis at the bank-county level of the effect on bank expansion into non-traditional activities on the transmission of monetary policy, and establish the wholesale funding as the mechanism behind the results. Section III.A presents the aggregate implications at the bank and the county level, as well as the positive effects on the real economy. In Section IV, we show the channel is distinct from existing theories of monetary policy and other alternative explanations. Section V examines the asymmetry of the effect and its presence in other lending markets. We also show consistent pattern for mortgage lending and for engagement with advisory services as an additional proxy of universal banking. Section VI concludes.

I. Data

Our data cover the universe of U.S. banks from 1997 to 2021 that report either detailed small business lending or mortgage lending activity. Throughout our paper, we consider banks at a bank holding company (BHC) level. We often refer to BHCs as banks for simplicity. This includes financial holding companies (FHCs), which are a classification of BHCs that engage in a broad range of financial activities. Most large BHCs are registered as FHCs (Avraham, Selvaggi, and Vickery, 2012).

I.A. Data Sources

We next describe the data sources and variables that we use.

Bank-level data. The Federal Reserve's quarterly Y-9C (consolidated bank holding company data) reports provided by the Federal Reserve. We use data from 1996 to 2021. It contains quarterly data on the income statements, balance sheets, detailed supporting schedules, and off balance-sheet items of all bank holding companies over a certain size threshold.[4]

Small business lending data. The Federal Financial Institutions Examination Council's (FFIEC) Community Reinvestment Act (CRA) small business lending data. All banks over a certain threshold of total assets are required to report this data on an annual basis.[5] We match and aggregate the small business lending data to the BHC parent level. The data is available starting in 1996 and as we rely on lagged lending activity for some of our measures, we begin analysis in 1997.

Mortgage loans. The Home Mortgage Disclosure Act (HMDA) data. The HMDA data provide detailed annual information on the mortgage originations of the bank including the geographic location of the borrower. Like other regulatory datasets, it has an asset-size threshold and some other rules based on loan origination activities that determines whether a given bank needs to report the data.[6]

BHC organizational structure. The FFIEC's National Information Center (NIC) data. The data provide the complete subsidiary structure of each bank, including the institution names, Federal Reserve identifiers (RSSD IDs), location, and a categorization of each institution type on a quarterly basis.[7] We use this data primarily to identify the presence of broker-dealer subsidiaries in the bank's organizational structure, which are the common classification for subsidiaries involved in advisory services activities.

Branch-level deposits. The Federal Deposit Insurance Corporation (FDIC) Summary of

[4]In our sample period, the size threshold is $150 million in assets until March 2006, when it increased to $500 million. It increased to $1 billion in March 2015 and $3 billion in September 2018. Certain BHCs below these size thresholds may also be required to file this report if they meet other criteria.

[5]For 2006 and earlier, the threshold is $250 million. Starting in 2007, the FFIEC began annual updates of the asset threshold level required for reporting. For 2007, the asset threshold was increased to $1.033 billion. By 2017, the threshold reached $1.226 billion. See `https://www.ffiec.gov/cra/reporter.htm` for the yearly thresholds.

[6]In general, these size thresholds are adjusted annually with inflation and are much lower than the CRA thresholds. For example, the threshold for 2018 was $45 million.

[7]The NIC data is generated from FR Y-6 *Annual Report of Bank Holding Companies* and FR Y-10 *Report of Changes in Organizational Structure*. See Avraham, Selvaggi, and Vickery (2012) for an overview of BHC organizational structures and other regulatory details.

Deposits data. The data cover the universe of U.S. bank branches at an annual frequency. The data has information on branch characteristics such as the parent bank, address, and amount of deposits. We aggregate this deposit data to the bank-county level to measure of local deposit market share.

Fed funds and other macro data. The effective Fed funds rate is taken from the St. Louis Fed's Federal Reserve Economic Data (FRED). We use the average quarterly rate. Depending on the analysis, we either take the quarterly change in the Fed funds rate or the year-over-year change in the Fed funds rate. For our analysis that uses the unexpected component of the change in the Fed funds rate, we follow Kuttner (2001) and Gertler and Karadi (2015) and use the change in the price for the current Fed funds futures contract between the day of an FOMC announcement and the prior day's value. We take the quarterly average of these changes. We also use the prior quarter's S&P 500 return, VIX index level, or percent change in real GDP, all from FRED.

I.B. Main Explanatory Variables

The analysis focuses on trading as a major non-lending activity for commercial banks. To measure each bank's exposure to trading activity, we use the size of its trading assets as a share of total assets. As a separate measure of non-lending activity, we also consider advisory services. For advisory services, there is no clear analogue on the bank's balance sheet. To capture the degree of a bank's exposure to advisory services, we follow Gelman, Goldstein, and MacKinlay (2021) and use the number of broker-dealer subsidiaries in the bank's organizational structure. For bank holding companies, subsidiaries that engage in typical advisory services activities are reported as securities broker-dealers in the NIC data.

We also consider the funding sources of bank. We consider changes in retail deposits, wholesale funding, and the combination of these two sources. Wholesale funding includes wholesale deposits, commercial paper, Fed funds purchased, and repo borrowing.

For monetary policy rates, our main measure is the one-year lagged change in the Fed funds rate. When estimating bank sensitivities to changes in Fed funds rates, we use a series of quarterly changes in the Fed funds rate rather than the one-year change.

I.C. Other Bank and County Variables

Our main dependent variable is small business lending estimated as the total volume originated by a bank in a year. Small-business loans are those loans whose original amounts are $1 million or less and fall into either the "Loans secured by nonfarm or nonresidential real estate" or "Commercial and industrial loans" categories on a bank's balance sheet. Importantly for our purposes, this small business lending data is reported at a county level, which allows us to more robustly control for economic conditions in the specific area. For some of the later analysis, we aggregate this data to either the bank level or aggregate county level.

Some analysis uses mortgage lending data. Like the small business lending data, these are the total amount of loans originated by banks as reported in HMDA data on an annual basis. We focus on the data at a county level. We also calculate the change in the bank's total lending as the one-year growth rate in total loans as reported on the bank's balance sheet.

Apart from lending data, we include other common bank-level variables such as the natural logarithm of total assets, equity to assets, and deposits to assets. As a measure of bank profitability, we calculate the bank's average quarterly ROA over the past three years, and the bank's Z-Score as a measure of the total risk of the bank. We also use the bank's average annual loan growth over the past three years and its net interest margin. We calculate the bank's deposit share in each county it lends as its reported deposits from the prior year divided by the total deposits in a county. We also use the reported average unemployment rate in a year for each county. The summary statistics for these variables are reported in Table I.

II. Effects on Lending

II.A. Trading Activities and Small Business Lending

We consider whether a bank's trading activities affect how its lending activities respond to changes in monetary policy rates. To formally test for this effect, we run the following regression:

$$\text{Log SBL}_{ict} = \gamma_1 \Delta\text{ FF Rate}_{t-1} + \gamma_2 \text{Trading Assets}_{it-1} + \gamma_3 \text{Trading Assets}_{it-1} \times \Delta\text{ FF Rate}_{t-1} + \gamma_4 \text{Bank Controls}_{it-1} + \gamma_5 \text{Bank-County Controls}_{ict-1} + \lambda_{ic} + \mu_{(c)t} + \varepsilon_{ict}. \quad (1)$$

Here we focus on small business lending for bank i in county c in year t. Our outcome variable for the bank-county analysis is small business lending as it is a sector that is very dependent on bank capital and therefore directly impacted by changes in bank lending behavior.[8] Small business lending also allows us to show in Section III.B the real economic implications of bank trading activities. *Trading Assets* is calculated as the bank's trading assets scaled by total assets.

We also include both bank-level and bank-county-level controls, including the bank's size, net interest margin (NIM), loan growth, Z-score, ROA, equity and deposit ratios, and its share of deposits in county c. We include bank-county fixed effects (λ_{ic}), which control for persistent differences across banks which lend in a given county. We also incorporate either year or county-year fixed effects (μ_{ct}), which remove any time-varying effects at the macro level (for year fixed effects) or time-varying differences in economic conditions in a given county (for county-year fixed effects). With the application of county-year fixed effects, we can interpret differences in bank lending decisions within a county to be attributable to differences in bank supply decisions rather than county-level demand factors. Standard errors are clustered at the

[8] It has also been a more recent direct focus of the Federal Reserve. One example is the implementation of the Main Street Lending Program to support small and medium-sized businesses during the initial impact of the COVID-19 pandemic. See `https://www.federalreserve.gov/monetarypolicy/mainstreetlending.htm`.

bank level. The results are presented in Table II.

As a starting point, we show that small business lending declines with a rise in the Fed funds rate. Given year or county-year fixed effects absorb the standalone coefficient for the Δ *FF Rate*, in Column 1 of Table II, we perform the specification in Equation (1) without time fixed effects. Instead, we include a few key macroeconomic variables that might influence a bank's lending decisions, namely the change in real GDP, the S&P 500 return, and the level of the VIX index. We find a negative and statistically significant coefficient for the change in the Fed funds rate on lending, indicating that increases in the Fed funds rate are associated with fewer new small business loan originations.

In Columns 2 and 3, we add year fixed effects and find that banks with a higher share of trading assets originate more small business loans for a given change in the Fed funds rate.In Column 3, we include various bank controls that separately influence the bank's lending decisions, such as size, net interest margin, local deposit share, and past loan growth. The interaction term between trading assets and changes in the Fed funds rate remains very similar to the estimate in Column 2 and is still statistically significant at the 1% level. In Column 4, we move from year fixed effects to county-year fixed effects. Here the estimates are interpreted as within a given county and year, and removes differences in demand across counties each year. The estimate remains very similar. In terms of economic magnitude, for a one percentage point (pp) increase in the Fed funds rate, banks with one higher standard deviation in trading assets are associated with 5.2% more small business lending (using the estimates from Column 4).

II.B. Mechanism Behind the Effect on Lending

In the previous section, we found that the more trading activities a bank engages in, the more small business lending it provides for a given change in the Fed funds rate. We note that this effect is found while controlling for the bank's size, NIM, and county-level deposit share among other characteristics. Trading activities affect the transmission of monetary policy through the bank's small business lending.

In this section, we turn to analyze the mechanism behind this result. We argue that banks with higher trading activity lend more when the monetary policy tightens because they have more access to other sources of funding—beyond retail deposits—and especially to wholesale funding. Banks that engage more in trading develop relationships with other financial institutions which allow them to tap into borrowing when needed. Trading assets can also serve as collateral in borrowing agreements. Thus, banks utilize wholesale funding when retail deposits are declining following monetary tightening. To test this hypothesis, we perform the following bank-level specification:

$$
\begin{aligned}
\text{Y}_{it} = {} & \gamma_1 \Delta \text{ FF Rate}_t + \gamma_2 \text{Trading Assets}_{it-1} + \gamma_3 \text{Trading Assets}_{it-1} \times \Delta \text{ FF Rate}_t \\
& + \gamma_4 \text{Bank Controls}_{it-1} + \lambda_i + \mu_t + \varepsilon_{it}. \qquad (2)
\end{aligned}
$$

Here *Y* stands for different funding measures. Specifically, we study the growth in total funding of the bank (wholesale funding plus retail deposits), and changes in its wholesale funding and retail deposits separately. In this specification, we are able to analyze the effects on a quarterly level. The explanatory variables are the same as in the specification in the previous section (excluding *County Deposit Share*). As we are considering the more immediate change in funding in response to rate changes, we consider contemporaneous quarterly changes in the Fed funds rate. We include bank and year-quarter fixed effects. Standard errors are clustered at the bank level.

Table III presents the results. In Columns 1-2, the outcome variable is *Total Funding Growth*. We find that banks with higher trading assets experience higher funding growth in general (Column 1) and the effect more than doubles as the monetary policy tightens, as can be seen in the interaction term in Column 2. Indeed, for a one pp increase in the Fed funds rate, a bank with one standard deviation more trading assets will increase total funding growth by 0.3 pp (or 1.2 pp on an annualized basis), compared to its peers. Splitting between different sources of funding, we find that banks with more trading assets indeed tap more into wholesale funding when the Fed funds rate goes up (Column 4). Here the marginal effect of a one pp increase in the Fed funds rate for a bank with one standard deviation more trading assets is 0.5 pp (or 2.1 pp on an annualized basis).

A natural question that arises is why these banks use more wholesale funding specifically following monetary policy tightening. To tackle this, we explore what happens to retail deposit growth in Columns 5-6 of Table III. We find that while banks with more trading assets have higher retail deposit inflows than other banks (Column 5), this difference is not driven by changes in the Fed funds rate (Column 6). Given that banks generally experience declines in retail deposits following increases in interest rates, it appears that these banks replace these retail deposits with wholesale funding. Utilizing wholesale funding allows them to continue lending.

As a final step, we compare the magnitudes implied by the lending and funding results. In our sample, the average bank originates small business loans equal to 4.5% of its total assets in a year. At the same time, the average bank has about 23% of its assets supported by wholesale funding (and 88% supported by retail deposits and wholesale funding). So for a bank with $16.2 billion in total assets (our sample average), a 2.1 pp annualized increase in wholesale funding growth would imply about $77.2 million additional wholesale funds over a year. The similar implied total funding increase is about $168.2 million. These numbers compare to an implied increase of $38 million in small business loan originations.

III. Aggregate Effects

In Section II.A, we considered small business lending at the bank-county level. This granularity enabled us to separate the bank's credit supply from the demand fluctuations for bank loans following changes in monetary policy and show that the results hold beyond time-varying local factors. We will discuss a variety of alternative explanations in Section IV. Now, we turn to analyze the aggregate effects. In Section III.A, we quantify the magnitude of the effects at the BHC level. In Section III.B, we study aggregate SBL at the county level and any corresponding real effects.

III.A. Bank-Level Analysis

In this section, we investigate whether the effects also hold at the BHC level by aggregating the bank-county data to the bank level. As changes in monetary policy may also affect debt repayment activity, the net change in bank lending is less clear. Columns 1-2 in Table IV present the results. Here, we perform the specification:

$$\begin{aligned} \text{Y}_{it} = {} & \gamma_1 \Delta \text{ FF Rate}_{t-1} + \gamma_2 \text{Trading Assets}_{it-1} + \gamma_3 \text{Trading Assets}_{it-1} \times \Delta \text{ FF Rate}_{t-1} \\ & + \gamma_4 \text{Bank Controls}_{it-1} + \lambda_i + \mu_t + \varepsilon_{it}. \end{aligned} \tag{3}$$

The outcome variables Y are the natural logarithm of small business lending at the bank-level (Column 1) and the one-year loan growth from the bank's overall balance sheet (Column 2). Given the nature of the SBL data, we conduct this regression on an annual basis. In Column 1, the coefficient of the interaction between the bank's trading assets and the change in the Fed funds rate is positive. The magnitude is also economically significant. For a given bank and year, a one standard deviation higher exposure to trading is associated with 0.9% more SBL following a one pp increase in the Fed funds rate.

In Column 2, the measure captures all types of lending that the bank chooses to keep on its balance sheet. We find a positive and statistically significant effect: banks with one standard deviation higher trading assets maintain 0.1 pp higher loan growth for a one pp change in the Fed funds rate. The result at the bank level is consistent with the bank-county level results, indicating that banks that engage more in trading meaningfully weaken the transmission of monetary policy by maintaining more lending at the aggregate bank level.

III.B. Aggregate SBL and Real Effects

In this section, we zoom out and explore the effects of banks engaging more in trading activities on the overall SBL at the county level and the corresponding real effects. While these banks maintain higher SBL following monetary tightening, this may not necessarily translate to an aggregate increase in lending. If this increase is coming entirely at the expense of the lending of other banks, total credit may not be meaningfully affected. To understand the effect of universal banks on county-level lending following changes in monetary policy, we aggregate bank activity to the county level and compare lending dynamics by performing the following specification:

$$\begin{aligned} \mathrm{Y}_{ct} =& \gamma_1 \Delta \text{ FF Rate}_{t-1} + \gamma_2 \text{Trading Assets}_{ct-1} + \gamma_3 \text{Trading Assets}_{ct-1} \times \Delta \text{ FF Rate}_{t-1} \\ &+ \gamma_4 \text{Bank Controls}_{ct-1} + \alpha_{LMA} + \mu_t + \varepsilon_{ct}. \end{aligned} \quad (4)$$

Here the outcome variable Y is either the aggregate small business lending or unemployment rate for county c in year t. County-level versions of *Trading Assets* and the other bank controls are calculated by weighting each bank by its share of lagged deposits in the county. We include labor market area (LMA) fixed effects (α_{LMA}) and year fixed effects (μ_t).[9] Standard errors are clustered by county.

Columns 3 and 4 in Table IV present the results for the aggregate county SBL. We find higher SBL levels in counties with more banks that expand into trading following a rise in the Fed funds rate. The results hold both with and without LMA fixed effects. Counties with more trading asset exposure maintain more SBL when the Fed funds rate increases, compared to other counties. For the specification with LMA fixed effects (Column 4), following a 1 pp increase in the Fed funds rate, counties with one standard deviation more trading asset activities have 0.4% more SBL than other counties. The fact that the effects observed at the bank-county level

[9] A LMA—defined by the BLS—is an economically-integrated area within which individuals can reside and find employment within a reasonable distance or can readily change jobs without changing their place of residence. We use LMA fixed effects to control for persistent differences in labor market areas that might affect county-level lending.

hold in the aggregate is further evidence of a reduction in the efficacy of the monetary policy transmission to the economy.

In Columns 5 and 6, we change the outcome variable to the county unemployment. We find that the more stable credit supply following a rise in the Fed funds rate contributes to lower unemployment rates. Using Column 6, for a one pp increase in the Fed funds rate and one standard deviation more trading activity, counties have a 2.3 basis point lower unemployment rate. Taken together, the expansion of banks into trading reduces the transmission of the monetary policy, as seen with more lending and lower unemployment in affected counties following increases in the Fed funds rate. This points to a meaningful effect of these banks on credit cycles.

IV. Alternative Explanations

IV.A. Distinction from Other Channels

So far, we have posited that non-traditional commercial banking activities, and specifically trading, alter the transmission of monetary policy by changing the link between the bank's funding and monetary policy rates. However, there are already several other channels of monetary policy that are well established. It is possible that our variables are picking up one of these other channels. We do not think such an event is likely, as our results are focused on access to alternative funding sources. Prior channels typically focus on how bank capital or retail deposits are affected by monetary policy (i.e., the banking lending channel, balance sheet channel, or deposits channel), or how a bank's lending income exposure affects transmission (the interest rate risk channel).

Nevertheless, in Table V, we attempt to more directly control for these other means of monetary policy transmission. In each column, we repeat our specification based on Equation (1) but introduce a specific variable that past literature has argued is related to these channels and interact it with Δ *FF Rate* (we add one variable in each column). If our measures of non-lending exposure are simply picking up one of these channels, our main estimates should lose significance.

In Column 1, we interact the bank's *Equity to Assets* with changes in the Fed funds rate.[10] This interaction serves as a way to capture differences in the importance of the balance sheet channel of monetary policy transmission across banks (Bernanke and Gertler, 1989; Gertler and Kiyotaki, 2010). We find that the estimate of the effect of trading assets on small business lending remains similar to Column 4 in Table II, which is the equivalent specification from Section II.A. In Column 2, we add the bank's share of liquid assets and interact it with changes in the Fed funds rate. This variable is motivated by Kashyap and Stein (2000), who find that banks with less liquid assets are more affected by monetary policy changes, and argue these patterns support the existence of a bank lending channel. We also include an interaction with bank size and the change in the Fed funds rate as it is the other dimension considered by Kashyap and Stein (2000). Again, we find our main estimate remains similar to the baseline specification.

In Column 3, we include the bank's deposit HHI measure and interact it with changes in the Fed funds rate. This variable is motivated by Drechsler, Savov, and Schnabl (2017), who find evidence of a deposits channel of monetary policy, where the bank's market power over deposits affects the transmission of monetary policy. In Column 4, we include the measure of a bank's income gap, defined as the difference in the amount of assets and liabilities that mature or reprice within one year. Gomez, Landier, Sraer, and Thesmar (2021) argue that a bank's exposure to interest rate risk—measured by the bank's income gap—is a significant determinant of monetary policy transmission. In both Columns 3 and 4, our estimate of the effect of *Trading Assets*$\times$*Chg. FF Rate* remains statistically significant and the same magnitude as in Table II.

IV.B. Monetary Policy Surprises

Another potential issue is that as some changes in the Fed funds rate are anticipated, banks may adjust their lending to the anticipated change in economic conditions. Thus, we verify

[10]The standalone *Equity to Assets* variable is already included in the specification from Table II, so here we just add the interaction term.

that the results are not driven solely by heterogeneity in banks' expectations rather than by their trading activity, and that banks that engage more with trading do not change their lending differentially for reasons not related their non-lending activities. Thus, in columns 5 and 6 of Table V we replace the total change in the Fed funds rate with the unanticipated change in the Fed funds rate. We use the unanticipated change in the Fed funds rate based on changes in Fed funds futures prices around FOMC announcements as in Kuttner (2001) and Gertler and Karadi (2015).

Studying how a bank's exposure to trading assets affects its lending activity following surprise changes in the monetary policy rate, we find a positive and statistically significant result, both with year fixed effects (Column 5) or county-year fixed effects (Column 6). It does not appear that the main findings are driven by some anticipated change in economic conditions that correlates with rate changes.

IV.C. Bank Size

It is also possible that the monetary policy transmission might be affected by factors that are correlated with trading activities but are distinct from them, and especially the size of the bank. As larger banks are potentially more likely to engage in trading, the size factor could be partially picked up by our main specification. We note that differences in size cannot explain our baseline lending result, as we include it as an additional interaction in Table V.

To verify that the wholesale funding mechanism presented in section II.B does not stem exclusively from the size of the bank, we rerun the specification in Equation (2) for all the three funding outcome variables, and this time add the interaction between bank size (measured by log assets) and the change in the Fed funds rate. Separately, we add an indicator for banks in the top 5% by assets in each year-quarter and interact it with changes in the Fed funds rate.

Table VI presents the results. Columns 1, 3, and 5 include the bank size interaction, while Columns 2, 4, and 6 include the *Large Bank* indicator. The coefficients of our main interaction term, *Trading Assets* $\times$ Δ *FF Rate* remain statistically significant with similar magnitudes to the ones in Table III for total funding growth and wholesale funding growth. The interaction remains statistically insignificant for retail deposit growth, as in Table III.

Our results show that the mechanism presented in this paper is distinct from the size of the bank. Bank size is used by Choi and Choi (2021) to proxy for access to wholesale funding. We show that trading assets in particular are the main driver of this effect.

IV.D. Volcker Rule

Our argument regarding the mechanism behind the results is that banks with more trading activities have access to additional sources of funding. This might raise the concern of reverse causality, i.e., that desired access to wholesale funding leads banks to engage more with trading.

To address this concern, we analyze the response of banks around the Volcker Rule implementation. The Volcker Rule is a regulation implemented after the 2008 financial crisis in the U.S. as part of the Dodd-Frank Wall Street Reform and Consumer Protection Act. The rule aims to prevent banks from making risky speculative investments that could potentially endanger their solvency and harm depositors. As part of the new regulation, banks were restricted from engaging in short-term proprietary trading of certain securities, derivatives, commodity futures and options on these instruments. It also imposed limits on their investments in hedge funds and private equity funds, aiming to prevent excessive risk-taking and conflicts of interest. The final regulations became effective on April 1, 2014. Effective June 30, 2014, banks above certain thresholds are required to report various quantitative measures related to their trading activities on a daily basis to ensure compliance.[11] Banks were required to conform their activities and investments to the requirements of the final regulations by July 21, 2015.

We utilize the onset of quantitative measure reporting required by the Volcker Rule as a negative shock to a bank's engagement with trading. As the rule did not impose any restrictions

[11]This requirement applied to banks with more than $50 billion in combined trading assets and liabilities. It expanded to banks with more than $25 billion in combined trading assets and liabilities in April 2016 and more than $10 billion in December 2016.

on wholesale funding, nor lending, the only reason for a bank to change its usage of wholesale funding following the new regulation is through the effect of the reduction of its trading activity. Less access to funding would lead these banks to reduce lending.

We perform the following bank-level difference-in-differences specification to establish the effect of trading activities on funding:

$$\mathrm{Y}_{it} = \beta_1 \text{Volcker Treat}_i \times \text{Post}_t + \beta_2 \text{Bank Controls}_{it} + \alpha_i + \gamma_t + \varepsilon_{it}, \tag{5}$$

Here *Y* stands for different funding variables: total funding growth, change in wholesale funding and change in retail deposits (as in Equation (2)) We classify all banks that are required to report measures as the treatment group (i.e., those with more than \$10 billion in combined trading assets and liabilities before the final regulations were announced). We classify as control banks those with combined trading assets and liabilities of more than \$1 billion but below the reporting threshold. This control group is selected to include banks that are more comparable to the treatment but not as intensely affected by the rule. *Post* takes the value of 1 for 2014Q3–2017Q4, the periods after the declaration of the Rule, and zero for 2012Q1–2014Q2. The control variables are the same as in Equation (2). Columns 1-4 in Table VII present the results of this specification.

In Column 1, we first verify that the new rule has a meaningful effect on the engagement of banks with trading. Otherwise, this is not a suitable shock to our purpose. In Column 1, we find that the interaction of *Volcker Treat* with *Post* is negative as expected, statistically significant, and has an economically meaningful magnitude. Relative to the control group, these banks reduced their share of trading assets by 2.2 pp following the rule. We also plot average level of trading assets for the treatment and control groups in Figure 1, relative to the quarter when the final rule was announced but not yet in effect. We see that both groups had maintained consistent levels of trading assets in the quarters leading up to the rule (so similar pre-trends), and that the treated group made a negative adjustment in the first few quarters following the announced rule. Taking Column 1 of Table VII and Figure 1 together, we take this as evidence that the Volcker Rule and the daily tracking of quantitative trading measures (or the desire to avoid such tracking), lead these banks to curtail their trading activity.

In Columns 2 and 3 of Table VII, we find that the treated banks reduce total funding growth (Column 2), and specifically wholesale funding growth (Column 3), following the new regulation. Consistent with retail deposits being unrelated to trading activity, we see no meaningful change in retail deposit growth (Column 4). Together, this indicates that the decrease in the treated banks' trading assets following the Volcker Rule lead banks to use less wholesale funding, which in turn decreased total funding.

Next, we turn to show the corresponding effect of this reduction in trading assets following the rule on small business lending. We perform the following bank-county difference-in-differences specification:

$$\begin{aligned}\text{Log SBL}_{ict} = {} & \beta_1 \text{Volcker Treat}_i \times \text{Post}_t + \beta_2 \text{Volcker Treat}_i \times \Delta \text{ FF Rate}_{t-1} \\ & + \beta_3 \text{Volcker Treat}_i \times \text{Post}_t \times \Delta \text{ FF Rate}_{t-1} + \beta_4 \text{Bank Controls}_{it-1} + \alpha_{ic} + \gamma_{ct} + \varepsilon_{ict},\end{aligned} \tag{6}$$

Here, the outcome variable, Δ *FF Rate*, and the controls are the same as in Equation (1). *Volcker Treat* is as defined above. For SBL, as the analysis is at the annual level, we choose to exclude 2014, and we adjust the *Post* indicator to equal one for the years 2015–2017 and zero for 2012–2013.[12] Columns 5 and 6 in Table VII present the results of this specification.

Similar to our main analysis, we find that the banks with more trading activity (the treated banks) are more likely to lend when the Fed funds rate increases than other banks before the shock ($\beta_2 > 0$). However, our main explanatory variable, the triple interaction of *Volcker Treat* × *Post* × Δ *FF Rate*, is negative and statistically significant in Column 5. This means that treated banks following the Volcker Rule increase small business lending less following in-

[12] This is because 2014 includes both quarters before and after the rule becomes finalized.

creases in the Fed funds rate, compared to the control group. The economic magnitude is also meaningful. The result also holds—with a similar magnitude—after including county-year fixed effects in Column 6. Analyzing the overall effect of the double and triple interaction terms, the regulation led the treated banks to scale back to lending behavior similar to the control group ($\beta_1 + \beta_2 + \beta_3$ is not statistically different from zero).

Overall, the results from the variety of analyses conducted in this section provide evidence that other explanations, not related to wholesale funding, are less likely to drive the observed effect of the bank's trading activities on its lending behavior during changing monetary policy.

V. Extensions to the Analysis

In this section, we provide evidence of an asymmetric effect of universal banking in periods of monetary tightening versus monetary loosening (Section V.A). Although we already show that universal banking contributes to more stable aggregate lending and small business lending, in Section V.B we show in a granular bank-county level analysis that the effect also holds for mortgage lending. Finally, we use a different measure of universal banking and provide evidence of a similar effect for banks expanding their advisory services on the efficacy of the monetary policy transmission to the economy (Section V.C).

V.A. Asymmetric Effects of Monetary Rate Changes

Given the very different economic conditions that exist when central banks seek to implement contractionary or expansionary monetary policy, it is not obvious that banks will react in a symmetric manner to increases and decreases in interest rates. To investigate this issue, in Table VIII, we perform the specification in Equation (1) and split the changes in the Fed funds rate into positive (Column 1) and negative (Column 2) components.

While we find that separately that the positive and negative Fed funds changes have the same sign and are highly significant, the magnitudes differ markedly. The effect associated with positive changes in the Fed funds rate is about 4.4 times larger than the effect associated with negative changes (comparing Columns 1 and 2). Further, in a specification that include both positive and negative rate changes as separate variables, we find that the negative rate changes lose statistical significance. These results suggest that banks are much more responsive to increases in the Fed funds rate when it comes to non-traditional commercial lending activities and their effect on lending.

This effect is not inconsistent with the underlying funding mechanism. Indeed, universal banks tap wholesale funding when rates are rising and retail deposits are leaving the banking system. At such a time, the non-universal banks are more constrained and unable to lend as much as the universal banks. Alternatively, when interest rates are falling and retail deposits flow into the banking system, both types of banks are less constrained and able to lend, leading to smaller differences across banks.

V.B. Other Types of Lending

So far, we have focused on the role of banks' overall lending activities, and small business lending in particular, where we can clearly identify the location of the borrower. While small business lending is an important contributor to economic activity, it is not the only type of lending that the Federal Reserve would hope to influence when implementing monetary policy. In this section, we consider another major source of bank lending, mortgages. The housing market represents an incremental component of the economic activity, affecting inflation and the welfare of households. To this end, in this section, we focus on this lending segment and utilize the granularity of the HMDA dataset, as it also allows us to identify the location of the borrower at the county level.

We therefore perform the specification in Equation (1) but instead consider the log of the total amount of mortgages originated by bank i in county c in year t. The results are presented in Table IX. Like with small business loans, we find a positive and statistically significant effect on overall mortgage lending. The effect is statistically significant at the 10% level with year fixed effects (Column 1) and at the 5% level with county-year fixed effects (Column 2). As a marginal effect, one standard deviation more trading assets lead to a bank to originate 4.8% more mortgages for a one pp change in the Fed funds rate (using estimates from Column 2). This effect is comparable 5.2% effect for small business lending (Column 4 of Table II). It appears that the weaker transmission of monetary policy for universal banks also applies to mortgage lending.

V.C. The Effect of Expanding Advisory Services

In this section, we show that our results are not specific for banks tapping into trading assets, but hold more generally for banks expanding into non-lending activities. To this end, we focus on advisory and wealth management services. We perform the specification in Equation (1), but replace trading assets with the number of broker-dealer subsidiaries (following Gelman, Goldstein, and MacKinlay, 2021).

We find that more advisory services activity is associated with more SBL for a given change in the Fed funds rate. The coefficient estimate for the interaction term (*No. BD Subsids.* $\times$ Δ *FF Rate*) is statistically significant at the 1% level and remains very similar in magnitude across all columns. In terms of economic magnitude, a one standard deviation increase in advisory services subsidiaries and a one pp increase in the Feds funds rate is associated with 3.7% more small business lending (based on Column 4). This is consistent with the results for trading assets in Table II, indicating of the consistent pattern of the effect of universal banks on credit supply, and the efficacy of the transmission of the monetary policy.

VI. Conclusions

We establish that universal banks reduce the efficacy of the monetary policy transmission to the economy though the banking system. Universal banks have access to a variety of funding sources, beyond retail deposits, which enable them to maintain a higher credit supply when the monetary policy tightens. This has positive real effects on the economy as the higher credit supply by universal banks leads to lower unemployment rates in areas where they lend more. The channel presented in this paper is distinct from existing theories of monetary policy transmission, and the results hold beyond other potential explanations.

The effect of universal banks on the transmission of the monetary policy is a new element of how the expansion of banking activities affects the real economy. The results shed new light on the implications for the Fed's execution of monetary policy and its effect on the economy, as well as for the regulation of banks' non-traditional activities. The potentially conflicting effects on monetary and macroprudential policy may provide an argument for the Fed to limit bank expansion into non-lending activities.

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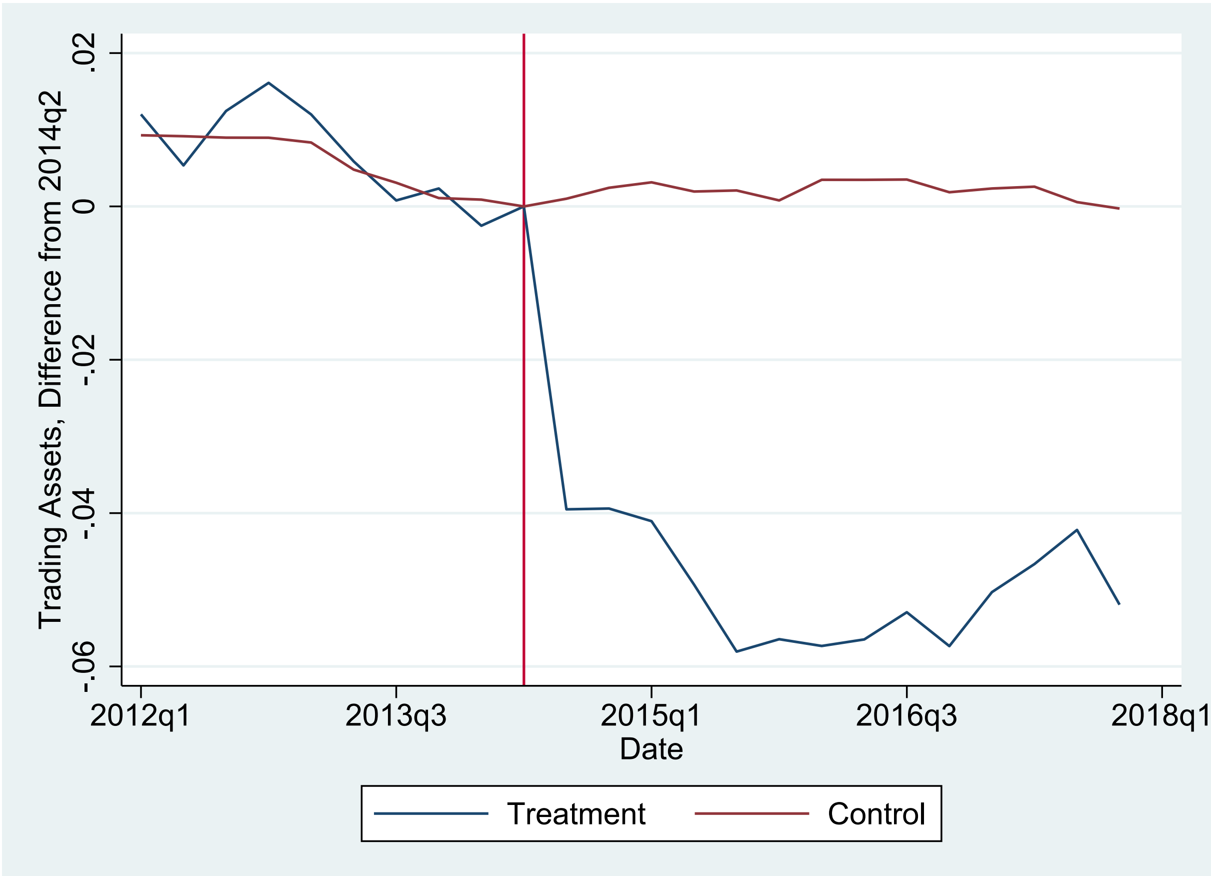

Figure 1: Volcker Rule

The figure presents the average trading assets to assets ratio, benchmarked against the 2014q2 value, for treatment banks and control banks for each quarter.

Table I: Summary Statistics

This table presents the summary statistics for our main variables. Our sample is from 1997-2021. *Bank Variables* are constructed at a BHC-level and are reported annually or quarterly. *Bank-County Variables* are reported annually at a county-level for each BHC, *County Variables* are at an aggregate annual county level, and *Macroeconomic Variable* is reported annually at a national level.

	Mean	Std Dev	25th Pctile	Median	75th Pctile	# Obs.
Bank Variables, Annual						
Small Business Loans	517554.0	1993211.3	45432	96692	247968.5	6,320
Loan Growth	0.074	0.12	0.011	0.068	0.13	6,320
Bank Variables, Quarterly						
Trading Assets	0.0029	0.021	0	0	0	82,769
No. BD Subsidiaries	0.53	3.71	0	0	0	80,207
Total Funding Growth	0.019	0.046	-0.0059	0.014	0.036	82,769
Wholesale Funding Growth	0.018	0.13	-0.045	0.010	0.075	82,769
Retail Funding Growth	0.019	0.057	-0.0093	0.012	0.038	82,769
Log Assets	14.0	1.58	12.9	13.6	14.6	82,769
NIM	0.035	0.0074	0.030	0.034	0.039	82,769
Loan Growth	0.28	0.29	0.11	0.26	0.43	82,769
Z-Score	1.86	1.51	0.76	1.49	2.55	82,769
Average ROA	0.24	0.17	0.18	0.25	0.33	82,769
Equity to Assets	0.095	0.038	0.076	0.091	0.11	82,769
Deposits to Assets	0.79	0.11	0.75	0.81	0.86	82,769
Liquid Assets	0.22	0.12	0.14	0.21	0.29	82,763
Income Gap	0.081	0.19	-0.031	0.081	0.20	82,720
Bank-County Variables						
Small Business Loans	6162.0	25823.4	150	740	3350	526,097
Mortgage Loans	17213.7	133174.0	255	1241	6257	526,097
County Deposit Share	0.088	0.20	0	0	0.055	526,097
County Variables						
Small Business Loans	59710.9	209508.9	2722.5	9647.5	35921	70,648
Unemployment Rate	6.20	3.08	4.10	5.50	7.50	70,648
Macroeconomic Variables						
Δ FF Rate	-0.25	1.48	-0.45	0.013	0.29	21
Pos. Δ FF Rate	0.31	0.56	0	0.013	0.29	21
Neg. Δ FF Rate	-0.57	1.23	-0.45	0	0	21
Surprise Δ FF Rate	-0.45	0.82	-0.76	-0.40	-0.0079	21
Surprise Pos. Δ FF Rate	0.11	0.39	0	0	0	21
Surprise Neg. Δ FF Rate	-0.55	0.63	-0.76	-0.40	-0.0079	21
Δ GDP (%)	2.49	3.09	1.80	2.50	4.20	21
VIX Index	22.2	10.4	16.1	19.3	27.1	21
S&P 500 Return (%)	5.11	8.96	2.44	6.45	10.2	21

Table II: Trading Activities and Monetary Policy Pass-through

This table measures the sensitivity of annual bank small business lending (SBL) on changes in the Fed funds rate and the bank's trading activity from 1997–2021 at the bank-county level. *Log SBL* is the logarithm of the total amount of small business loans originated by a bank in a given county and year. *Trading Assets* is the bank's trading assets as a share of total assets. Δ *FF Rate* is the prior year's annual change in the Fed funds rate. *Macro Variables* include the change in real GDP (as a percent), the S&P 500 index return, and the VIX index. All macro variables are as of the end of the prior year. Standard errors are clustered by bank.

	Log SBL			
	(1)	(2)	(3)	(4)
Trading Assets	3.667***	2.189**	2.788*	2.138
	(1.094)	(0.883)	(1.625)	(1.569)
Δ FF Rate	-0.0623***			
	(0.0127)			
Trading Assets × Δ FF Rate	0.954***	0.790***	0.847***	0.823***
	(0.0817)	(0.0903)	(0.0655)	(0.0608)
Bank Size			0.766***	0.806***
			(0.0841)	(0.0822)
Bank NIM			17.54***	17.63***
			(4.438)	(4.725)
Bank Loan Growth			0.697**	0.568*
			(0.319)	(0.315)
Bank Z-Score			0.00446	0.00463
			(0.0121)	(0.0124)
Bank ROA			0.322	0.322
			(0.274)	(0.276)
Bank Equity to Assets			-1.859	-2.104
			(2.221)	(2.229)
Bank Deposits to Assets			0.404	0.557
			(0.581)	(0.593)
County Deposit Share			1.334***	1.277***
			(0.120)	(0.0972)
Macro Variables	Yes	No	No	No
Bank-County Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	No	Yes	Yes	No
County-Year Fixed Effects	No	No	No	Yes
Observations	1,050,018	1,050,018	1,050,018	1,050,018
Adjusted R^2	0.775	0.789	0.798	0.803

Standard errors in parentheses. * p<.10, ** p<.05, *** p<.01

Table III: Changes in Funding

This table measures the sensitivity of a bank's funding growth to changes in the Fed funds rate and the bank's trading activities. *Additional Controls* includes the same set of control variables as in Table II. Analysis is conducted quarterly at the bank level and standard errors are clustered by bank.

	Total Funding Growth		Wholesale Funding Growth		Retail Deposit Growth	
	(1)	(2)	(3)	(4)	(5)	(6)
Trading Assets	0.0925**	0.115***	0.127	0.166*	0.127***	0.118***
	(0.0371)	(0.0373)	(0.0981)	(0.0950)	(0.0401)	(0.0394)
Trading Assets × Δ FF Rate		0.141***		0.249***		-0.0563
		(0.0227)		(0.0647)		(0.0345)
Additional Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	82,668	82,668	82,668	82,668	82,668	82,668
Adjusted R^2	0.137	0.137	0.089	0.089	0.099	0.099

Standard errors in parentheses. * p<.10, ** p<.05, *** p<.01

Table IV: Trading Activities and Real Effects

This table measures the sensitivity of annual bank-level lending and county-level small business lending (SBL) and county-level unemployment on changes in the Fed funds rate and the bank's trading activities from 1997–2021. Columns 1–2 are at the bank level, and Columns 3–6 are at the county level. *Additional Controls* includes the same set of control variables as in Table II, but aggregated to the county level using each bank's lagged county deposit share as weights for Columns 3–6. Standard errors are clustered by bank (Columns 1–2) or county (Columns 3–6).

	Bank Level		County Level			
	Log SBL	Loan Growth	Log SBL		County Unemployment	
	(1)	(2)	(3)	(4)	(5)	(6)
Trading Assets	0.631	0.491	13.65***	7.741***	-6.118***	-2.598***
	(1.031)	(0.343)	(1.424)	(1.049)	(1.509)	(0.832)
Trading Assets $\times$ Δ FF Rate	0.450***	0.0703**	0.358***	0.179**	-0.793***	-0.951***
	(0.106)	(0.0337)	(0.131)	(0.0913)	(0.190)	(0.167)
Additional Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	No	No	No	No
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
LMA Fixed Effects	No	No	No	Yes	No	Yes
Observations	6,079	6,079	83,389	81,270	83,389	81,270
Adjusted R^2	0.933	0.340	0.415	0.646	0.277	0.597

Standard errors in parentheses. * $p<.10$, ** $p<.05$, *** $p<.01$

Table V: Trading Activities and Monetary Policy Pass-through, Robustness

This table measures the sensitivity of annual bank small business lending (SBL) on changes in the Fed funds rate and the bank's trading activities at the bank-county level. *Additional Controls* includes the same set of control variables as in Table II. Column 1 includes an interaction term *Bank Equity to Assets* $\times$ Δ *FF Rate*. Column 2 includes a measure of liquid assets and its interaction with Δ *FF Rate*, and an interaction between bank size and Δ *FF Rate*. Column 3 includes the bank's deposit HHI and its interaction with Δ *FF Rate*. Column 4 includes a measure of the bank's income gap and its interaction with Δ *FF Rate*. Columns 5 and 6 replace Δ *FF Rate* with a measure of surprise changes in the Fed funds rate, *Surprise* Δ *FF Rate*. Standard errors are clustered by bank.

	Log SBL					
	Alternative Channels				Policy Shocks	
	(1)	(2)	(3)	(4)	(5)	(6)
Trading Assets	2.346	2.531	2.335	2.074	3.471*	2.979
	(1.563)	(1.631)	(1.574)	(1.548)	(1.845)	(1.865)
Trading Assets × Δ FF Rate	0.868***	1.004***	0.806***	0.825***		
	(0.0639)	(0.0732)	(0.0625)	(0.0651)		
Trading Assets × Surprise Δ FF Rate					0.370***	0.394***
					(0.109)	(0.109)
Bank Equity to Assets × Δ FF Rate	0.394*					
	(0.236)					
Bank Size × Δ FF Rate		-0.0107***				
		(0.00320)				
Bank Liquid Assets × Δ FF Rate		-0.210***				
		(0.0810)				
County Deposit Share × Δ FF Rate			-0.0567***			
			(0.0164)			
Bank Income Gap × Δ FF Rate				-0.0452		
				(0.0456)		
Balance Sheet Channel	Yes					
Bank Lending Channel		Yes				
Deposits Channel			Yes			
Interest Rate Risk Channel				Yes		
Additional Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank-County Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	No	No	No	No	Yes	No
County-Year Fixed Effects	Yes	Yes	Yes	Yes	No	Yes
Observations	1,049,999	1,049,999	1,049,999	1,049,999	797,746	796,301
Adjusted R^2	0.803	0.803	0.803	0.803	0.797	0.801

Standard errors in parentheses. * p<.10, ** p<.05, *** p<.01

Table VI: Changes in Funding, Robustness

This table measures the sensitivity of a bank's funding growth to changes in the Fed funds rate and the bank's trading activities. *Large Banks* is an indicator for banks in the top 5% of banks by assets. *Additional Controls* includes the same set of control variables as in Table II. Analysis is conducted quarterly at the bank level and standard errors are clustered by bank.

	Total Funding Growth		Wholesale Funding Growth		Retail Deposit Growth	
	(1)	(2)	(3)	(4)	(5)	(6)
Trading Assets	0.114***	0.115***	0.163*	0.164*	0.120***	0.120***
	(0.0375)	(0.0370)	(0.0957)	(0.0952)	(0.0393)	(0.0395)
Trading Assets × Δ FF Rate	0.130***	0.145***	0.201***	0.221***	-0.0270	-0.0221
	(0.0249)	(0.0250)	(0.0696)	(0.0684)	(0.0381)	(0.0368)
Log Assets	-0.0271***	-0.0273***	-0.0317***	-0.0319***	-0.0269***	-0.0271***
	(0.00167)	(0.00169)	(0.00283)	(0.00283)	(0.00178)	(0.00180)
Log Assets × Δ FF Rate	0.000371		0.00160*		-0.000978**	
	(0.000365)		(0.000885)		(0.000418)	
Large Banks		0.00320		0.00334		0.00240
		(0.00219)		(0.00551)		(0.00242)
Large Banks × Δ FF Rate		-0.000783		0.00572		-0.00740***
		(0.00213)		(0.00475)		(0.00247)
Additional Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	82,668	82,668	82,668	82,668	82,668	82,668
Adjusted R^2	0.137	0.137	0.089	0.089	0.099	0.099

Standard errors in parentheses. * p<.10, ** p<.05, *** p<.01

Table VII: Shock to Trading

This table presents the difference-in-differences of a bank's trading assets, funding growth, and lending to the implementation of the Volcker Rule. The sample window is 2012Q1 to 2017Q4. *Volcker Treat* is an indicator for banks that face the strictest implementation of the Volcker Rule (banks with more than \$10 billion in combined trading assets and liabilities). The control group is banks with more than \$1 billion in combined trading assets and liabilities, but less than \$10 billion. *Post* is an indicator for 2014Q3 and onward. Δ *FF Rate* is the prior year's annual change in the Fed funds rate. *Additional Controls* includes the same set of control variables as in Table II. Analysis is conducted quarterly at the bank level and standard errors are clustered by bank.

	Bank Level				Bank-County Level	
	Trading Assets	Total Funding Growth	Wholesale Funding Growth	Retail Deposit Growth	Log SBL	
	(1)	(2)	(3)	(4)	(5)	(6)
Volcker Treat × Post	-0.0220***	-0.0116*	-0.0283**	-0.00507	0.0364	0.0365
	(0.00637)	(0.00638)	(0.0142)	(0.00816)	(0.158)	(0.158)
Volcker Treat × Δ FF Rate					2.087***	2.167**
					(0.727)	(0.793)
Volcker Treat × Post × Δ FF Rate					-2.528***	-2.516***
					(0.811)	(0.887)
Additional Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes	No	No
Year Fixed Effects	No	No	No	No	Yes	No
County-Year Fixed Effects	No	No	No	No	No	Yes
Observations	1,219	1,219	1,219	1,218	121,361	121,167
Adjusted R^2	0.985	0.192	0.041	0.173	0.879	0.874

Standard errors in parentheses. * p<.10, ** p<.05, *** p<.01

Table VIII: Trading Activities and Monetary Policy Pass-through, Asymmetry

This table measures the sensitivity of annual bank small business lending (SBL) on changes in the Fed funds rate and the bank's trading activities from 1997–2021 at the bank-county level. Changes in the Fed funds rate are split into positive changes *Pos.* Δ *FF Rate* and negative changes *Neg.* Δ *FF Rate*. *Pos.* Δ *FF Rate* takes a value of zero if there is a negative rate change and *Neg.* Δ *FF Rate* takes a value of zero if there is a positive rate change. *Additional Controls* includes the same set of control variables as in Table II. Standard errors are clustered by bank.

	Log SBL		
	(1)	(2)	(3)
Trading Assets	1.422	2.274	1.517
	(1.533)	(1.473)	(1.601)
Trading Assets × Pos. Δ FF Rate	2.752***		2.617***
	(0.305)		(0.397)
Trading Assets × Neg. Δ FF Rate		0.625***	0.201
		(0.109)	(0.159)
Additional Controls	Yes	Yes	Yes
Bank-County Fixed Effects	Yes	Yes	Yes
County-Year Fixed Effects	Yes	Yes	Yes
Observations	1,050,018	1,050,018	1,050,018
Adjusted R^2	0.804	0.802	0.804

Standard errors in parentheses. * p<.10, ** p<.05, *** p<.01

Table IX: Trading Activities and Monetary Policy Pass-through, Mortgages

This table measures the sensitivity of annual mortgage lending (HMDA) on changes in the Fed funds rate and the bank's trading activities from 1997–2021 at the bank-county level. *Additional Controls* includes the same set of control variables as in Table II. Standard errors are clustered by bank.

	Log HMDA	
	(1)	(2)
Trading Assets	2.510	2.214
	(3.040)	(2.633)
Trading Assets × Δ FF Rate	0.377*	0.413**
	(0.225)	(0.206)
Additional Controls	Yes	Yes
Bank-County Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	No
County-Year Fixed Effects	No	Yes
Observations	472,870	472,870
Adjusted R^2	0.750	0.756

Standard errors in parentheses. * p<.10, ** p<.05, *** p<.01

Table X: Other Non-Lending Activities and Monetary Policy Pass-through

This table measures the sensitivity of annual bank small business lending (SBL) on changes in the Fed funds rate and the bank's investment banking activity from 1997–2021 at the bank-county level. *Log SBL* is the logarithm of the total amount of small business loans originated by a bank in a given county and year. The table uses the number of broker-dealer subsidiaries in the bank's organizational structure as a measure of non-lending activity (*No. BD Subsids.*). *Additional Controls* includes the same set of control variables as in Table II. *Macro Variables* include the change in real GDP (as a percent), the S&P 500 index return, and the VIX index. All macro variables are as of the end of the prior year. Standard errors are clustered by bank.

	Log SBL			
	(1)	(2)	(3)	(4)
No. BD Subsids.	0.0178	0.0179*	0.00826	0.00635
	(0.0111)	(0.0101)	(0.00853)	(0.00764)
Δ FF Rate	-0.0653***			
	(0.0117)			
No. BD Subsids. × Δ FF Rate	0.00262***	0.00195***	0.00198***	0.00188***
	(0.000217)	(0.000244)	(0.000341)	(0.000340)
Additional Controls	No	No	Yes	Yes
Macro Variables	Yes	No	No	No
Bank-County Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	No	Yes	Yes	No
County-Year Fixed Effects	No	No	No	Yes
Observations	1,032,301	1,032,301	1,032,301	1,032,301
Adjusted R^2	0.775	0.789	0.797	0.802

Standard errors in parentheses. * p<.10, ** p<.05, *** p<.01