Local lending specialization and monetary policy*

Alejandro Casado† UC3M

David Martinez-Miera‡ UC3M and CEPR

July 5, 2023

Abstract

We explore how banks' local lending market specialization shapes their loan supply in response to monetary policy changes. Using data from the U.S. mortgage market, we find that when the Fed funds rate declines, banks increase new mortgage lending growth by more in markets where they are more specialized, i.e. lent more in the past, relative to other markets. This result holds when controlling for local lending opportunities and bank-year level heterogeneity. We also document relevant aggregate county-level and bank-level implications of this channel. After a decrease in the Fed funds rate: (i) mortgage markets with more exposure to specialized banks experience a higher increase in aggregate new mortgage supply and house price growth and (ii) banks increase (decrease) their average specialization (diversification) growth. We provide theoretical and empirical evidence in line with heterogeneous lending costs across markets, related to informational asymmetries, being a relevant driver of the results. Our findings suggest that bank's local specialization is an important determinant for the transmission of monetary policy to the economy and that it is itself affected by monetary policy changes.

Keywords: Bank Lending; Federal Funds Rate; Geographical Specialization; Information Asymmetries; Market Structure; Monetary Policy; Mortgage Market.
JEL Codes: D82; E52; E58; G21; G23; L10

*We thank Dominic Cucic, Hans Degryse, Sebastian Doerr, Farzad Saidi, Christian Eufinger, Tim Eisert, Carlos Perez Montes, Gabriel Jimenez, Andres Almazan, Olivier De Jonghe, Marco Giometti, Veronica Rappoport, Maria Gutierrez, Eduardo Melero, Jesper Rüdiger, Pablo Ruiz-Verdu, Anna Toldrà-Simats, Alfredo Martin-Oliver, Margarita Samartín, Pedro Serrano and seminar participants at the Fourth Conference on Financial Stability at the Central Bank of Spain and CEMFI, the Finance Forum, the Swiss Winter Conference on Financial Intermediation, the Symposium of Money, Banking and Finance, the Financial Management and Accounting Research Conference, the Central Bank of Spain, Erasmus School of Economics, ESCP Business School, University of the Balearic Islands and CUNEF for their helpful comments. Financial support from Universidad Carlos III de Madrid (PIPF UC3M 01-1920) is gratefully acknowledged. This work has been supported by the Spanish Ministry of Science and Innovation "PID2020-114108GB-I00" and the Madrid Government (Comunidad de Madrid-Spain) under the Multiannual Agreement with UC3M in the line of Excellence of University Professors (EPUC3M12), and in the context of the V PRICIT (Regional Programme of Research and Technological Innovation). Usual disclaimer applies.

†Alejandro Casado: Corresponding author at Department of Business Administration, Universidad Carlos III de Madrid. Contact: alecasad@emp.uc3m.es

‡David Martinez-Miera: Department of Business Administration, Universidad Carlos III de Madrid. Contact: david.martinez@uc3m.es

1 Introduction

Banks are key agents in the transmission of monetary policy to the real economy (Kashyap and Stein, 1995; Kishan and Opiela, 2000; Drechsler, Savov and Schnabl, 2017). One relevant characteristic of banking markets is their heterogeneous presence in different local markets, local specialization, as it affects information collection of banks (Loutskina and Strahan, 2011) and also how they are exposed to idiosyncratic local shocks (Goetz, Laeven and Levine, 2016). In this study, we propose and test, how banks' local specialization in lending markets is a relevant determinant for the transmission of monetary policy to the economy.

We find that after an easing of monetary policy, banks increase new mortgage lending growth by more in counties where they are more specialized, i.e. they lent more in the past, relative to other markets.[1] This is what we call the local specialization channel. We document how this local specialization channel, by affecting new mortgage lending at the county level, induces relevant regional effects affecting house price growth, which has been shown to be important for household borrowing and financial stability (Cloyne, Huber, Ilzetzki and Kleven, 2019; Mian and Sufi, 2009), and also affects banks' overall diversification which can affect their resiliency to economic shocks. We provide theoretical and empirical evidence in line with this channel being due to banks facing heterogeneous marginal lending costs across local markets that can be linked to a given bank facing differential informational asymmetries across markets.

Our results are important for two reasons. First, to the best of the authors' knowledge, we are the first paper to provide evidence, and a simple theoretical setup, in line with the bank's local market specialization being a relevant channel for the transmission of monetary policy to regional mortgage lending, house prices, and economic activity. The results we present are robust to various specifications and measures, and their aggregate economic effects are large. Second, we provide evidence suggesting that monetary policy is a determinant of how banks are geographically specialized (or diversified) in local mortgage markets. Low monetary policy rate levels increase bank specialization (diversification) incentives, and in doing so, they may impact banks' exposure to negative shocks in local markets.

Our analyses are subject to two common identification challenges in the empirical banking literature: our results might be driven by changes in local lending opportunities and/or bank-year level heterogeneity and not by changes in bank's loan supply. If monetary policy changes affect local lending opportunities and/or the liability side of banks, we cannot attribute changes in loan quantities to changes in loan supply due to local market specialization. As

[1] While our main results are average effects, we interpret our results coming from decreases in the interest rate levels because, as we will explain below, further tests show that the proposed channel is especially present after an easing of monetary policy.

we will now explain, our data and estimation procedures allow us to address these concerns.

We analyze the mortgage market using origination data collected under the Home Mortgage Disclosure Act (HMDA) from the Federal Financial Institutions Examination Council (FFIEC) for the years 1994 to 2019. We measure growth in new mortgage lending at the bank-county-year level and construct a measure of bank specialization at the bank-county-year level. This latter measure captures the relative importance of each county for a given bank. We state that a bank is more specialized in a given market if the relative amount of new mortgages originated in such market is higher. The granularity of the data allows us to absorb potential confounding demand effects with county-time fixed effects and bank time-variant heterogeneity with bank-time fixed effects. In our most saturated specification, we are effectively comparing at the same time new mortgage lending growth originated by different banks facing different levels of local specialization in the same market and year, and new mortgage lending growth originated by the same bank in different markets where it faces different levels of local specialization. The identifying assumptions for our estimates capturing supply effects are: (i) that banks can allocate funds internally; and (ii) that banks located in the same market face the same change in local lending opportunities. Both assumptions are standard in the empirical banking literature (e.g., Gilje, Loutskina and Strahan (2016); Cortés, Demyanyk, Li, Loutskina and Strahan (2020))

It is important to highlight that, while analyzing the mortgage market helps in ameliorating some identification challenges, the mortgage market is in itself a very important market to analyze. The mortgage market is not only one of the most relevant credit markets for banks and households but also has been argued to be at the core of important economic fluctuations like the recent financial crisis (Mian and Sufi, 2009; Favara and Imbs, 2015; Cortés and Strahan, 2017; Demyanyk and Loutskina, 2016).

Our first finding indicates that bank's local mortgage market specialization affects the transmission of monetary policy to new mortgage lending growth. This holds when we control for potential changes in local lending opportunities and bank-year heterogeneity. We document how following a 100 basis points (bps) decline in the Fed funds rate, a one standard deviation increase in bank's local mortgage market specialization increases new mortgage lending growth by 54.3 bps.

One concern regarding this first finding is that it could be driven by other banks' local market structure characteristics that may affect the transmission of monetary policy to loan supply and could be correlated with local market specialization. Some of these characteristics could be banks' local loan market share (Giannetti and Saidi, 2019) or banks' exposure to local deposit market concentration (Drechsler et al., 2017).[2] To ameliorate this concern, we

[2]Note that in our main specification where we control for bank-year level heterogeneity, by including

show that bank's local mortgage market specialization is still economically and statistically relevant when controlling for the effect of both, local loan market share and bank exposure to local deposit market concentration.

To verify the consistency of our finding we perform several additional robustness tests. First, as we do not have information on the stock of mortgages disaggregated by markets, we proxy bank's local mortgage market specialization using different measures of the specialization variable, such as using two-period lag, the average for the whole sample period, the average for the previous five years and by constructing specialization for the average from 1994 to 2004 and then testing the influence of such measure for the period after 2005.[3] Results hold with these alternative measures of specialization. Second, we show that our results are robust to the use of different monetary policy measures. In particular, we use an alternative aggregation method for the Fed funds target rate, monetary policy shocks purged from the effect of information shocks following Jarociński and Karadi (2020), and shadow rates. Results also hold when we include entries and exits into local markets. The results are also qualitatively similar when we use alternative dependent variables as the log-difference of new lending (Favara and Imbs, 2015), the growth of the number instead of the amount of new mortgage lending, and the difference in the approval ratio. We also investigate whether specific sample periods may be driving the results. Drechsler, Savov and Schnabl (2022) show that monetary policy impacted the U.S. housing boom, Gelman, Goldstein and MacKinlay (2021) demonstrate how bank's geographic diversification influences credit supply during crisis periods and Altavilla, Boucinha and Peydró (2018) show that under a low-interest rate environment, monetary policy does not work as intended. We provide evidence that our results are not driven by these specific sample periods, as they hold when we focus on the U.S. housing boom period, when we exclude such period from the sample, when we do not include the years related to the Great Recession or when we focus on the sample period from 1994 to 2013, which excludes the low-interest rate period. Additionally, in the appendix, we provide evidence that the local specialization channel is especially driven by the effect of decreases in the monetary policy rates.[4]

bank-year fixed effects, we absorb the effect of bank exposure to local deposit market concentration. So, to include the effect of bank exposure to concentrated deposit markets as a control, we need to omit the bank-year fixed effects

[3] This latter specification gives evidence that endogeneity issues of the specialization variable may not be a fundamental driver of our results.

[4] In the appendix we also provide additional robustness tests. We show that our results hold when we control for the effect of lagged new mortgage lending growth in specific markets, use alternative specialization variables, focus on an alternative boom period, use new small business lending, use alternative definitions of the mortgage market, and include depository and non-depository institutions in the analysis. The last result provides evidence that loan supply originated by any type of financial institution, regardless of its deposit insurance condition, is affected by monetary policy changes heterogeneously depending on its level of local

We then analyze the aggregate implications of the channel we have documented, both at the county level and at the bank level. To do so, we first compute the county level exposure to local specialized banks in the mortgage market and examine its effect on the transmission of monetary policy to regional new mortgage lending, house prices, and economic activity (wage and employment) growth. Consistent with our previous results, we find that after an easing of monetary policy, counties exposed to banks that are more specialized in that mortgage market, suffer a higher increase in aggregate new mortgage lending, house price, wage, and employment growth relative to other counties, even when we control for relevant local market characteristics and additional county controls. We obtain that a one standard deviation increase in county level exposure to specialized banks increases new mortgage lending growth by 138.24, house price growth by 14.4, wage growth by 8.69 bps, and employment growth by 1.66 bps per 100 bps decrease in the Fed funds rate. We also document how these results hold when, as in the previous analysis, we use monetary policy shocks, construct the dependent variables with the log difference, and focus on the period from 1994 to 2013.

We then turn to analyze the aggregate effects at the bank level. To do so we compute the average bank's local specialization, which is the opposite of banks' geographical diversification, to examine the impact of monetary policy on aggregate bank specialization (diversification) growth. We find that banks suffer an increase in their aggregate local specialization growth, i.e. reduction in geographic diversification, after an easing of monetary policy, even when we control for time-invariant bank heterogeneity and time-variant bank characteristics. We estimate that for a 100 bps decrease in the Fed funds rate, bank's specialization growth increases by 47.4 bps. As in our previous analyses, we document how this result is robust when we use the monetary policy shocks, construct the dependent variables with the log difference, and focus on the period from 1994 to 2013.

We end our analysis by studying a plausible mechanism consistent with our findings, which is the existence of heterogeneous marginal lending costs across local markets for a given bank. We first provide a simple theoretical model in which a bank faces different marginal lending costs across markets and funds itself at the monetary policy rate. We assume that the bank has an exogenous market-specific lending cost function that is increasing and convex. Crucially the convexity of the function differs across markets and, hence, the bank has lower lending costs in some markets (the ones with a lower convex cost function) relative to others. We first show how the bank lends more, i.e. is more specialized in markets in which the lending cost function is less convex. We then show how, in line with our results, the bank increases lending relatively more strongly to monetary policy decreases in such markets.

specialization. Additionally, we find that the effect is amplified for non-depository institutions as monetary policy changes may have a higher effect on their funding costs.

We then provide empirical evidence related to heterogeneity in bank lending costs being a plausible underlying mechanism of our previous findings. We do so by focusing on a proxy of informational asymmetries between the bank and its borrowers that have argued to affect lending. We argue, following Bolton, Freixas, Gambacorta and Mistrulli (2016), that banks may face lower marginal lending costs of screening and/or monitoring borrowers in markets close to their bank's headquarters, as the transmission of soft information from distant bank branches to its headquarters is more difficult. Therefore, we use physical distance from markets to bank's headquarters as a proxy for higher increasingly marginal lending costs. We empirically show that banks tend to specialize less and their loan supply has lower sensitivity to monetary policy changes in markets where they face higher marginal lending costs proxied by this measure.[5]

Taken together, our novel findings show how bank specialization decisions are relevant for the transmission of monetary policy to the real economy and how they are shaped by monetary policy, hence having important implications for understanding the overall effects of monetary policy on the economy. These findings help to inform the conduct of monetary policy and in anticipating its heterogeneous effects lead to more informed monetary policy decisions.

1.1 Literature Review

This paper contributes to several strands of the literature. First, our article relates to long-standing literature on the transmission of monetary policy to the real economy through bank lending, the bank lending channel. The focus of this literature has primarily been on the effect of Federal funds rate changes on commercial banks (Bernanke and Blinder, 1988; Bernanke, 1992; Kashyap, Stein and Wilcox, 1993; Kashyap and Stein, 2000; Jiménez, Ongena, Peydró and Saurina, 2012). This literature has emphasized the role of different bank characteristics affecting the transmission of monetary policy to bank lending such as size (Kashyap and Stein, 1995, 2000; Kishan and Opiela, 2000), liquidity (Kashyap and Stein, 2000; Jiménez et al., 2012), capital (Jiménez et al., 2012), leverage (Kishan and Opiela, 2000; Dell'Ariccia, Laeven and Suarez, 2017) and the exposure to interest rate risk (Gomez, Landier, Sraer and Thesmar, 2021).[6] To this literature we contribute by providing evidence of bank geographical lending specialization being a key driver of bank lending responses to Fed funds changes.

On this strand of literature, our article is most closely related to studies analyzing the

[5]In the appendix we show that these results hold when we use an indicator variable for the market where the bank is headquartered as an alternative measure of informational distance.

[6]Similar to these studies, Agarwal, Chomsisengphet, Mahoney and Stroebel (2018) focus on the relevance of asymmetric information between borrowers and banks for the pass-through of funding costs to bank lending.

role of banking market structure characteristics in the transmission of monetary policy to the economy. Imperfect competition in the banking market has been theoretically (Dell'Ariccia, Laeven and Marquez, 2014; Drechsler et al., 2017; Martinez-Miera and Repullo, 2020) and empirically (Scharfstein and Sunderam, 2016; Drechsler et al., 2017) examined as a relevant friction for the transmission of monetary policy. Drechsler et al. (2017) provides a theoretical setup and empirical findings, showing how a tightening of monetary policy impacts more strongly the reduction of deposit quantities in concentrated compared to competitive deposit markets. As a result, this translates into a larger negative effect on bank lending. This is the so called deposits channel of monetary policy that works through bank market power in the deposit market.[7] Scharfstein and Sunderam (2016) show how local concentration in mortgage lending reduces the sensitivity of mortgage rates and refinancing activity to mortgage-backed security (MBS) yields.

While Drechsler et al. (2017) and Scharfstein and Sunderam (2016) focus on imperfect competition in the deposit or loan market for the pass-through of monetary policy to lending, we focus on providing evidence and a simple theoretical setup, of a novel market structure characteristic affecting this transmission, bank's local lending specialization.

Our paper is also related to empirical research on how shocks affecting banks are transmitted to the economy depending on banking market structure characteristics such as local bank market share. Giannetti and Saidi (2019) show that banks are more likely to internalize negative spillovers and provide liquidity in periods of distress to industries where they have a high market share. In other words, they provide evidence that bank market share affects the transmission of bad times.[8] In similar lines, Favara and Giannetti (2017) show that lenders with a high share of outstanding mortgages on their balance sheets have more incentives to internalize the negative spillover effects of foreclosures. Paravisini, Rappoport and Schnabl (2017) and Karakaya, Michalski and Örs (2022) exploit the U.S. banking deregulation to empirically investigate whether bank's export market specialization affects firms' exports after credit supply shocks and how industry specialization influences industry growth in the states where banks entered recently, respectively. De Jonghe, Dewachter, Mulier, Ongena and Schepens (2020) study how a negative funding shock triggered by the collapse of Lehman Brothers in September 2008 affected bank reallocation of credit depending on bank market share, bank specialization, and firm risk. Finally, Gupta (2021) developed a theoretical model where lenders with many outstanding mortgages have incentives to extend risky credit to prop up house prices.

[7] They find that the deposit rate of branches of banks located in concentrated deposit markets has a lower sensitivity to changes in the interest rates relative to other branches of the same bank.

[8] We show that our results hold if we include a control for the effect of local market share for the transmission of monetary policy to loan supply.

We depart from these previous studies by analyzing how monetary policy affects bank's local specialization decisions and by showing how bank's local specialization affects the transmission of monetary policy to lending supply. To the best of our knowledge, we are the first to show that monetary policy is one determinant of bank's local specialization and that bank's local specialization affects the transmission of monetary policy to the economy.

The second strand of literature we contribute to is the literature on the real effects of bank specialization and diversification. Existing studies show that banks specialize, i.e., concentrate their lending activities in certain industries and markets (Loutskina and Strahan, 2011; Giometti and Pietrosanti, 2022; Blickle, Parlatore and Saunders, 2021). Specialized banks can offer better loan conditions, such as less restrictive covenants and lower spreads, and invest more in information collection. Berger, Minnis and Sutherland (2017b) find that banks are less likely to demand audited financial statements from industries and markets where they are specialized and Xiao and Zheng (2021) give evidence on information spillovers from bank's industry specialization to its mortgage lending allocation.[9]

This literature also focuses on analyzing the advantages and disadvantages of bank diversification and highlights that it is not clear whether diversification leads to greater bank stability. On the one hand, some papers argue that diversification could undermine monitoring incentives. Acharya, Hasan and Saunders (2006) argue that diversification may lower monitoring effectiveness and increase risk-taking and Loutskina and Strahan (2011) find that concentrated mortgage lenders invest more on information collection, have higher profits and their profits vary less systematically compared to diversified lenders during the 2007-2008 crisis. Berger, El Ghoul, Guedhami and Roman (2017a) provide evidence of internationalization increasing bank risk caused by higher exposure to market-specific factors, the opposite of diversification of operations reducing bank risk. At last, Goetz, Laeven and Levine (2013) and Chu, Deng and Xia (2020) exploit the U.S. banking deregulation to provide evidence that bank geographic diversification reduces bank holding company valuations and increases systemic risk through its impact on asset similarity, respectively.

On the other hand, some papers argue that diversification reduces bank risk and influences positively lending origination during the crisis, hence generating good spillovers to the real economy. Gelman et al. (2021) empirically analyze geographic and business line diversification and find that banks with more diversified assets lend more during the crisis periods inducing positive regional real effects in terms of aggregate new small business lending and employment. Consistent with this finding, Doerr and Schaz (2021) show that geographically

[9] Duquerroy, Mazet-Sonilhac, Mésonnier and Paravisini (2022) find that bank branches specialize by industry affecting lending to small businesses in France and Di and Pattison (2022) analyze the small business lenders' increasing tendency to specialize in certain industries and its impact on credit and competition.

diversified banks maintain higher loan supply during a crisis using their international syndicated loan portfolio. It leads to positive real effects for firms in terms of higher investment and employment growth. Goetz et al. (2016) show that geographic diversification of banks reduces exposure to idiosyncratic local shocks. Bord, Ivashina and Taliaferro (2021) and Levine, Lin and Xie (2021) provide evidence that diversification implies lower risk and it provides banks with better access to funding, especially during crisis periods.[10]

Overall, we contribute to this literature by analyzing bank specialization by showing how Fed funds rate changes are key determinants of how bank geographical specialization (diversification) is determined. We show how a decrease in the Fed funds rate increases (reduces) banks' local market specialization (diversification) growth. We also contribute by providing a novel relevant effect of specialization for the real economy, the transmission of monetary policy.

This paper also relates to work on the effect of credit supply on aggregate economic activity and the price of assets. Previous studies have demonstrated that changes in credit supply, coming from different lending channels, affected real economic outcomes, measured by employment (Chodorow-Reich, 2014; Lin, 2020; Luck and Zimmermann, 2020) and wage growth (Drechsler et al., 2017). Abundant evidence shows that asset prices are affected by changes in credit supply. While Favilukis, Ludvigson and Van Nieuwerburgh (2017) show theoretically that lowering financing constraints leads to an increase in house prices, empirical evidence for this link is provided by Favara and Imbs (2015), Di Maggio and Kermani (2017) and Blickle (2022).[11] Our paper extends this literature by highlighting the importance of a novel mechanism for the transmission of monetary policy changes, banks' geographical specialization, affecting house prices and regional economic activity.

Our article is also related to work in the banking literature emphasizing the role of non-insured financial institutions in the transmission of monetary policy to the economy. Xiao (2020), Elliott, Meisenzahl and Peydró (2021) and Cucic and Gorea (2021) show that non-insured financial institutions dampen the impact of monetary policy while Drechsler et al. (2022) study how the tightening of monetary policy during the U.S. housing boom affect

[10] Gilje et al. (2016) highlight the relevance of banks for being geographically diversified as they can allocate funds internally from markets with excess raised funds to markets with more lending opportunities. Traversa and Vuillemey (2019) use branch-level data to empirically study how banks expand or contract to local markets. They find that banks expand in counties that are similar in terms of industry composition, to those in which they are located and that banks are more likely to contract in more similar areas. Favara and Imbs (2015) use the U.S. branching deregulation to show how banks expand credit, leading to house price increases, after the bank's geographic diversification.

[11] Related to credit supply affecting house prices, Favara and Giannetti (2017) find that lenders with a large share of outstanding mortgages on their balance sheets exhibit less propensity to foreclose due to higher incentives on internalizing negative spillovers, having an impact on house prices at the zip code level.

differently bank and nonbank lenders.[12] Our article shows that local market specialization is relevant, and it is even moreso, for the transmission of monetary policy to new mortgage lending growth when including nonbank lenders.

In the remainder of the paper, Section 2 describes the data, Section 3 discusses our empirical methods and reports the micro evidence on lending, Section 4 examines the regional aggregate implications on lending, house prices, and economic activity, Section 5 reports the aggregate implications on bank specialization, Section 6 presents the theoretical model and empirical evidence consistent with the mechanism behind our results, and Section 7 concludes.

2 Data

2.1 Data Sources

For our study, we need information on bank loans to borrowers in a wide range of local markets. In the absence of data on all bank credit disaggregated by local markets, we focus on the mortgage market as it is one of the largest markets for banks.[13] In doing so, we follow many empirical studies analyzing heterogeneous lending origination across markets in the United States (e.g., Favara and Imbs (2015); Gilje et al. (2016); Favara and Giannetti (2017); Cortés and Strahan (2017); Doerr, Kabas and Ongena (2020)). We use data obtained from the FFIEC HMDA database.

The HMDA database covers the vast majority of mortgage activity of commercial banks, thrifts, credit unions, and mortgage companies (Mian and Sufi (2009), Favara and Imbs (2015), Favara and Giannetti (2017)).[14] It provides information on size, type and purpose of the loan, whether the loan was approved, denied or purchased, county and state location of the property purchased using the mortgage, as well as information on borrower characteristics such as self-reported income, race and sex.

Our sample, built at the bank-county-year level, measures the amount of total housing-related loans originated (including mortgages for home-purchase, refinancing and improvement) from depository institutions (i.e. banks) as in Gilje et al. (2016).[15] To differentiate

[12] Mian and Sufi (2009) and Justiniano, Primiceri and Tambalotti (2019) focus on the housing boom period to document its impact on the Great Recession. We provide evidence suggesting that our local specialization mechanism for the transmission of monetary policy is amplified during the U.S. housing boom period.

[13] See in Figure A1 of the appendix that outstanding mortgages constitute between 49 to 65 percent of total outstanding loans of U.S. banks from 1994 to 2019.

[14] Whether a lender is covered by the HMDA database depends on its size, the extent of its activity in a Central Business Statistical Area (CBSA), and the relevance of mortgage lending in its own portfolio. See Gilje et al. (2016) and Cortés and Strahan (2017) for a more comprehensive description of HMDA data.

[15] From now on, we refer to this structure of data where we observe the amount of lending originated by

between depository and non-depository institutions, we use the so-called "HMDA Lender file" compiled by Robert Avery for most lenders who have ever reported mortgage originations in HMDA as in Demyanyk and Loutskina (2016). While we focus on banks for our main analyses we also use non-depository institutions in some robustness checks.[16] We also focus on mortgages originated to hold and sell as we are interested in the originated amount rather than if banks keep lending on their balance sheet.[17] We consider counties to be local banking markets, following standard practices in the empirical banking literature (see, for example, Gilje et al. (2016), Drechsler et al. (2017), Lin (2020)).[18] Our sample begins in 1994 and ends in 2019.[19]

We collect the Fed funds target rate as our main measure of monetary policy rates from the Federal Reserve Economic Data (FRED) as in Drechsler et al. (2017). We use the end of period aggregation method and, after the introduction of a target corridor in 2008, compute the average of the upper and lower Fed funds target rate. More specifically, we use annual data on the Fed funds target rate corresponding to the last quarter of each year.[20]

We collect county level data on house prices from the Federal Housing Finance Agency (FHFA) following Chakraborty, Goldstein and MacKinlay (2018), Lin (2020) and Doerr et al. (2020). The series are calibrated using appraisal values and sales prices for mortgages

each bank in each county (i.e. market) and year as bank-county-year level data. We divide (deflate) the amount of new mortgage lending by the consumer price index in order to have more comparable quantities across the sample period as in Drechsler et al. (2017). In our preferred specification (column 1 of Table 2) we have mortgage lending growth information for 12,082 unique depository institutions.

[16]We use the variable ENTITYyy that takes the Federal Reserve Board Entity number (RSSD9001) for the lending institution if it is a commercial bank, thrift, or credit union. For subsidiaries of BHC, it corresponds to the entity number of the lead bank or thrift in the holding company. These institutions are classified as banks, and they comprise our main sample for this research. For independent mortgage companies that comprise our sample classified as nonbanks, the variable takes a value of zero unless additional information indicates that it is a subsidiary of a commercial bank or thrift. If the independent mortgage company is a subsidiary of a holding company, its mortgage lending is attributed to the lead bank in the holding company. We show in Table A3 of the appendix that our results hold when including non-depository institutions in the analysis.

[17]We show in robustness tests that our results are robust to not including mortgages originated to sell. We also drop from our sample Federal Housing Administration (FHA) insured, Veterans Administration (VA) guaranteed, Farm Service Agency (FSA) and Rural Housing Service (RHS) mortgages following Loutskina and Strahan (2009).

[18]Following Cortés et al. (2020), we restrict our sample to markets where a given bank made at least five loans in period $t - 1$ in order to eliminate noise stemming from counties with an insignificant amount of loans originated by a given bank. We show in Table 4 that our results are robust to analyzing the whole sample of bank-counties.

[19]Our sample stops in December 2019 in order to not be affected by Covid-19 related issues as it is not the purpose of this study.

[20]We also use the estimated monetary policy shocks following Jarociński and Karadi (2020) to disentangle the effect of interest rate changes from central bank information shocks and our results hold. Additionally, our results are robust to use the average aggregation method of the Fed funds target rate and shadow rates.

bought or guaranteed by Fannie Mae and Freddie Mac.[21] We use data on total wages and employment at the county level to measure local economic activity from the Quarterly Census of Employment and Wages (QCEW) and the Local Area Unemployment Statistics (LAUS) programs provided by the Bureau of Labor Statistics (BLS). We use data on house prices, wages, and employment per county and year from 1994 to 2019. Additionally, we use as county level controls the log of population and the log of income per capita from the Bureau of Economic Analysis (BEA) and the proportion of securitized mortgages from HMDA.

We use deposit market data in order to control for bank exposure to local deposit market concentration that has been shown to affect the transmission of monetary policy to bank's loan supply (Drechsler et al., 2017). This information is obtained from the Federal Deposit Insurance Corporation (FDIC) Summary of Deposits (SOD) database. The FDIC collects information for the universe of U.S. bank branches at an annual frequency from June 1994 onwards. The data includes information on branch characteristics such as deposit quantities, parent bank and geographic location.

We collect bank level data on bank characteristics and headquarters location from the U.S. Call Reports provided by the FDIC. We use data corresponding to the last quarter of each year from 1994 to 2019. Although this data is available at the quarterly level, we only use end-of-year data to merge it with mortgage market data. We match bank level data from the U.S. Call Reports to the HMDA bank-county level data using the Federal Reserve Board entity's unique identifier.

2.2 Variable Definitions

We define the growth of new mortgage lending following Cortés et al. (2020) to mitigate the effect of outliers (e.g., due to a small denominator). To do so, we normalize the year-to-year change in new mortgage lending amount by the midpoint of new mortgage lending between the two years, as follows:

$$Growth_{bct} = \frac{A_{bct} - A_{bct-1}}{(A_{bct} + A_{bct-1})/2} \tag{1}$$

where A represents the amount of new mortgage lending, b represents the bank, c represents county, and t represents year. With this definition, the growth variable is bounded above (+2) and below (-2) and it is equal to zero for banks in counties that do not register any variation in new mortgage lending.[22] This definition of growth has been used in re-

[21] See Bogin, Doerner and Larson (2019) for a more detailed description of house price index data.

[22] The boundaries of the variable measure entries and exits of banks in local markets. Despite we do not include entries and exits in our main specification, we show in Table 4 that our main result holds when we include them.

lated research by Berton, Mocetti, Presbitero and Richiardi (2018), Luck and Zimmermann (2020) and Doerr et al. (2020) among others, in order to calculate employment, lending and/or deposits growth.[23]

We exploit differences in banks' specialization to study the transmission of monetary policy to new mortgage lending growth. First, we define bank's specialization of bank b in county c and year t as the share of new mortgage lending originated by bank b in county c in year t, divided by the total amount of new mortgage lending originated by bank b in a year t.[24] We label this variable as $Spec_{bct}$ and it is defined in equation 2:

$$Spec_{bct} = \frac{A_{bct}}{A_{bt}} \tag{2}$$

Higher values of bank's specialization in a given local market and year imply that the specific local market is more important for the overall bank's allocation of new mortgage lending during that year.

To study the aggregate regional and bank implications of our results, we compute two measures of specialization, one at the county and another at the bank level. We measure the county level exposure to banks that are specialized in that market calculated as the weighted average of $Spec_{bct}$ across all banks originating new mortgage loans, using the amount of new mortgage loans originated as weights. We label this variable as $CSpec_{ct}$ and it is defined in equation 3:

$$CSpec_{ct} = \sum_{b=1}^{n} \frac{Spec_{bct} \quad A_{bct}}{A_{ct}} \tag{3}$$

According to this definition, this variable captures the extent to which new mortgage lending of a local market (i.e., county) in a year is originated by banks specialized in that specific market and year.

To calculate aggregate banks' average specialization, we compute the weighted average of $Spec_{bct}$ across all markets, using the amount of new mortgage loans originated in each county c as weights. We label this variable as $BSpec_{bt}$ and it is defined in equation 4:

[23]We use the log-difference as an alternative measure of new mortgage lending growth as in Favara and Imbs (2015) that uses the log-difference of county-level activity in the mortgage market. We show in Tables 4 and A5 that our results hold when using this dependent variable at the bank-county and county level, respectively.

[24]We construct bank's local specialization in mortgage markets using new mortgage lending because we do not have information on the stock of loans disaggregated by local markets. Nevertheless, our variable seems to be measuring local mortgage market specialization because it is stable across periods, having a high serial correlation as shown in Table A1 of the appendix, and results hold if we use alternative specifications of the specialization variable, as shown in Tables 4 and A3.

$$BSpec_{bt} = \sum_{c=1}^{n} \frac{Spec_{bct} \quad A_{bct}}{A_{bt}} \tag{4}$$

High bank's average specialization implies that a large share of new mortgage lending originated by a given bank and year is concentrated in markets where the bank is specialized.

2.3 Summary Statistics

Panel A of Table 1 presents summary statistics at the bank-county-year level for the mortgage market using HMDA and FDIC data. The average bank-county originates a quantity of 89 new mortgages corresponding to an average amount of $17.3 million of new mortgages originated per year. Growth of new mortgage lending has a mean of -11.5 bps and a standard deviation of 71 bps. The average bank-county has a level of specialization equal to 7.9 bps.[25]

Panel B provides county level summary statistics for the HMDA, FHFA and BLS data. Banks originate $376 million of new mortgage lending in the average county representing a growth of 8 bps. The average county has 45 thousand of total employed population, $1.8 billion of total wages and a house price index of 242.[26] The average county level employment, total wage bill and house price index growth are 0.4, 3.5 and 2.7 bps, respectively. There are 37 banks on average originating mortgage lending in each U.S. county. Finally, the average county is exposed to a level of CSpec of 6.8 bps.

Panel C presents summary statistics at the bank level for the HMDA and FDIC data. The average bank originates mortgage lending in 28 markets and has $758 million of total assets, 82% of deposit ratio, 6% of liquidity ratio, and 90% of leverage ratio. We compute the deposit, liquidity, and leverage ratio as total deposits over total assets, total cash and balances due from depository institutions over total assets, and total liabilities over total assets, respectively.[27] The average bank also has an average bank's local specialization of 48.5 bps and an average bank's local specialization growth of -2.8 bps.

Our empirical analysis uses variation in local market exposure to specialized banks to analyze regional aggregate implications of the channel we present. As defined more precisely above, we measure county exposure to specialized banks in a given year as $CSpec_{ct}$.

Figure 1 presents a map of the average county exposure for the sample period from

[25] Note that these summary statistics correspond to our main sample of bank-county-year observations where banks originate at least five loans in period t 1 in a given market.

[26] We obtain publicly available data on house price index from the FHFA which is available for 2,755 counties between 1994 and 2019 and not for all counties in our mortgage market sample (around 3,227 counties).

[27] We measure these bank characteristics from the U.S. Call Reports provided by the FDIC and focus on the information held in domestic offices.

1994 to 2019 across the United States. A higher number indicates that new mortgage lending is originated by banks that are more specialized in that market. There is significant variation across counties, from a minimum average county exposure of 0.0001 to a maximum of 0.63. This variation allows us to study the aggregate regional effects for the transmission of monetary policy through county exposure to specialized banks.

3 Results on Bank Lending: Micro Evidence

3.1 Identification Strategy

In this section, we analyze how bank's local market specialization affects the transmission of monetary policy to bank lending supply. One main identification challenge arises due to the potential omitted variables. The most important omitted variables are the change in local lending opportunities (i.e., local loan demand) and bank-year level heterogeneity (e.g., massive deposit outflows from a specific bank). If changes in the Fed funds rate affect local lending opportunities, changes in loan quantities may be caused by loan demand and not by loan supply, which is a core and well-known problem in the banking literature (Khwaja and Mian, 2008; Degryse, De Jonghe, Jakovljević, Mulier and Schepens, 2019). Also, if changes in the Fed funds rate affect the liability side of banks differently (Dell'Ariccia et al., 2017; Drechsler et al., 2017; Heider, Saidi and Schepens, 2019), changes in loan supply may be caused by changes in bank financing instead of their local loan market specialization.

We address these identification challenges by comparing at the same time lending originated by different banks in the same market and year (see, for example, Gilje et al. (2016); Drechsler et al. (2017); Lin (2020); Cortés et al. (2020)), and lending originated by the same bank in different markets where it faces different levels of specialization (see, for example, Drechsler et al. (2017); Lin (2020); Cortés et al. (2020)).[28] We refer to it as a within-bank-county estimation strategy. The main identifying assumptions for our specifications to be controlling for changes in local lending opportunities and bank-specific shocks are that banks located in the same market face the same change in lending opportunities and banks can allocate deposits across branches.[29] This last assumption implies that their decision on raising deposits and originate loans are separated. In other words, overall bank-specific shocks due

[28] Cortés et al. (2020) uses at the same time a within-county and within-bank estimation including county-time and bank-time fixed effects to reduce the potential for credit demand to drive their results and to absorb all sources of bank-year-level heterogeneity, respectively.

[29] Under these assumptions, when we compare lending originated by the same bank in different markets, we control for changes coming from the liability side of banks each period. Specifically, we absorb any possible effect of bank size, liquidity, capital, deposit ratio, and bank exposure to local deposit market specialization and concentration that may affect loan supply after monetary policy changes.

to monetary policy changes are transmitted equally to their lending decisions across markets. If a bank suffers from huge deposit outflows for one year and cannot perfectly substitute deposits with other sources of financing, then reducing lending origination, this reduction of lending supply would be homogenous across markets. This assumption is supported by Gilje et al. (2016), who provide evidence that banks facing liquidity inflows after shale booms increase their origination of new loans in markets other than the one experiencing the liquidity windfall.[30]

3.2 Bank-County Level Estimation: Main Result

We now apply our within-bank-county estimation strategy to study the effect of bank's local specialization in the loan market for the transmission of monetary policy to loan supply using information from the mortgage market.[31] As previously explained, we control for the change in local lending opportunities and bank-year level heterogeneity by running the following panel regression including bank-time and county-time fixed effects:

$$\Delta y_{bct} = \omega_{bt} + \gamma_{ct} + \beta_1 \Delta FF_t \times Spec_{bct-1} + \beta_2 Spec_{bct-1} + \epsilon_{bct}, \qquad (5)$$

where Δy_{bct} is the growth of the amount of new mortgage lending originated by bank b in county c at year t, $Spec_{bct-1}$ is the specialization of bank b in county c at year $t-1$, ΔFF_t is the difference in the Fed funds target rate from year $t-1$ to t, ω_{bt} and γ_{ct} are bank-time and county-time fixed effects, respectively.[32] We double-cluster standard errors at the bank and county levels.

County-time fixed effects are the main control variables that absorb changes in local loan demand under the identifying assumption that banks located in the same market face the same change in local lending opportunities.[33] We include bank-time fixed effects to absorb all sources of bank-year level heterogeneity and alleviate the possibility that changes in bank deposit quantities or the liability structure are driving the results. When, in some specifications, we do not include county-time fixed effects, we interact county fixed effects

[30] Cortés and Strahan (2017) provides evidence consistent with banks reallocating funds across markets after natural disasters and Brown, Gustafson and Ivanov (2021) highlights the relevance of controlling for credit demand as they may shape loan conditions.

[31] We only keep bank-county-year observations with positive values on the amount of new mortgages originated.

[32] We do not include the difference in the Fed funds target rate in the regression because it is absorbed across all columns of our tables by bank-time, county-time, or time fixed effects.

[33] If different banks that originate loans in the same market have heterogeneous changes in loan opportunities (i.e. different changes in loan demand), the inclusion of county-time fixed effects would not solve this issue. In such a case, our results could be driven by loan demand rather than loan supply. We alleviate this concern in table 4 where we use as a dependent variable the difference in approval ratio.

with a dummy variable that takes the value of one from 2009 to 2014, and zero otherwise, to account for the flat Fed funds target rate period.[34] When we omit bank-year fixed effects, we include bank fixed effects. Finally, when in some specifications we omit both county-year and bank-year fixed effects, we include year fixed effects.

We focus on the sample of banks originating mortgages in at least two counties and in counties where at least two banks originate mortgages. Because the coefficient of interest, β_1, is not identified for single-county banks and for counties with only one bank when bank-time and county-time fixed effects are included. For comparison, we also provide estimates without the bank-time and county-time fixed effects.

Table 2 presents the results of estimating equation (5) using bank's specialization in each local market from 1994 to 2019. Column (1) contains our preferred specification with the full set of fixed effects. It documents that after a decrease in the Fed funds rate, banks increase new mortgage lending growth by more in markets where they are more specialized relative to markets where they are less specialized, controlling for the change in aggregate local lending opportunities (i.e., local loan demand). A one standard deviation increase in *Spec* (0.192) increases lending by 54.3 bps per 100 bps decrease in the Fed funds target rate (54.3 = 0.543% = 0.192 (-0.0283) (-100)). It is statistically significant at the 1% level. As previously explained in Section 2, we do not observe the stock of mortgages held on banks' balance sheets. Therefore, this estimate captures the growth of new mortgage lending, not the growth of outstanding mortgage lending on banks' balance sheets.

This estimate provides strong evidence that local bank's specialization in the mortgage market affects how changes in monetary policy are transmitted to the growth of new mortgage lending. We call it the specialization channel. This result can also be interpreted in the following way: after a decrease in the Fed funds rate, more locally specialized banks increase new mortgage lending growth by more, relative to other banks in the same market. In doing so, we compare two different banks originating new mortgage lending in the same market and controlling for bank-year level heterogeneity.

Column (2) drops the county-year fixed effects, and the coefficient of interest (β_1) is almost unchanged from column (1) and remains statistically significant at the 1% level. Column (3) shows how our coefficient of interest remains negative and significant, but the effect almost doubles in magnitude, when we omit the bank-year fixed effects. This finding suggests that bank-year level heterogeneity is a relevant factor to be controlled for when analyzing the impact of bank's local specialization for the transmission of monetary policy

[34] We follow Drechsler et al. (2017) for the inclusion of such fixed effects. From now on, we add these fixed effects, which we call fipszero, to all lending specifications that include the flat Fed funds target rate period and do not include county-time fixed effects.

changes to new mortgage lending growth. Such fixed effects control, among other things, for any change in the liability side of banks created by changes in the Fed funds rate.[35]

Column (4) drops county-year and bank-year fixed effects. The main coefficient of interest (β_1) remains statistically significant at the 1% level and almost unchanged from column (3), suggesting that the main control for our coefficient to be accurately estimated is bank-year level heterogeneity. These results show that the effect of local bank's specialization in the mortgage market on the sensitivity of local new mortgage lending growth to monetary policy is still present when we do not control for the change in local lending opportunities and bank-year level heterogeneity.

The estimates in Table 2 are consistent with banks' differential behavior in more or less specialized markets following a monetary policy change. We argue that this differential sensitivity to monetary policy changes is due to banks facing heterogeneous lending costs across markets, in line with empirical evidence and our simple theoretical setup developed in section 6. These results also provide evidence in line with monetary policy being a key determinant of bank's local mortgage market specialization decisions. If banks are specialized in only a few local lending markets (i.e., low geographical diversification), they would be more exposed to negative local market shocks. Therefore, our results imply that monetary policy influences the exposure of banks to shocks of specific local loan markets. Section 5 performs an analysis of this result at the bank level.

3.3 Bank-County Level Estimation: Robustness

3.3.1 Other Relevant Market Structure Characteristics

Having established that bank's local mortgage market specialization affects the transmission of monetary policy to mortgage lending supply, we investigate whether it holds when we control for alternative local market structure mechanisms. For instance, lenders with high market share are more likely to internalize negative spillovers and provide liquidity to industries in distress (Giannetti and Saidi, 2019). So, bank's local mortgage market shares may also impact the transmission of monetary policy to loan supply. We follow Giannetti and Saidi (2019) and construct bank's local mortgage market shares as the share of new mortgage lending originated in a market by a bank and year, divided by the total amount of

[35]Dell'Ariccia et al. (2017) provide evidence that banks increase risk-taking after decreases in short-term interest rates being the effect more pronounced for banks with relatively high capital. Drechsler et al. (2017) show that after a rise (reduction) in the Fed funds rate, banks that raise deposits in more concentrated markets reduce (increase) lending relative to banks that raise deposits in less concentrated markets. Heider et al. (2019) show how negative interest rates may increase the funding cost of high-deposit banks relative to low-deposit banks, hence impacting bank risk-taking and lending behavior. With the inclusion of the bank-year fixed effects in columns (1) and (2) we are controlling for these effects, among others.

new mortgage lending originated by all banks in a market and year. We label this variable as $MktSh_{bct}$.[36]

Bank exposure to local deposit market concentration has also been documented as a determinant for the transmission of monetary policy to bank's loan supply (Drechsler et al., 2017). We follow Drechsler et al. (2017) and construct two variables. We construct the variable C-HHI-Dep$_c$ that measures local deposit market concentration calculated as a standard Herfindahl index. It is calculated by summing up the squared deposit-market shares of all banks with branches in a given county and year and then averaging over all years from 1994 to 2019. We also construct a bank-level variable that measures to which extent banks raise deposits in concentrated deposit markets. We do so by averaging C-HHI-Dep$_c$ at the bank level, using lagged deposit shares across branches as weights. We refer to this variable as Bank-HHI-Dep$_{bt}$.[37]

Table 3 presents the results estimating equation 5 adding controls for these relevant bank market structure characteristics that may affect the transmission of monetary policy to loan supply.[38] Column (1) is similar to column (1) of Table 2 but we control for the effect of bank's loan market share for the transmission of monetary policy to mortgage loan supply.[39] They provide evidence that our specialization channel ($\Delta FF \quad Spec$) is robust to controlling for the effect of bank's local market share for the transmission of monetary policy ($\Delta FF \quad MktSh$). As column (1) shows, after a 100 bps decrease in the Fed funds rate, a one standard deviation increase in $Spec$ (0.192) increases lending by 36.5 bps while a one standard deviation increase in $MktSh$ (0.070) increases lending by 65.6 bps. The results are statistically significant at the 1% level. This result also suggests that bank's local loan market share is a relevant characteristic that affects the transmission of monetary policy to new mortgage lending.[40]

Column (2) drops the bank-year fixed effects and control for the effect of bank exposure

[36]It is calculated as follows:

$$MktSh_{bct} = \frac{A_{bct}}{A_{ct}}$$

where A represents the amount of new mortgage lending, b represents the bank, c represents county, and t represents year.

[37]We report in Table A2 of the appendix the correlation matrix between bank's local mortgage market specialization, banks' local mortgage market share, bank-level exposure to local deposit market concentration and county-level local deposit market concentration. We show that the correlations between our main measure of specialization and other relevant market structure characteristics are not a concern for our analysis.

[38]We include the interaction terms of such variables with changes in the Fed funds rate.

[39]Note that we cannot control for the effect of bank exposure to concentrated deposit markets because its effect is absorbed when we include bank-year fixed effects.

[40]This result is interesting but as the focus of our study is the effect of bank's local specialization on the transmission of monetary policy, we leave further analysis of this finding for future research.

to concentrated deposit markets for the transmission of monetary policy (ΔFF Bank-HHI-Dep). It shows that after controlling for the bank exposure to concentrated deposit markets, the result of bank's local specialization remains robust. Our main coefficient of interest on the interaction term between changes in the Fed funds rate and specialization remains large and significant at the 1% level. While the effect of bank exposure to concentrated deposit markets for the transmission of monetary policy to new mortgage lending growth is not statistically significant at the 10% level, the effect of bank's local loan market share is still statistically significant at the 1% level. Note again, that in comparison with our main specifications, these estimates may be biased by the presence of bank-year level heterogeneity. It may explain why the magnitude of the coefficients on the effect of bank's local specialization and market share for the transmission of monetary policy is multiplied by more than two.

Finally, column (3) drops the county-year fixed effects and control for the direct effect of local deposit market concentration for the transmission of monetary policy (ΔFF C-HHI-Dep). Our main coefficient of interest on the effect of specialization remains almost unchanged from column (2) and it is still statistically significant at the 1% level. The effect of local market shares for the transmission of monetary policy remains unaltered. We also find that local deposit market concentration is affecting positively the transmission of Fed funds rate to new mortgage lending growth. This result is statistically significant at the 10% level. Bank exposure to concentrated deposit markets still has no statistically significant effect on the transmission of Fed funds rate to new mortgage lending growth at the standard levels.

Overall, the results in Table 3 indicate that our results are robust to controlling for other relevant banks' local market structure characteristics that may affect the transmission of monetary policy to new lending growth in the mortgage market.

3.3.2 Further robustness

Our previous results show the relevance of bank's geographical specialization for the transmission of monetary policy to mortgage lending supply. Table 4 provides a number of further robustness tests for our preferred specification including bank-time and county-time fixed effects, and controlling for the direct effect of local bank market shares for the transmission of monetary policy. Our objective is to show whether bank's local market specialization affects the transmission of monetary policy to bank's loan supply for different computations of the specialization variable, alternative monetary policy measures, various dependent variables, and different sample periods.

First, we do not have information on the stock of mortgage lending on bank balance sheets disaggregated by markets. So, our variable *Spec* (lagged one period) may not be a good measure of a given bank's local bank market specialization. To address this concern, in columns (1) - (3) of panel A we reestimate our baseline specification using alternative definitions of the specialization variable as the two periods lag, the average for the whole sample period from 1994 to 2019 and the average for the five previous years, respectively.[41] The results are similar, consistent with our variable *Spec* presumably being a good measure of a given bank's local market specialization.[42]

One might still be concerned that our specific construction of the specialization variable is leading the results as we use the same sample period for the construction of the specialization variable and to test the analysis. In column (4) of panel A we construct the specialization variable as the average for the sample period from 1994 to 2004 and test the relevance of the specialization channel from 2005 to 2019, which is the sample period not included in the construction of the main variable. The result is robust to this alternative specification.

One possible concern with the interpretation of the results is that they may be led by the specific choice of the monetary policy variable. To address this concern, in Panel B we report the result for alternative monetary policy measures. First, in column (1) we use the average aggregation method to compute the yearly measure of the Fed funds target rate. Second, in column (2) we follow Jarociński and Karadi (2020) in order to disentangle the effect of changes in the Fed funds rate from central bank information shocks and to avoid the concern that our results may come from information shocks rather than policy changes. Third, in column (3) we use the shadow rates in order to have monetary policy movements during the flat Fed funds target rate. We find that the results hold.

One possible concern with the interpretation of the results is that banks may be reacting differently to their decisions to enter and exit local markets. To address this concern, we include entries and exists of banks in different local markets. As the dependent variable is bounded, the upper (+2) and lower (-2) limits correspond to entries and exits, respectively. Column (4) of Panel B shows that not only does our estimate remain robust, but the point estimate of the interaction term is even larger

We then explore in Panel C whether the results hold if we use alternative measures of the outcome variable. In column (1), we use the log-difference of new mortgage lending originated as in Favara and Imbs (2015) that uses the log-difference of county-level activity in the mortgage market. Column (2) computes the growth of the number of new mortgages,

[41] In table A3 of the appendix we also show that the result is similar if we use the three-period lag of the specialization variable, an indicator variable for the markets where the bank has a physical branch with positive deposit quantities or an alternative measure of the specialization variable in the spirit of Paravisini et al. (2017).

[42] These results further suggest that our results are not driven by the specific definition of the specialization variable. Table A1 of the appendix provides evidence that the specialization variable is very stable across periods.

column (3) uses the average loan amount growth, and column (4) reports the result using the difference in the approval ratio. Our result holds when we use the log difference instead of growth, the number instead of amount, and the approval ratio to further avoid issues that demand may be driving the results. These results provide evidence that they are not specifically driven by the selection of the outcome variable and reveal that after an easing of monetary policy, banks modify loan supply decisions depending on the level of local specialization by changing the number of loans and not the dollar amount of the loans they grant.

Another possible concern with our main result is that it may be driven by specific sample periods. Mian and Sufi (2009), Justiniano et al. (2019) and Drechsler et al. (2022) have shed light on the relevance of the housing boom to the U.S. mortgage market and on its implications for the Great Depression when bank's geographic diversification may work differently (Gelman et al., 2021). Columns (1) - (4) of panel D revisit this concern. We test whether the result holds for the U.S. housing boom period from 2003 to 2006 following Drechsler et al. (2022) (column (1)), when we exclude the four years corresponding to the housing boom (column (2)), when we exclude the years from 2007 to 2009 in order to not be affected by the Great Recession (column (3)) and when we focus on the subsample period from 1994 to 2013. Our results hold and are even amplified for the U.S. housing boom period.[43] Column (3) shows that our result is similar when we exclude the years corresponding to the Great Recession and column (4) focuses on the sample period from 1994 to 2013 in order to alleviate possible concerns that under low Fed funds rate, monetary policy does not work as intended (Heider et al., 2019; Brunnermeier and Koby, 2018; Altavilla et al., 2018).

Tables A3 and A4 of the appendix present additional robustness tests. If bank's local specialization is closely related to bank's past new mortgage lending growth, one might be concerned that the transmission of monetary policy to new mortgage lending is affected by past growth rather than by local specialization. To address this concern, we control for the effect of lagged new mortgage lending growth on the transmission of monetary policy to contemporaneous new mortgage lending growth and show that the result holds.

We exploit information from 1997 to 2019 from the FFIEC Community Reinvestment Act (CRA) on an alternative lending market, bank loans to small businesses. We compute total new small business lending as the total amount of new loans of less than $1 million and show that bank's local specialization in the small business lending market also affects the transmission of monetary policy to new small business lending growth. Despite new small business lending may be more affected by other market characteristics such as sector

[43]We find similar results when using the years from 2002 to 2005 as the U.S. housing boom period following Mian and Sufi (2009). We report the results in Table A3 of the appendix.

specialization (Paravisini et al., 2017), this finding provides further evidence of the relevance of local lending specialization for the transmission of monetary policy.

Our main sample includes all new mortgage lending originated to hold and sell by banks for bank-counties with positive lending in markets where a given bank made more than five loans in the previous year. In order to alleviate the possible concern that our results are only specific to the sample selection we make in the mortgage market, we show that our estimates remain robust if we include also all mortgage markets where a given bank made less than 5 loans in the previous period and if we include only mortgage lending originated to hold. Additionally, as explained in Loutskina and Strahan (2009) and Cortés and Strahan (2017), the presence of Fannie Mae and Freddie Mac (GSEs) created a segmentation of the U.S. mortgage market into two types of mortgages depending on its size. GSEs can purchase or help to securitize by selling credit protection mortgages that are below the jumbo cutoff threshold (i.e., non-jumbo mortgages). Yet by regulation, jumbo mortgages which are bigger than the jumbo cutoff threshold are out of the scope of GSEs. This limitation was designed to promote access to mortgage credit for low- and moderate-income households. Using data from the FHFA, we identify the jumbo cutoff threshold for each year, and we keep the most illiquid mortgages which have an amount above the size threshold. We do so in order to avoid the possible concern that our results are driven only by mortgages originated to be sold (or helped to securitize by) the GSEs. We show that our result holds for this alternative sample selection.

We also extend our sample to include depository and non-depository institutions, related to prior research providing evidence that the transmission of monetary policy to financial institutions may be different depending on their type of financing (Xiao, 2020; Drechsler et al., 2022; Elliott et al., 2021; Cucic and Gorea, 2021). Non-depository institutions are also called independent mortgage companies (IMC) in the U.S. mortgage market and originate a substantial amount of mortgage lending in the U.S. mortgage market as shown in Figure A2 of the appendix. The results confirm that loan supply originated by any type of financial institution (banks and non-depository institutions) is affected by the specialization channel and that the sensitivity of mortgage loan supply to this channel is amplified for non-depository institutions, relative to banks.

The underlying assumption of our identification strategy to be controlling for the change in local lending opportunities is that banks located in the same market face the same change in loan demand. Nevertheless, if banks that originate loans in the same market have heterogeneous changes in loan opportunities (i.e. different changes in loan demand), the inclusion of county-time fixed effects would not solve this issue. In such a case, our results could be driven by loan demand rather than loan supply. We alleviate this concern using the self-reported income from HMDA. We compare lending originated by different banks to the same type of borrower. We do so by dividing borrowers into four different income brackets. We define the four income categories using the 25^{th}, 50^{th}, and 75^{th} percentiles as cutoffs, corresponding to USD $59,000$, USD $90,000$, and USD $137,000$, respectively, as of 2010 USD. Then, we include county-year-income fixed effects to control for the change in local lending opportunities (demand) coming from different types of borrowers depending on their income and show that our result holds.

At last, we use the Fed funds target rate and monetary policy shocks following Jarociński and Karadi (2020) to provide evidence that the effect of monetary policy easing especially drives the local specialization channel.

4 County Level Results on Lending, House Prices and Economic Activity

4.1 Baseline specifications

In our core set of tests, we isolate the supply effect of banks by comparing at the same time bank's new mortgage lending growth originated by the same bank-year in different counties, and new mortgage lending growth originated by different banks in the same county-year. Bank-year effects absorb time-variant bank heterogeneity. County-year effects absorb changes in credit demand, but they also absorb any potential aggregate effect of credit supply. We expect aggregate mortgage credit supply to be affected by the specialization channel. However, differences in new mortgage lending growth following monetary policy changes may be compensated in a given market between specialized and non-specialized banks. In this case, credit would be reallocated between banks in a market, but aggregate mortgage credit supply would be unaffected.

In this section, we analyze the aggregate effects at the county level of the channel we have documented. To do so, we aggregate our loan market data on mortgage lending at the county-year level and study whether specialization affects the transmission of monetary policy to aggregate growth of mortgage lending, house prices, and economic activity, measured by employment and wages.

Our previous results suggest that markets that are more exposed to specialized banks can face a rise in aggregate new mortgage lending growth relative to other markets after an easing of monetary policy. If this hypothesis holds at the aggregate (county) level, it implies that banks' new mortgage lending growth supply is increased, hence households are less restricted in their access to mortgage credit and house prices increase by more in markets exposed to specialized banks relative to other markets after an easing of monetary policy.[44] Finally, the expansion of new mortgage lending growth may have a direct effect on economic activity growth measured by employment and wages or also an indirect effect through the increase in house price growth which can affect the collateral value of entrepreneurs (Cloyne et al., 2019).

We construct a county-level variable that measures to which extent new mortgage lending of a county is originated by banks that are specialized in that specific market. We do so by calculating the weighted average of $Spec_{bct}$ across all banks originating mortgages, using the amount of new mortgage lending originated as weights. We refer to this variable as $CSpec_{ct}$ as defined more precisely in Section 2.

We also construct a variable at the aggregate county level to control for the influence of local bank market shares (Giannetti and Saidi, 2019) for the transmission of monetary policy to aggregate mortgage lending, house price, wage and employment growth. We construct the variable $CMktSh_{ct}$ that measures local mortgage market concentration (i.e. county exposure to banks with high mortgage market shares in that specific county) calculated as a standard Herfindahl index. It is calculated by summing up the squared mortgage-market shares of all banks in a given county and year.

At last, we construct the county exposure to banks raising deposits in concentrated deposit markets (Drechsler et al., 2017) to capture the extent to which new lending of a market is originated by banks that raise deposits in concentrated deposit markets and refer to it as C-HHI-Expo$_{ct}$.[45]

To ascertain the effect of county specialization on the transmission of monetary policy to regional outcomes, we estimate the following regression:

$$\begin{aligned}\Delta y_{ct} =& \alpha_c + \omega_t + \beta_1 \Delta FF_t \times CSpec_{ct-1} + \beta_2 CSpec_{ct-1} + \\ &+ \beta_3 \Delta FF_t \times CMktSh_{ct-1} + \beta_4 CMktSh_{ct-1} + CountyControls + \epsilon_{ct},\end{aligned} \tag{6}$$

where Δy_{ct} is either the new mortgage lending growth, house price growth, total wage growth, or total employment growth in county c from year $t-1$ to t, ΔFF_t is the difference in the Fed funds target rate from $t-1$ to t, $CSpec_{ct-1}$ is the lagged county exposure to bank's specialization in that local market using new mortgage lending shares as weights, $CMktSh_{ct-1}$ is the lagged local mortgage market concentration, α_c and ω_t are county and time fixed effects, respectively.[46] $CountyControls$ is a set of controls that include the lagged

[44]This goes in line with findings in Blickle (2022) that study the effect of mortgage supply on house prices.

[45]Given our focus on the mortgage market, we use new mortgage lending shares as weights.

[46]We do not include the difference in the Fed funds target rate in the regression because it is absorbed

log of the population, the lagged log of income per capita, the lagged proportion of securitized mortgages, C-HHI-Dep, C-HHI-Expo, and their interactions with the difference in the Fed funds rate. We cluster standard errors at the county level.

Table 5 presents the results. Columns (1) and (2) report the specifications using new mortgage lending growth as the outcome variable, excluding and including relevant controls, respectively. They show that counties more exposed to banks that are specialized in that specific local market see an increase in new mortgage lending growth relative to other markets after an easing of monetary policy. Column (2) shows that a one standard deviation increase in *CSpec* (0.096) increases new mortgage lending growth by 138.24 bps per 100 bps decrease in the Fed funds rate. The result is statistically significant at the 1% level.

Columns (3) and (4) present the results for regional house price growth. As shown in column (4), we find that per 100 bps decrease in the Fed funds rate, a one standard deviation increase in *CSpec* (0.096) increases house price index growth by 14.4 bps. This result is statistically significant at the 1% level.

Columns (5), (6), (7), and (8) present the results for economic activity measured by total wage and employment growth. Columns (6) and (8) show that a one standard deviation increase in *CSpec* (0.096) increases wage and employment growth by 8.69 bps and 1.66 bps, respectively, per 100 bps decrease in the Fed funds rate. The results on wage and employment growth are statistically significant at the 1% and 10% levels, respectively.

Overall, the results in Table 5 provide evidence that the specialization channel gives rise to aggregate regional implications. County exposure to local specialized banks in the mortgage market significantly affects the sensitivity of new mortgage lending, house price, wage, and employment growth to monetary policy changes. These results suggest that the expansion in new mortgage lending growth due to the heterogeneous exposure to local bank's specialization in the mortgage market after an easing in monetary policy increases regional house price growth, also affecting directly and/or indirectly wage and employment growth.

4.2 Robustness

We document in Table A5 how our results withstand a wide set of additional robustness tests for the specifications in columns (2), (4), (6), and (8) of Table 5. In Panel A we first address the possible concern that our results could be driven by information shocks on the economic conditions instead of interest rate changes. We replace the change in the Fed funds rate with the annual monetary policy shocks constructed following Jarociński and Karadi (2020). Our results hold for the use of this alternative monetary policy measure.

across all columns of our tables by time fixed effects.

We then measure the four different outcome variables, new mortgage lending, house price index, wage, and employment growth, using an alternative specification in Panel B. We show that the results remain robust if we use the log difference of new mortgage lending as in Favara and Imbs (2015), the log difference of house price index as in Favara and Imbs (2015), Favara and Giannetti (2017), Cloyne et al. (2019) and Doerr et al. (2020) and the log difference in wage and employment as in Drechsler et al. (2017).

Finally, we focus on the sample period from 1994 to 2013 in Panel C. We do so to exclude the low Fed funds rate environment period when the transmission of monetary policy may not work as intended (Heider et al., 2019). While we find similar results on new mortgage lending, house price, and wage growth, the result on employment growth is not statistically significant at the standard levels.

5 Bank Level Results on Bank Specialization

Our estimates so far provide evidence that banks react heterogeneously to monetary policy changes depending on how specialized they are, even after controlling for the change in local lending opportunities and bank-year level heterogeneity, and that this channel generates aggregate county level implications on mortgage lending, house prices, total wages and total employment. This heterogeneous reaction to monetary policy within a given bank also affects its overall specialization by construction: If after a decrease in the Fed funds rate, banks increase new mortgage lending growth by more in markets where they are specialized, bank's average specialization growth would increase. Nevertheless, a reduction in the Fed funds rate may also lead banks to enter local markets, hence reducing their specialization growth. In this section, we provide a detailed picture at the aggregate bank level of how bank's average specialization growth is affected by changes in the Fed funds rate.

We start by constructing banks' average specialization for each bank and year as the weighted average of $Spec_{bct}$ across all markets, using the amount of new mortgage loans originated in each county as weights. We refer to this variable as $BSpec_{bt}$ as defined more precisely in Section 2. This measure captures the extent to which a bank is on average specialized in local mortgage markets in the U.S. in a given year.

Under the specialization channel we present, decreases in the Fed funds rate should predict increases in bank's specialization growth. We compute the growth of $BSpec_{bt}$ and we present some visual evidence of how bank's average specialization growth is affected by changes in the Fed funds rate.[47] We do so by first sorting all years into 12 bins according to

[47] To be consistent with prior analyses, we measure the growth of bank's average specialization as in equation 1.

their change in the Fed funds target rate.[48] Then, we average the growth of bank's average specialization by bin.

Figure 2 plots the result. It suggests that decreases in the Fed funds rate are related to smaller average decreases in bank's specialization growth. Bank's average specialization growth decreases from -0.6 bps in the biggest easing to -2.9 bps in the strongest tightening of monetary policy.

One might be concerned that extreme values of bank's average specialization growth or that the specific construction of the outcome variable is driving this result. To address these concerns, we compute the median of bank's average specialization growth by bin and then we also calculate the growth of bank's average specialization using log differences. We provide graphical evidence that the result holds with these changes in Figure A3 of the appendix.

We should be cautious when interpreting this evidence as we cannot control for changes in loan demand or bank-year level heterogeneity. The best we can do at the aggregate bank level is to control for bank level heterogeneity. We do so by including bank fixed effects and time-variant bank controls in the following regression:

$$\Delta y_{bt} = \alpha_b + \beta_1 \Delta FF_t + BankControls + \epsilon_{bt}, \tag{7}$$

where y_{bt} is bank's average specialization growth of bank b from year t 1 to t, ΔFF_t is the difference in the Fed funds target rate from t 1 to t, α_b are bank fixed effects, and $BankControls$ is a set of lagged controls that include the deposit ratio, liquidity ratio, leverage ratio and log of total assets. We cluster standard errors at the bank level.

Table 6 presents the result. Columns (1) and (2) report the specifications using bank's average specialization growth as the outcome variable. Column (2) is our preferred specification where we include bank fixed effects and lagged bank characteristics as controls. It shows that a reduction in the Fed funds rate is related to increases in bank's average specialization growth. Per 100 bps decrease in the Fed funds rate, bank's average specialization growth increases by 47.4 bps. The result is statistically significant at the 1% level.

We show in Table A6 of the appendix that our results hold for an additional set of robustness tests. As in the robustness tests in previous sections, we replace the change in the Fed funds rate for the monetary policy shocks constructed following Jarociński and Karadi (2020) in order to avoid the possible concern that our results could be driven by information shocks. Our results hold for this alternative monetary policy measure.

We also use the log difference of bank's average specialization as the outcome variable to

[48] We have 12 different changes in the Fed funds target rate across the whole sample period where the growth in the bank's average specialization can be computed. The first bin corresponds to the biggest easing of monetary policy (-475 bps) and the last corresponds to the largest tightening (200 bps).

avoid concerns that our main result may be driven by the specific computation of the growth variable. The result is virtually unaltered.

At last, to address the possible concern that the low Fed funds rate period may be affecting our results, we focus on the sample period from 1994 to 2013 excluding the period close to the zero lower bound, and find that our results are similar.

Despite we cannot control for changes in loan demand or bank-year level heterogeneity, these results provide evidence that a monetary policy easing (tightening) is related to increases (decreases) in bank's average local specialization growth. Therefore, after a monetary policy easing, the banking system would be relatively more exposed to local market shocks.

6 Mechanism

In this section, we first provide a simple theoretical model, based on heterogeneous market-specific lending costs, whose main hypotheses are in line with our empirical findings. We then provide evidence of heterogeneous market-specific lending costs related to informational asymmetries being a relevant driver of our main results regarding bank geographical specialization.

6.1 Theoretical Model

In this subsection, we provide a simple theoretical setup that helps rationalize the empirical findings relating to monetary policy, banks' lending specialization, and loan supply documented in our main empirical analysis.

Consider a one-period risk-neutral economy with two types of agents: borrowers and a monopolistic financial intermediary that we call a bank. The bank invests in lending to borrowers and funds itself in a perfectly competitive market that requires an expected return R_0 per unit of funding. We take this return as a proxy for the monetary policy rate. Borrowers are located in two different markets, A and B. If nothing is explicitly stated both markets are symmetrical.

In each market, there is a continuum of penniless borrowers indexed by i. Each borrower needs L units to invest in an asset that generates Y units. Borrowers differ in a borrower specific observable characteristic x_i which determines the cost of lending to such entrepreneur.[49] In order to lend to a borrower with characteristic x_i the bank has to undergo a cost $c(x_i)$. One way to rationalize the existence of lending cost is to assume that the bank has to screen

[49] While x_i can represent the physical distance between a bank's branch and a borrower, it can also represent the dissimilarities between bank's core knowledge of an industry and the borrower's operations, or bank's characteristics and borrower's tastes.

or monitor the borrower and that in the absence of screening or monitoring the loan has a negative NPV. Following Hauswald and Marquez (2003) we can assume that monitoring cost is borrower specific and more costly the higher the x_i.[50]

Specifically, we assume that the lending cost function takes the form

$$c(x_i) = x_i^{\beta_j} \tag{8}$$

with $\beta_j > 1$. This increasing and convex cost function captures that lending is more costly, and increasingly so, for higher x_i.

The only difference that we assume between the two markets is that the bank has a higher marginal cost of lending in market B than in market A, which we capture by assuming $\beta_A < \beta_B$. This can be related to differences in the familiarity of the bank with each given market which, following Bolton et al. (2016), could occur because the transmission of soft information from distant branches to the bank's headquarters is more difficult for markets further away from the bank's headquarters. Therefore, the marginal lending cost in markets more distant to the bank's headquarters, market B, is higher for the bank.[51]

Given that the bank is a monopolist it sets a lending rate equal to the success return (utility of the borrower). Hence, the profits of the bank from serving a borrower with characteristics x_i in market j is equal to:

$$Y \quad LR_0 \quad x_i^{\beta_j} \tag{9}$$

This allows us to determine the threshold borrower $\hat{x}_j$, which is the last borrower a bank serves. This threshold borrower is defined by the following equation:

$$\begin{aligned} Y \quad LR_0 \quad x^{\beta_j} &= 0. \\ \hat{x}_j &= (Y \quad LR_0)^{\frac{1}{\beta_j}} \end{aligned} \tag{10}$$

Given that the supply of loans in each market, $L\hat{x}_j$, is determined by the threshold borrower, $\hat{x}_j$, we can obtain the following two results.

1. ***Specialization result.*** The bank is more specialized in market A, $\hat{x}_A > \hat{x}_B$

[50]See also Vives and Ye (2021) for similar assumptions. An alternative way to rationalize our lending cost function is to assume that the bank has to approach the borrower in order for the borrower to know of the bank's existence, e.g. through focused marketing techniques. If the bank does not incur such costs the borrower does not ask for a loan to the bank as it does not know of its existence. We assume that reaching borrowers that have higher x_i is more costly for the bank.

[51]Subsection 6.2 gives empirical evidence that, in line with this micro foundation of the heterogeneous cost function, the physical distance between the lending market and the bank's headquarters is a relevant driver of our results.

Given that $\hat{x}_A = (Y \quad LR_0)^{\frac{1}{\beta_A}}$ and $\hat{x}_B = (Y \quad LR_0)^{\frac{1}{\beta_B}}$ it is direct to show that $\frac{L\hat{x}_A}{L\hat{x}_A + L\hat{x}_B} > \frac{L\hat{x}_B}{L\hat{x}_A + L\hat{x}_B}$ follows from $\beta_A < \beta_B$ .This result states that the bank lends more, i.e. is more specialized, in the market in which it has lower marginal lending costs.

2.*Di erential response to* R_0. A decrease in R_0 leads to a higher relative increase in loan supply by the bank in market A than in market B $\frac{\frac{dL\hat{x}_A}{dR_0}}{L\hat{x}_A} < \frac{\frac{dL\hat{x}_B}{dR_0}}{L\hat{x}_B} < 0$. This result states that the bank has a higher relative increase in lending as a response to lower safe rates in the market in which it has a larger presence.

Proof:

$$\begin{aligned} \frac{\frac{dL\hat{x}_A}{dR_0}}{L\hat{x}_A} = \frac{\frac{L^2}{\beta_A}(Y \quad LR_0)^{\frac{1}{\beta_A}\ 1}}{L(Y \quad LR_0)^{\frac{1}{\beta_A}}} < \frac{\frac{L^2}{\beta_B}(Y \quad LR_0)^{\frac{1}{\beta_B}\ 1}}{L(Y \quad LR_0)^{\frac{1}{\beta_B}}} = \frac{\frac{dL\hat{x}_B}{dR_0}}{L\hat{x}_B} \\ \frac{1}{\beta_A}\left(\frac{L}{Y \quad LR_0}\right) < \frac{1}{\beta_B}\left(\frac{L}{Y \quad LR_0}\right) \\ \beta_B > \beta_{A.} \end{aligned} \tag{11}$$

Results 1 and 2, which are the main testable hypotheses of our stylized setup are in line with our empirical findings. The main intuition for such results follows: The bank is more specialized in market A as the marginal cost of lending (through lower lending, e.g. monitoring or screening costs) is lower in such market. Also, the bank responds to a reduction in the safe (monetary policy) rate, R_0, by expanding (relatively) more in the market in which the marginal cost of increasing such lending is lower, market A.

6.2 Empirical Evidence

Having established that the influence of the specialization channel on banks' loan supply is robust and generates aggregate county and bank level implications, we empirically explore whether it is indeed due to heterogeneous marginal lending costs across local markets consistent with our simple theoretical model. For instance, these differential increasingly marginal costs can arise from the familiarity of the bank with each local market which, could take place as a consequence of different sources associated with informational asymmetries. Following Bolton et al. (2016), the transmission of soft information from bank branches to the bank's headquarters is more difficult for branches located in distant markets from the bank's headquarters.[52] In other words, bank's headquarters may be less able to interpret customer

[52]In line with this explanation, Hollander and Verriest (2016) also analyzes the effect of information asymmetry, measured as geographical distance between lenders and borrowers, on loan contracts. They find

and market information from monitoring and/or screening activities developed by employees in distant bank branches. Therefore, the physical distance between loan markets and bank's headquarters can be used as a proxy for informational distance, hence for higher marginal lending costs.[53]

Following this argument, we use a proxy for heterogeneous marginal lending costs across local markets to give evidence that this is the underlying mechanism behind our channel. We rely on data from the County Distance Database provided by the National Bureau of Economic Research which reports the distance in miles for all combinations of U.S. counties. We construct the variable $Dist$ as the natural logarithm of one plus the distance in miles from a given local market to the market where the bank is headquartered.[54] Higher values of $Dist$ measure greater increasingly marginal lending costs for banks. Also, it takes the minimum value in the market where the bank is headquartered.

Bank's local lending specialization is negatively correlated with $Dist$, which indicates that banks tend to specialize less in distant markets from their banks' headquarters. This suggests that banks face higher marginal lending costs of monitoring or/and screening borrowers in such markets, in line with the first implication of our simple theoretical model developed in subsection 6.1.[55] It supports the use of geographical distance as a good proxy for higher increasingly marginal lending costs. Therefore, we use this variable as a proxy for the different β which the theoretical setup states represent that banks face heterogeneous marginal lending costs across local markets.

Moreover, to give more evidence on heterogeneous marginal lending costs across markets being the relevant driver of our results, we construct a county-level variable that measures to which extent new mortgage lending of a county is originated by banks that have their headquarters located in distant markets. We do so by calculating the weighted average of $Dist_{bct}$, using the amount of new mortgage lending as weights. We refer to this variable as

that the higher the distance between the headquarters of lenders and borrowers, the stronger the covenant tightness of loan contracts.

[53] While we focus on physical distance, Rehbein and Rother (2022) use social connections as a proxy for soft information between banks and borrowers. More specifically, they use Facebook friendship links in the U.S. to measure the level of social connectedness between the region where the bank office is located and local lending markets. They find that loans to borrowers that are located in well-connected regions present more favorable terms and improve loan performance. Our argument goes also in line with Berger et al. (2017b) that finds evidence that banks are less likely to collect audited financial statements from firms in industries and local markets where they are more specialized. This is consistent with banks having expertise, hence facing lower marginal costs of monitoring/screening in some industries and markets where they do not need to demand detailed and verified borrower information.

[54] Jean Roth created this data of U.S. county distances using the Haversine formula based on internal points in the geographic area.

[55] As shown in Table A7 of the appendix, the correlation between $Spec$ and $Dist$ is -0.61. We also show in Table A8 of the appendix that the direction of such relationship holds for regressing $Spec$ on $Dist$ when we include county-time and bank-time fixed effects.

$CDist_{ct}$.

At last, we construct a bank-level variable that measures to which extent new mortgage lending is originated by a bank in distant markets to bank's headquarters. We do so by calculating for each bank the weighted average of $Dist_{bct}$ across all markets, using the amount of new mortgage lending in each county as weights. We refer to this variable as $BDist_{bt}$.

We then implement this approach by replacing the *Spec* variable in regression 5 for *Dist*, the *CSpec* variable in regression 6 for *CDist*, and the *BSpec* variable in regression 7 for *BDist*. Table 7 reports the results. Columns (1) and (2) present the results at the bank-county level controlling for the change in local loan demand and bank-time variant heterogeneity.[56] Column (2) also controls for the effect of local market share for the transmission of monetary policy. It shows that banks increase new mortgage loan supply growth by more in markets that are close to their banks' headquarters relative to other markets when the Fed funds rate decreases. A one standard deviation decrease in *Dist* (1.98) increases lending by 99 bps per 100 bps decrease in the Fed funds rate. This result is statistically significant at the 1% level. It provides evidence that our measure of low increasingly marginal lending cost (lower distance to headquarters) has a similar effect as specialization. The sensitivity of bank's loan supply to monetary policy changes is higher in markets where they face lower increasingly marginal lending costs, hence markets close to their headquarters.

Columns (3) to (10) test the relevance of our regional proxy on informational asymmetry for the transmission of monetary policy changes to regional aggregate new mortgage lending, house price, wage, and employment growth. Columns (4), (6), and (8) control for the effect of local mortgage market concentration and include additional county level controls. They show that counties that are less exposed to banks with their headquarters located in distant markets experience a higher increase in aggregate new mortgage lending, house price, and wage growth relative to other counties, after a decrease in the Fed funds rate.[57] A one standard deviation decrease in *CDist* (1.23) increases new mortgage lending, house price and wage growth by 196.8 bps, 30.38 bps and 4.31 bps, respectively, per 100 bps decrease in the Fed funds rate. These results on aggregate lending and house prices are statistically significant at the 1% level and the result on total wages is statistically significant at the 5% level.

Columns (11) and (12) analyze whether changes in the Fed funds rate have an impact

[56] The market location of bank's headquarters is obtained using the U.S. Call Reports from the FDIC. This is the reason why the number of observations is reduced compared to Table 2, after keeping only banks that appear in the U.S. Call Reports. We mainly lose information on Federal and State Credit Unions that report to HMDA but are not included in the U.S. Call Reports data from the FDIC.

[57] While the results on aggregate lending, house prices, and total wages are consistent with our reasoning on the mechanism and previous results, we find that the result in total employment is not consistent.

on the bank level of information asymmetry, bank's average distance of markets to the headquarters growth. Column (12) includes bank fixed effects and also controls for bank characteristics. It shows that a 100 bps decrease in the Fed funds rate decreases the growth of bank average lending to distant markets by 53.2 bps. This result is statistically significant at the 1% level.

Results in table 7 suggest that heterogeneous marginal lending costs across local markets are the mechanism behind the higher sensitivity of bank's loan supply to monetary policy changes in specialized relative to other markets.[58] This is consistent with the second implication of our model (in subsection 6.1) where, after a reduction in the safe rate, banks increase loan supply by more in the market where they face lower marginal lending costs. Overall, these findings provide strong evidence that heterogeneous increasingly marginal lending costs are the underlying mechanism of the proposed channel.

7 Conclusion

This paper provides evidence consistent with bank's local mortgage market specialization affecting the sensitivity of new mortgage lending growth to monetary policy changes. We use U.S. mortgage market data that allows us to control for the change in local lending opportunities by comparing new mortgage lending growth originated by different banks in the same market and year. We also control for bank-year level heterogeneity, which could arise for example from different bank liability structures, by comparing new mortgage lending growth originated by the same bank and year in different markets. We find that after a decrease in the Fed funds rate, banks increase new mortgage lending growth by more in markets where they are more specialized relative to other markets. As suggested by our empirical findings and theoretical setup, this result may be explained by the fact that banks face heterogeneous marginal costs of lending in different markets, related to differential informational asymmetries.

Our results suggest that the specialization channel we document gives rise to aggregate regional and bank level implications. We document how aggregate regional new mortgage

[58]In Table A9 of the appendix we use an alternative measure of lower increasingly marginal costs, an indicator variable for the market where the bank is headquartered, and show that our results at the bank-county, county, and bank level hold. To do so, we construct the indicator variable $SameMkt$ that equals one if the lending market is located in the same market as the bank's headquarters, and zero otherwise. In practical terms, we will compare the market with the lowest marginal lending cost, i.e. where the bank is headquartered, with the rest of the markets where banks face higher increasingly marginal lending costs. The correlation between *Spec* and $SameMkt$ is 0.77. We then construct the county exposure to banks that have their headquarters in such market ($CSameMkt_{ct}$), and the bank exposure to lending in the market where the bank is headquartered ($BSameMkt_{bt}$).

lending is affected by market exposure to locally specialized banks after monetary policy changes. Bank mortgage lending supply impacts directly household availability of funds to purchase houses. Therefore, after a reduction in the Fed funds rate, we find that markets with greater exposure to locally specialized banks increase aggregate new mortgage lending growth by more, and experience greater increases in house price index growth, relative to other markets. As a result, changes in new mortgage lending and house price growth may impact real economic activity at the regional level. Our results indicate that wage and employment growth are weakly affected by the specialization channel consistently with an expansion in aggregate new mortgage lending growth and/or house price index growth increasing real economic activity.

Our results by construction imply that monetary policy changes affect how banks specialize in local markets. We conduct the analysis at the aggregate bank level to provide additional evidence on this link. Our results imply that the easing of monetary policy spurs bank's specialization growth in local mortgage markets, increasing risk exposure to local market shocks as they become less geographically diversified. In this respect, we present evidence of a new channel for how monetary policy may influence banks' decisions to specialize or diversify their lending activities in local markets.

Our results are important for two reasons. First, we contribute to the understanding of the transmission of monetary policy to lending, house prices, and economic activity through a novel characteristic of banking market structure, geographical specialization. Second, these findings have important policy implications. Monetary policy impacts the diversification decisions of banks to local mortgage markets and therefore, low-interest rate levels may spur bank risk-taking in the form of banks being more exposed to local negative shocks.

References

Acharya, V.V., Hasan, I., Saunders, A., 2006. Should banks be diversified? evidence from individual bank loan portfolios. The Journal of Business 79, 1355–1412.

Agarwal, S., Chomsisengphet, S., Mahoney, N., Stroebel, J., 2018. Do banks pass through credit expansions to consumers who want to borrow? The Quarterly Journal of Economics 133, 129–190.

Altavilla, C., Boucinha, M., Peydró, J.L., 2018. Monetary policy and bank profitability in a low interest rate environment. Economic Policy 33, 531–586.

Berger, A.N., El Ghoul, S., Guedhami, O., Roman, R.A., 2017a. Internationalization and bank risk. Management Science 63, 2283–2301.

Berger, P.G., Minnis, M., Sutherland, A., 2017b. Commercial lending concentration and bank expertise: Evidence from borrower financial statements. Journal of Accounting and Economics 64, 253–277.

Bernanke, B., 1992. The federal funds rate and the channels of monetary transnission. American Economic Review 82, 901–921.

Bernanke, B.S., Blinder, A.S., 1988. Credit, money, and aggregate demand. American Economic Review 78, 435–439.

Berton, F., Mocetti, S., Presbitero, A.F., Richiardi, M., 2018. Banks, firms, and jobs. The Review of Financial Studies 31, 2113–2156.

Blickle, K., 2022. Local banks, credit supply, and house prices. Journal of Financial Economics 143, 876–896.

Blickle, K., Parlatore, C., Saunders, A., 2021. Specialization in banking. FRB of New York Staff Report .

Bogin, A., Doerner, W., Larson, W., 2019. Local house price dynamics: New indices and stylized facts. Real Estate Economics 47, 365–398.

Bolton, P., Freixas, X., Gambacorta, L., Mistrulli, P.E., 2016. Relationship and transaction lending in a crisis. The Review of Financial Studies 29, 2643–2676.

Bord, V.M., Ivashina, V., Taliaferro, R.D., 2021. Large banks and small firm lending. Journal of Financial Intermediation 48, 100924.

Brown, J.R., Gustafson, M.T., Ivanov, I.T., 2021. Weathering cash flow shocks. The Journal of Finance 76, 1731–1772.

Brunnermeier, M.K., Koby, Y., 2018. The reversal interest rate. Technical Report. National Bureau of Economic Research.

Chakraborty, I., Goldstein, I., MacKinlay, A., 2018. Housing price booms and crowding-out effects in bank lending. The Review of Financial Studies 31, 2806–2853.

Chodorow-Reich, G., 2014. The employment effects of credit market disruptions: Firm-level evidence from the 2008–9 financial crisis. The Quarterly Journal of Economics 129, 1–59.

Chu, Y., Deng, S., Xia, C., 2020. Bank geographic diversification and systemic risk. The Review of Financial Studies 33, 4811–4838.

Cloyne, J., Huber, K., Ilzetzki, E., Kleven, H., 2019. The effect of house prices on household borrowing: A new approach. American Economic Review 109, 2104–36.

Cortés, K.R., Demyanyk, Y., Li, L., Loutskina, E., Strahan, P.E., 2020. Stress tests and small business lending. Journal of Financial Economics 136, 260–279.

Cortés, K.R., Strahan, P.E., 2017. Tracing out capital flows: How financially integrated banks respond to natural disasters. Journal of Financial Economics 125, 182–199.

Cucic, D., Gorea, D., 2021. Nonbank lending and the transmission of monetary policy. Available at SSRN 3974863 .

De Jonghe, O., Dewachter, H., Mulier, K., Ongena, S., Schepens, G., 2020. Some borrowers are more equal than others: Bank funding shocks and credit reallocation. Review of Finance 24, 1–43.

Degryse, H., De Jonghe, O., Jakovljević, S., Mulier, K., Schepens, G., 2019. Identifying credit supply shocks with bank-firm data: Methods and applications. Journal of Financial Intermediation 40, 100813.

Dell'Ariccia, G., Laeven, L., Marquez, R., 2014. Real interest rates, leverage, and bank risk-taking. Journal of Economic Theory 149, 65–99.

Dell'Ariccia, G., Laeven, L., Suarez, G.A., 2017. Bank leverage and monetary policy's risk-taking channel: evidence from the united states. the Journal of Finance 72, 613–654.

Demyanyk, Y., Loutskina, E., 2016. Mortgage companies and regulatory arbitrage. Journal of Financial Economics 122, 328–351.

Di, W., Pattison, N., 2022. Industry specialization and small business lending. Unpublished manuscript .

Di Maggio, M., Kermani, A., 2017. Credit-induced boom and bust. The Review of Financial Studies 30, 3711–3758.

Doerr, S., Kabas, G., Ongena, S., 2020. Population aging and bank risk-taking. Swiss Finance Institute Research Paper .

Doerr, S., Schaz, P., 2021. Geographic diversification and bank lending during crises. Journal of Financial Economics 140, 768–788.

Drechsler, I., Savov, A., Schnabl, P., 2017. The deposits channel of monetary policy. The Quarterly Journal of Economics 132, 1819–1876.

Drechsler, I., Savov, A., Schnabl, P., 2022. How monetary policy shaped the housing boom. Journal of Financial Economics 144, 992–1021.

Duquerroy, A., Mazet-Sonilhac, C., Mésonnier, J.S., Paravisini, D., 2022. Bank Local Specialization. Technical Report.

Elliott, D., Meisenzahl, R., Peydró, J.L., 2021. Nonbank Lenders as Global Shock Absorbers: Evidence from US Monetary Policy Spillovers. Technical Report. working paper, Imperial College London.

Favara, G., Giannetti, M., 2017. Forced asset sales and the concentration of outstanding debt: evidence from the mortgage market. The Journal of Finance 72, 1081–1118.

Favara, G., Imbs, J., 2015. Credit supply and the price of housing. American Economic Review 105, 958–92.

Favilukis, J., Ludvigson, S.C., Van Nieuwerburgh, S., 2017. The macroeconomic effects of housing wealth, housing finance, and limited risk sharing in general equilibrium. Journal of Political Economy 125, 140–223.

Gelman, M., Goldstein, I., MacKinlay, A., 2021. Bank diversification and lending resiliency. Unpublished manuscript .

Giannetti, M., Saidi, F., 2019. Shock propagation and banking structure. The Review of Financial Studies 32, 2499–2540.

Gilje, E.P., Loutskina, E., Strahan, P.E., 2016. Exporting liquidity: Branch banking and financial integration. The Journal of Finance 71, 1159–1184.

Giometti, M., Pietrosanti, S., 2022. Bank specialization and the design of loan contracts. FDIC Center for Financial Research Working Paper No. 2022-14 .

Goetz, M.R., Laeven, L., Levine, R., 2013. Identifying the valuation effects and agency costs of corporate diversification: Evidence from the geographic diversification of us banks. The Review of Financial Studies 26, 1787–1823.

Goetz, M.R., Laeven, L., Levine, R., 2016. Does the geographic expansion of banks reduce risk? Journal of Financial Economics 120, 346–362.

Gomez, M., Landier, A., Sraer, D., Thesmar, D., 2021. Banks' exposure to interest rate risk and the transmission of monetary policy. Journal of Monetary Economics 117, 543–570.

Gupta, D., 2021. Too much skin-in-the-game? the effect of mortgage market concentration on credit and house prices. The Review of Financial Studies .

Hauswald, R., Marquez, R., 2003. Information technology and financial services competition. The Review of Financial Studies 16, 921–948.

Heider, F., Saidi, F., Schepens, G., 2019. Life below zero: Bank lending under negative policy rates. The Review of Financial Studies 32, 3728–3761.

Hollander, S., Verriest, A., 2016. Bridging the gap: the design of bank loan contracts and distance. Journal of Financial Economics 119, 399–419.

Jarociński, M., Karadi, P., 2020. Deconstructing monetary policy surprises—the role of information shocks. American Economic Journal: Macroeconomics 12, 1–43.

Jiménez, G., Ongena, S., Peydró, J.L., Saurina, J., 2012. Credit supply and monetary policy: Identifying the bank balance-sheet channel with loan applications. American Economic Review 102, 2301–26.

Justiniano, A., Primiceri, G.E., Tambalotti, A., 2019. Credit supply and the housing boom. Journal of Political Economy 127, 1317–1350.

Karakaya, N., Michalski, T.K., Örs, E., 2022. Banking integration and growth: Role of banks' previous industry exposure. Journal of Financial Intermediation 49, 100944.

Kashyap, A.K., Stein, J.C., 1995. The impact of monetary policy on bank balance sheets, in: Carnegie-rochester conference series on public policy, Elsevier. pp. 151–195.

Kashyap, A.K., Stein, J.C., 2000. What do a million observations on banks say about the transmission of monetary policy? American Economic Review 90, 407–428.

Kashyap, A.K., Stein, J.C., Wilcox, D.W., 1993. Monetary policy and credit conditions: Evidence from the composition of external finance. American Economic Review 83, 78–98.

Khwaja, A.I., Mian, A., 2008. Tracing the impact of bank liquidity shocks: Evidence from an emerging market. American Economic Review 98, 1413–42.

Kishan, R.P., Opiela, T.P., 2000. Bank size, bank capital, and the bank lending channel. Journal of Money, credit and banking , 121–141.

Levine, R., Lin, C., Xie, W., 2021. Geographic diversification and banks' funding costs. Management Science 67, 2657–2678.

Lin, L., 2020. Bank deposits and the stock market. The Review of Financial Studies 33, 2622–2658.

Loutskina, E., Strahan, P.E., 2009. Securitization and the declining impact of bank finance on loan supply: Evidence from mortgage originations. The Journal of Finance 64, 861–889.

Loutskina, E., Strahan, P.E., 2011. Informed and uninformed investment in housing: The downside of diversification. The Review of Financial Studies 24, 1447–1480.

Luck, S., Zimmermann, T., 2020. Employment effects of unconventional monetary policy: Evidence from qe. Journal of Financial Economics 135, 678–703.

Martinez-Miera, D., Repullo, R., 2020. Interest rates, market power, and financial stability. CEPR Discussion Paper No. DP15063 .

Mian, A., Sufi, A., 2009. The consequences of mortgage credit expansion: Evidence from the us mortgage default crisis. The Quarterly journal of economics 124, 1449–1496.

Paravisini, D., Rappoport, V., Schnabl, P., 2017. Specialization in bank lending: Evidence from exporting firms. The Journal of Finance .

Rehbein, O., Rother, S., 2022. Social connectedness (and distance) in bank lending. Unpublished working paper. .

Scharfstein, D., Sunderam, A., 2016. Market power in mortgage lending and the transmission of monetary policy. Unpublished working paper. Harvard University 2.

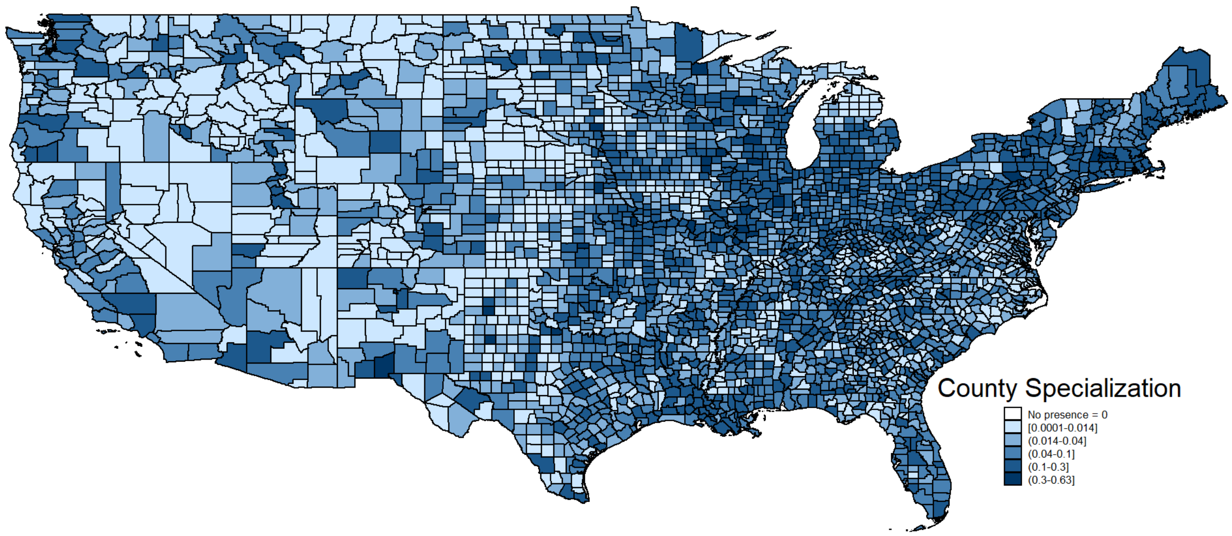
Traversa, M., Vuillemey, G., 2019. Entry in banking markets. Available at SSRN 3355572 .

Vives, X., Ye, Z., 2021. Information technology and bank competition. Available at SSRN 3863988 .

Xiao, K., 2020. Monetary transmission through shadow banks. The Review of Financial Studies 33, 2379–2420.

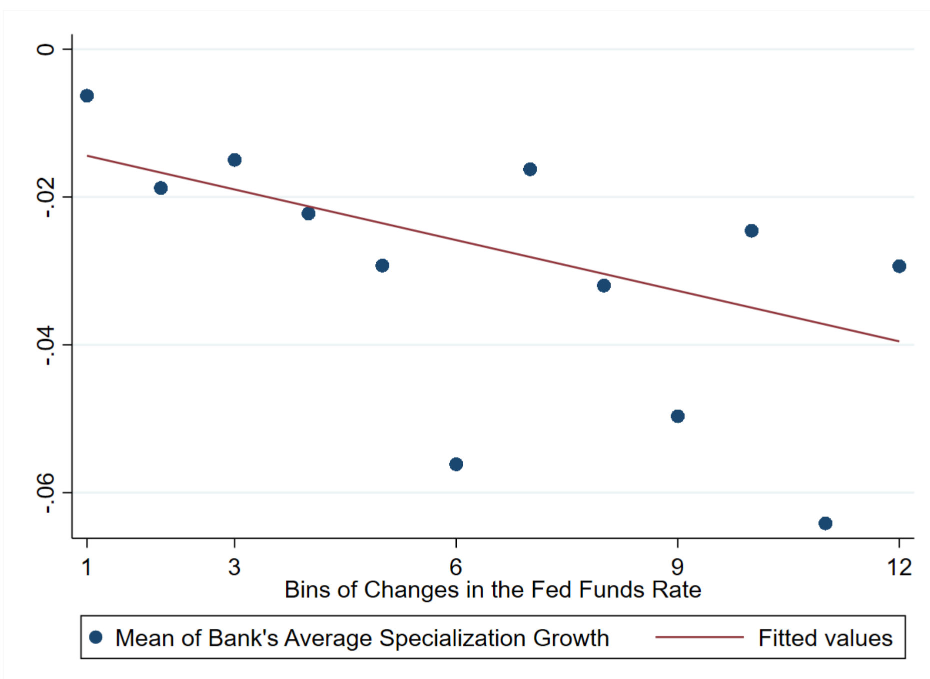
Xiao, Z., Zheng, Y., 2021. The industry expertise channel of mortgage lending. Available at SSRN 3792629 .

Figure 1: County Exposure to Specialization in Local Lending Markets



Notes. This map shows the average county-level exposure to banks' local mortgage market specialization for each U.S. county during the sample period from 1994 to 2019. The underlying data is from the FFIEC.

Figure 2: Banks' Average Specialization and Monetary Policy



Notes. This figure shows the relationship between the mean of bank's average specialization growth and changes in the Fed funds rate. The figure is constructed in two steps. The first is to sort all years into 12 bins according to their change in the Fed funds rate. The second is to compute the mean of bank's average specialization growth for each bin. The underlying data are from HMDA and the FRED covering 1994 to 2019.

Table 1: Summary Statistics

	N	mean	sd
Panel A: Bank-county-level mortgage lending (HMDA and FDIC)			
New mortgage lending (mill. $)	1,600,174	17.298	126.663
New mortgage lending growth	1,600,174	-0.115	0.710
Number of new mortgages	1,600,174	89.169	405.981
ΔFF	1,600,174	-0.154	1.534
Spec	1,600,174	0.079	0.192
MktSh	1,600,174	0.035	0.070
Bank-HHI-Dep	1,025,741	0.226	0.083
C-HHI-Dep	1,599,973	0.239	0.131
Dist (miles)	1,391,438	524.286	631.917
Dist (log)	1,391,438	5.144	1.980
Panel B: County-level (HMDA, FHFA and BLS)			
New mortgage lending (mill. $)	79,619	376.276	2,080.451
New mortgage lending growth	79,619	0.080	0.449
Total employment (thousand)	79,531	44.635	143.978
Employment growth	79,524	0.004	0.042
HPI	65,071	241.844	155.881
HPI growth	64,261	0.027	0.052
Total wages (bill. $)	79,580	1.766	8.264
Wage growth	79,571	0.035	0.060
ΔFF	79,619	-0.156	1.439
CSpec	78,558	0.068	0.096
CMktSh	79,619	0.169	0.162
C-HHI-Expo	79,516	0.239	0.052
C-HHI-Dep	79,323	0.354	0.211
Population (thousand)	76,296	97.101	311.732
Population (log)	76,296	10.271	1.435
Income per capita (thousand $)	76,296	31.822	11.894
Income per capita (log)	76,296	10.271	1.435
Securitized mortgages (%)	79,619	51.089	55.688
Banks (number)	78,558	36.954	39.596
CDist	78,069	4.825	1.249
Panel C: Bank-level (HMDA and FDIC)			
BSpec	151,713	0.485	0.270
BSpec growth	151,713	-0.028	0.307
ΔFF	151,713	-0.168	1.440
Mkts (number)	151,713	27.537	137.298
Size (bill. $)	106,401	0.758	2.013
Size (log)	106,401	12.404	1.279
Deposit ratio (%)	106,400	82.6	8.7
Liquidity ratio (%)	106,400	5.9	5.3
Leverage ratio (%)	106,400	89.7	3.5
BDist	106,410	1.893	1.410
BDist growth	102,995	0.050	0.628

Notes. This table provides summary statistics at the bank-county, county, and bank levels. Panel A presents mortgage lending data at the bank-county level. The underlying data are from the FFIEC, FDIC, and FRED for the years 1994 to 2019. Panel B presents data on mortgage lending, house prices, employment, and wages at the county level. The underlying data are from the FFIEC, FDIC, FHFA, FRED, and BLS for the years 1994 to 2019. Panel C presents data on mortgage bank specialization at the bank level. The underlying data are from the FFIEC, FDIC, and FRED for the years 1994 to 2019.

Table 2: Lending, Local Specialization, and Monetary Policy

	New mortgage lending growth			
	(1)	(2)	(3)	(4)
ΔFF Spec	-0.0283***	-0.0323***	-0.0692***	-0.0749***
	(0.00293)	(0.00253)	(0.0136)	(0.0148)
Spec	-0.0465***	-0.0545***	0.0412***	0.0363***
	(0.00632)	(0.00666)	(0.00932)	(0.00960)
Observations	1,557,766	1,562,955	1,594,588	1,599,605
R-squared	0.424	0.383	0.177	0.131
Bank-Year FE	Y	Y	N	N
County-Year FE	Y	N	Y	N
Bank FE	N	N	Y	Y
County FE	N	N	N	Y
Year FE	N	N	N	Y
Fipszero FE	N	Y	N	Y
Cluster s.e.	Bank&County	Bank&County	Bank&County	Bank&County

Notes. This table estimates the effect of banks' local specialization on the transmission of monetary policy to new mortgage lending growth. The data are at the bank-county-year level from 1994 to 2019. New mortgage lending growth is the growth of new mortgage lending originated by a given bank in a given county and year. Spec is the bank's local specialization in a given county and year, lagged one period. ΔFF is the difference in the Fed funds target rate. Fipszero is the interaction between a county identifier and a dummy variable that takes the value of one from 2009 to 2014, and zero otherwise. The data are from the FFIEC and the FRED. Fixed effects are denoted at the bottom of the table. Standard errors are clustered by bank and county. *** indicates significance at the 0.01 level.

Table 3: Lending, Specialization, and Monetary Policy: Market Structure Controls

	New mortgage lending growth		
	(1)	(2)	(3)
ΔFF Spec	-0.0190***	-0.0638***	-0.0708***
	(0.00415)	(0.0184)	(0.0195)
Spec	0.00419	0.0704***	0.0473***
	(0.00834)	(0.0108)	(0.0114)
ΔFF MktSh	-0.0937***	-0.272***	-0.216***
	(0.0312)	(0.0389)	(0.0432)
MktSh	-0.466***	-0.698***	-0.587***
	(0.0602)	(0.0724)	(0.0617)
ΔFF Bank-HHI-Dep		-0.0328	-0.0239
		(0.0814)	(0.0796)
Bank-HHI-Dep		-0.0328	-0.0239
		(0.0814)	(0.0796)
ΔFF C-HHI-Dep			0.0272*
			(0.0118)
C-HHI-Dep			0.0272**
			(0.0118)
Observations	1,557,766	1,019,762	1,025,192
R-squared	0.424	0.196	0.134
Bank-Year FE	Y	N	N
County-Year FE	Y	Y	N
Bank FE	N	Y	Y
County FE	N	N	Y
Year FE	N	N	Y
Fipszero FE	N	N	Y
Cluster s.e.	Bank&County	Bank&County	Bank&County

Notes. This table estimates the effect of banks' local specialization on the transmission of monetary policy to new mortgage lending growth controlling for the effect of other relevant bank's local market characteristics. The data are at the bank-county-year level from 1994 to 2019. MktSh is the bank's local market share in a given county and year, lagged one period. C-HHI-Dep is the county level HHI of the deposit market. Bank-HHI-Dep is the bank level average of C-HHI-Dep using lagged deposit shares across branches as weights. All other variables are explained in Table 2. The data are from the FFIEC, the FDIC, and the FRED. Fixed effects are denoted at the bottom of the table. Standard errors are clustered by bank and county. *, **, *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

Table 4: Lending, Specialization, and Monetary Policy: Robustness

	New mortgage lending growth			
	Spec t-2	Spec Avg	Spec Avg 5y	Spec Prev. Sample
	(1)	(2)	(3)	(4)
Panel A: Alternative measures of specialization				
ΔFF×Spec	-0.0186***	-0.0193***	-0.0198***	-0.0130***
	(0.00335)	(0.00391)	(0.00372)	(0.00372)
Spec	0.139***	0.180***	0.114***	0.137***
	(0.00753)	(0.0125)	(0.00684)	(0.00818)
ΔFF×MktSh	-0.125***	-0.172***	-0.138***	-0.0776***
	(0.0232)	(0.0274)	(0.0275)	(0.0258)
MktSh	0.253***	0.979***	0.0749*	0.437***
	(0.0481)	(0.0966)	(0.0454)	(0.0622)
Observations	1,395,035	1,557,766	1,557,766	793,781
R-squared	0.432	0.428	0.424	0.411
Bank-Year FE	Y	Y	Y	Y
County-Year FE	Y	Y	Y	Y
Cluster s.e.	Bank&County	Bank&County	Bank&County	Bank&County
	New mortgage lending growth			
	FF avg	JK Shocks	Shadow Rate	Exit & Entry
	(1)	(2)	(3)	(4)
Panel B: Alternative monetary policy measures and including exits & entries				
MP×Spec	-0.0236***	-0.114***	-0.0155**	-0.0249***
	(0.00428)	(0.0315)	(0.00362)	(0.00415)
Spec	0.00502	9.37e-05	0.00320	-0.580***
	(0.00835)	(0.00846)	(0.00839)	(0.0164)
MP×MktSh	-0.106***	-0.699***	-0.0717**	-0.109***
	(0.0285)	(0.205)	(0.0255)	(0.0417)
MktSh	-0.470***	-0.497***	-0.467***	-3.341***
	(0.0600)	(0.0620)	(0.0605)	(0.168)
Observations	1,557,766	1,557,766	1,557,766	5,965,916
R-squared	0.424	0.424	0.424	0.273
Bank-Year FE	Y	Y	Y	Y
County-Year FE	Y	Y	Y	Y
Cluster s.e.	Bank&County	Bank&County	Bank&County	Bank&County
	New mortgage lending growth			
	Logdifference	New # Loans	Avg Amount	Approval Ratio
	(1)	(2)	(3)	(4)
Panel C: Alternative dependent variables				
ΔFF×Spec	-0.0120**	-0.0187***	0.00131	-0.235**
	(0.00535)	(0.00353)	(0.00233)	(0.113)
Spec	0.0339***	0.0970***	-0.0778***	-0.109
	(0.0100)	(0.00787)	(0.00456)	(0.111)
ΔFF×MktSh	-0.0744*	-0.101***	0.0213	3.048***
	(0.0406)	(0.0271)	(0.0170)	(1.043)
MktSh	-0.474***	-0.0892	-0.362***	-4.066***
	(0.0739)	(0.0610)	(0.0234)	(0.798)
Observations	1,557,766	1,557,766	1,557,766	1,557,766
R-squared	0.419	0.462	0.247	0.234
Bank-Year FE	Y	Y	Y	Y
County-Year FE	Y	Y	Y	Y
Cluster s.e.	Bank&County	Bank&County	Bank&County	Bank&County
	New mortgage lending growth			
	Boom	Non-Boom	Without Crisis	1994-2013
	(1)	(2)	(3)	(4)
Panel D: Alternative sample periods				
ΔFF×Spec	-0.0413***	-0.0190***	-0.0199***	-0.0201***
	(0.0120)	(0.00492)	(0.00535)	(0.00430)
Spec	0.0350*	0.00158	-0.00173	0.00971
	(0.0188)	(0.00803)	(0.00820)	(0.00865)
ΔFF×MktSh	-0.204**	-0.0687*	-0.136***	-0.0984***
	(0.0824)	(0.0358)	(0.0400)	(0.0329)
MktSh	-0.479***	-0.435***	-0.451***	-0.496***
	(0.143)	(0.0547)	(0.0563)	(0.0684)
Observations	349,281	1,208,485	1,339,333	1,234,411
R-squared	0.398	0.431	0.413	0.442
Bank-Year FE	Y	Y	Y	Y
County-Year FE	Y	Y	Y	Y
Cluster s.e.	Bank&County	Bank&County	Bank&County	Bank&County

Notes. This table estimates the effect of banks' local specialization on the transmission of monetary policy to new mortgage lending growth using different specifications for robustness. The data are at the bank-county-year level from 1994 to 2019. If nothing is explicitly stated, new mortgage lending growth is the growth of new mortgage lending originated by a given bank in a given county and year. Panel A examines other measures of specialization. Columns (1)-(3) report the results for *Spec* lagged two periods, average for the whole sample period from 1994 to 2019, and average from t-1 to t-5, respectively. Column (4) uses the specialization average from 1994 to 2004 and 2005 to 2019 as the sample for the analysis. Panel B examines whether the result holds for alternative monetary policy measures and including exits and entries in local markets. Columns (1)-(3) report the results for the difference in the Fed funds using the average aggregation method, monetary policy shocks following Jarociński and Karadi (2020), and the difference in shadow rates, respectively. Column 4 includes entries and exits in local markets. Panel C examines alternative dependent variables. Columns (1)-(4) use the log difference of new lending, the growth of the number of new mortgages, the growth of the average amount of new lending, and the difference in the approval ratio, respectively. Panel D examines alternative sample periods. Columns (1)-(4) focus on the U.S. housing boom period from 2003 to 2006, excluding on the U.S. housing boom period (2003 to 2006), excluding the three years related to the Great Recession (2007-2009), and focus on the years from 1994 to 2013, respectively. All other variables are explained in Tables 2 and 3. The data are from the FFIEC and the FRED. Fixed effects are denoted at the bottom of the table. Standard errors are clustered by bank and county. *, **, *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

Table 5: Specialization Channel and Aggregate County Implications

	New mortgage lending growth		HPI growth		Wage growth		Employment growth	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔFF CSpec	-0.129***	-0.144***	-0.00902***	-0.0150***	-0.00266	-0.00905***	-0.000105	-0.00173*
	(0.00941)	(0.0104)	(0.00127)	(0.00159)	(0.00163)	(0.00175)	(0.000868)	(0.000938)
CSpec	-1.160***	-1.193***	-0.00478*	-0.00555*	0.00946***	0.00334	0.00238	0.000251
	(0.0299)	(0.0297)	(0.00288)	(0.00305)	(0.00307)	(0.00319)	(0.00199)	(0.00210)
ΔFF CMktSh		-0.0183		0.000428		-0.00248		-0.00477***
		(0.0182)		(0.00247)		(0.00281)		(0.00141)
CMktSh		0.357***		0.0173***		0.000239		-0.00150
		(0.0266)		(0.00279)		(0.00269)		(0.00177)
Observations	78,545	75,029	64,111	62,828	78,500	75,011	78,457	75,008
R-squared	0.475	0.500	0.401	0.411	0.222	0.232	0.214	0.218
County FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Fipszero FE	Y	Y	Y	Y	Y	Y	Y	Y
County Controls	N	Y	N	Y	N	Y	N	Y
Cluster s.e.	County	County	County	County	County	County	County	County

Notes. This table estimates the effect of county exposure to local specialized banks for the transmission of monetary policy to aggregate new mortgage lending, house price, wage, and employment growth. The data are at the county-year level covering the years from 1994 to 2019. New mortgage lending growth is the growth of new mortgage lending in a given county and year. HPI growth is the growth of the house price index in a given county and year. Employment and wage growth are the growth in total employment and wages in a given county and year, respectively. *CSpec* is the county-level average of *Spec* using mortgage lending shares across banks as weights, lagged one period. *CMktSh* is the county-level local mortgage market concentration calculated as a standard HHI, lagged one period. County (not reported) controls are the lagged log of the population, the lagged log of income per capita, the lagged proportion of securitized mortgages, C-HHI-Dep, C-HHI-Expo, and the interactions between these variables and the difference in the Fed funds rate. All other variables are defined in Table 2. The data are from the FFIEC, the FRED, the FHFA, and the BLS. Fixed effects are denoted at the bottom of the table. Standard errors are clustered by county. *, *** indicate significance at the 0.1, and 0.01 levels, respectively.

Table 6: Aggregate Bank Specialization and Monetary Policy

	Bank's average specialization growth	
	(1)	(2)
ΔFF	-0.00412***	-0.00474***
	(0.000561)	(0.000689)
Observations	150,863	105,717
R-squared	0.040	0.048
Bank FE	Y	Y
Bank Controls	N	Y
Cluster s.e.	Bank	Bank

Notes. This table estimates the effect of monetary policy changes on bank's average specialization growth. The data are at the bank-year level covering the years from 1994 to 2019. Bank's average specialization growth is the growth of bank's average specialization for a given bank and year. Bank (not reported) controls are the lagged deposit ratio, lagged liquidity ratio, lagged leverage ratio, and lagged log of total assets. All other variables are defined in Table 2. The data are from the FFIEC, the FDIC, and the FRED. Fixed effects are denoted at the bottom of the table. Standard errors are clustered by bank. *** indicates significance at the 0.01 level.

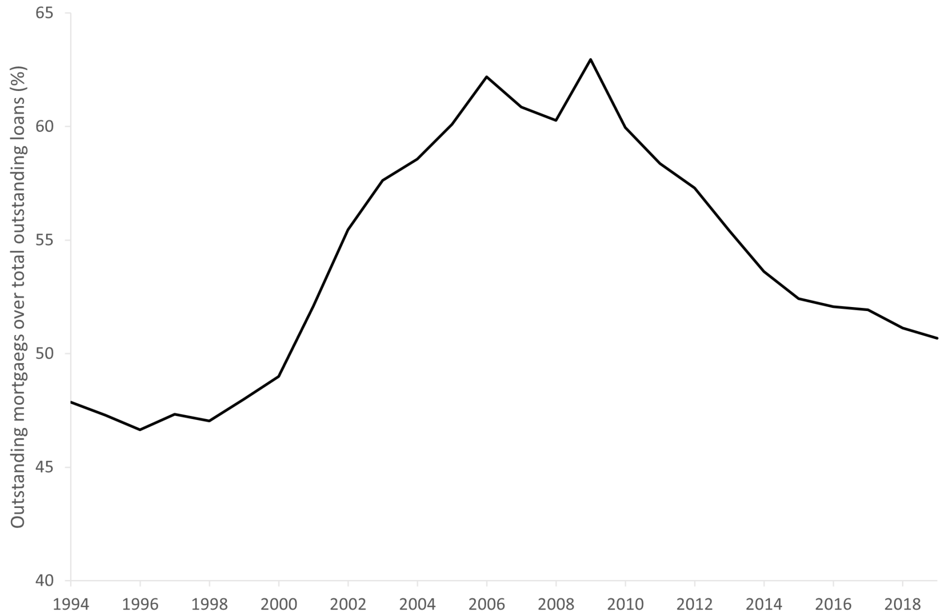
Table 7: Lending, County and Bank Implications, Distance, and Monetary Policy

	Bank-county level		County level								Bank level	
	Lending growth		Lending growth		HPI growth		Wage growth		Employment growth		BDist growth	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
FF Dist	0.00599***	0.00500***										
	(0.00118)	(0.00113)										
Dist	-0.0467***	-0.0411***										
	(0.00249)	(0.00175)										
FF MktSh		-0.0746***										
		(0.0288)										
MktSh		-0.742***										
		(0.0516)										
FF CDist			0.0120***	0.0160***	0.00251***	0.00247***	0.000236*	0.000350**	-0.000393***	-0.000223**		
			(0.000772)	(0.000944)	(0.000168)	(0.000181)	(0.000143)	(0.000159)	(8.33e-05)	(9.36e-05)		
CDist			0.0709***	0.0793***	0.00123***	0.00107***	-0.000194	0.000555	0.000412*	0.000689***		
			(0.00226)	(0.00245)	(0.000278)	(0.000298)	(0.000337)	(0.000351)	(0.000221)	(0.000229)		
FF CMktSh				-0.0226		0.00153		-0.00594***		-0.00491***		
				(0.0190)		(0.00252)		(0.00211)		(0.00144)		
CMktSh				0.363***		0.0166***		-0.00278		-0.00217		
				(0.0277)		(0.00286)		(0.00258)		(0.00183)		
FF											0.00479***	0.00532***
											(0.00129)	(0.00130)
Observations	1,362,255	1,362,255	78,055	74,599	63,965	62,682	78,035	74,582	77,991	74,578	102,284	102,283
R-squared	0.420	0.422	0.464	0.487	0.406	0.414	0.225	0.235	0.214	0.218	0.044	0.047
Bank-Year FE	Y	Y	N	N	N	N	N	N	N	N	N	N
County-Year FE	Y	Y	N	N	N	N	N	N	N	N	N	N
County FE	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N
Year FE	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N
Fipszero FE	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N
Bank FE	N	N	N	N	N	N	N	N	N	N	Y	Y
Additional Controls	N	N	N	Y	N	Y	N	Y	N	Y	N	Y
Cluster s.e.	Bank&County	Bank&County	County	County	County	County	County	County	County	County	Bank	Bank

Notes. This table estimates the relevance of distance from local markets to the bank's headquarters as a possible mechanism for the results at the bank-county level in columns (1)-(2), county level in columns (3)-(10), and bank level in columns (11)-(12). The data are at the bank-county, county, or bank level covering the years from 1994 to 2019. BDist growth is the growth of bank's average lending distance to their bank's headquarters for a given bank and year. Dist is the natural logarithm of one plus the distance in miles from the headquarters of the bank to a given county and year, lagged one period. CDist is the average of Dist, using the lagged amount of new mortgage lending as weights. Additional (not reported) controls are the lagged log of the population, the lagged log of income per capita, the lagged proportion of securitized mortgages, C-HHI-Dep, C-HHI-Expo, and the interactions between these variables and the difference in the Fed funds rate at the county level, or the lagged deposit ratio, lagged liquidity ratio, lagged leverage ratio, and lagged log of total assets at the bank level. All other variables are defined in Tables 2, 5, and 6. The data are from the FFIEC, the FDIC, the FHFA, the BLS, and the FRED. Fixed effects are denoted at the bottom of the table. Standard errors are clustered by bank and county in columns (1)-(2), by county in columns (3)-(10), and by bank in columns (11)-(12). *, **, *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

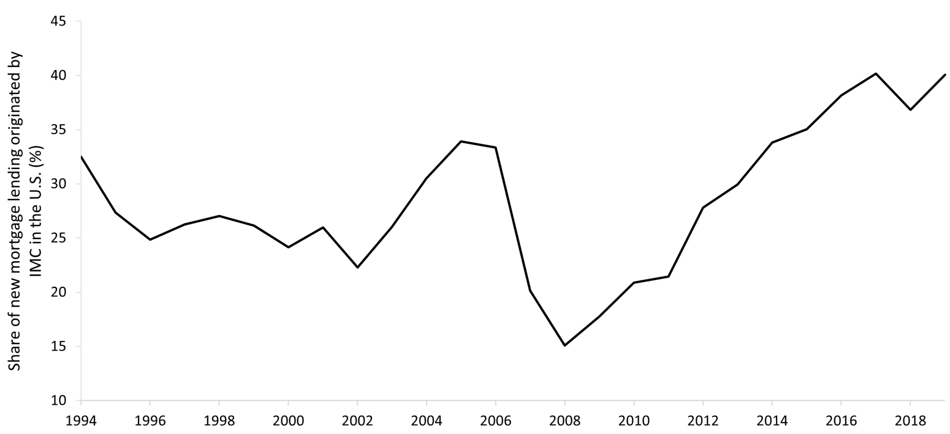
A Appendix

Figure A1: Mortgage Market Relevance



Notes. This figure shows the relevance of outstanding mortgage lending over total outstanding loans of U.S. banks. The figure is constructed using data from the last quarter of each year. The underlying data are from the FDIC (U.S. Call Reports) covering 1994 to 2019.

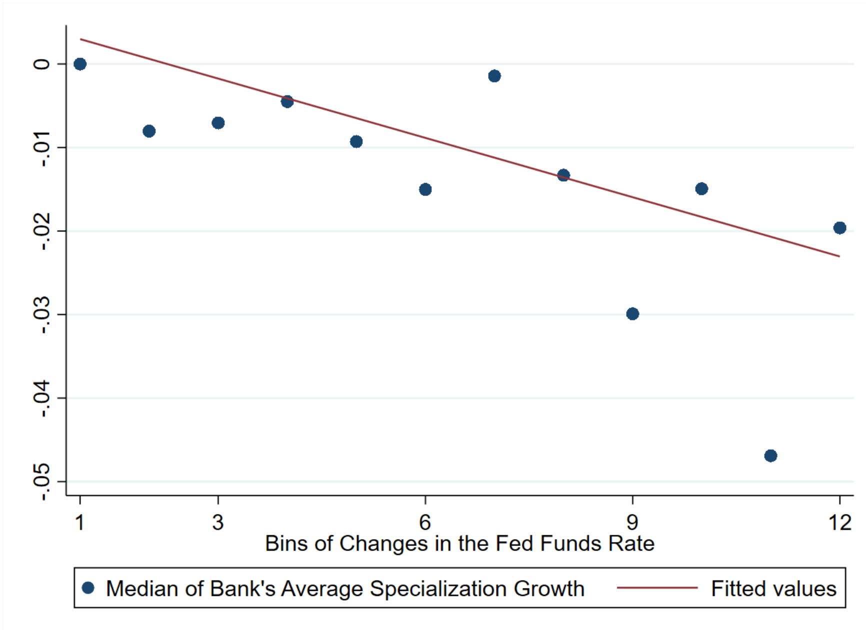
Figure A2: Non-Depository Institutions Relevance



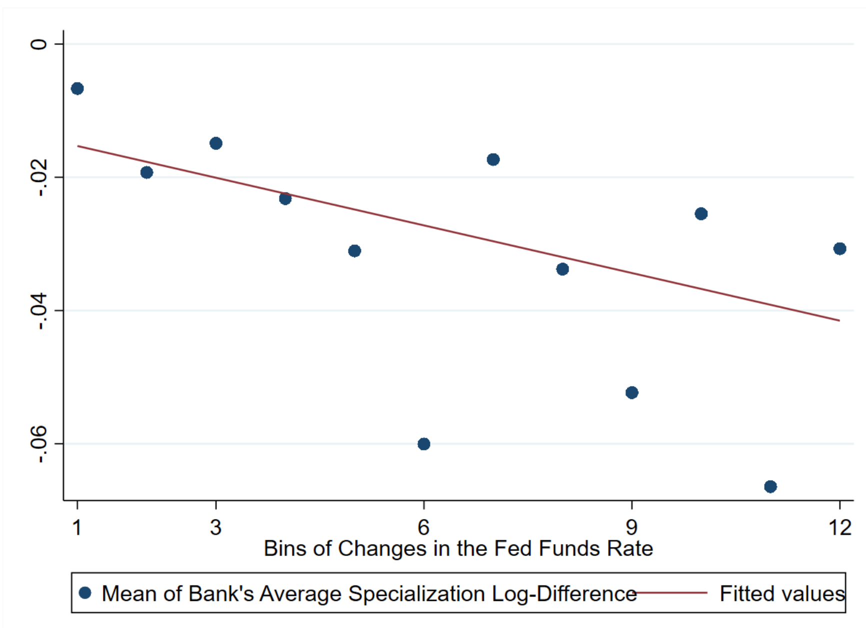
Notes. This figure shows the relevance of non-depository institutions (IMC) in the U.S. mortgage market. The underlying data are from the FFIEC covering 1994 to 2019.

Figure A3: Bank Implication Robustness

Panel A: Median of Average Specialization and Monetary Policy



Panel B: Log-Difference of Average Specialization and Monetary Policy



Notes. This figure shows the relationship between the median of the growth of bank's average specialization or the average of the log-difference of bank's average specialization and changes in the Fed funds rate. The figure is constructed in two steps. The first is to sort all years into 12 bins according to their change in the Fed funds rate. The second is to compute the median or average of the growth or log-difference of bank's average specialization for each bin. Panel A shows the results for the median of bank's average specialization growth. Panel B shows the results for the mean of bank's average specialization log-difference. The underlying data are from HMDA and the FRED covering 1994 to 2019.

Table A1: Serial Correlation Specialization Variable

	Spec t		
	(1)	(2)	(3)
Spec t-1	0.936***		
	(0.000174)		
Spec t-5		0.866***	
		(0.00356)	
Spec t-10			0.797***
			(0.00577)
Observations	2,903,057	1,254,409	586,308
R-squared	0.903	0.862	0.822
Year FE	Yes	Yes	Yes
Cluster s.e.	Bank&County	Bank&County	Bank&County

Notes. This table reports the serial correlation of the bank's local mortgage market specialization variable for different periods. The data are at the bank-county-year level from 1994 to 2019. *Spect*, *Spect* 1, *Spect* 5, and *Spect* 10 correspond to the specialization of bank b in a given county and year, in the contemporaneous period, lagged one period, lagged five periods and lagged ten periods, respectively. The data are from the FFIEC. Fixed effects are denoted at the bottom of the table. Standard errors are clustered by bank and county. *** indicates significance at the 0.01 level.

Table A2: Correlation Matrix: Market Structure Characteristics

Variables	Spec	MktSh	Bank-HHI-Dep	C-HHI-Dep
Spec	1.000			
MktSh	0.063	1.000		
Bank-HHI-Dep	-0.062	0.118	1.000	
C-HHI-Dep	-0.100	0.233	0.124	1.000

Notes. This table reports the correlation matrix between bank's local mortgage market specialization, banks' local mortgage market share, bank-level exposure to local deposit market concentration, and county-level local deposit market concentration. The data are at the bank-county-year level from 1994 to 2019. All variables are defined in Tables 2 and 3. The data are from the FFIEC and the FDIC.

Table A3: Lending, Specialization, and Monetary Policy: Additional Robustness

	New lending growth							
	Growth Control	Spec t-3	Physical Branch	Spec Outlier	Alt. Boom	Alt. Non-Boom	SBL	SBL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔFF Spec	-0.0173***	-0.0156***	-0.0235***	-0.00501**	-0.0416***	-0.0174***	-0.0233***	-0.0197*
	(0.00384)	(0.00348)	(0.00430)	(0.00219)	(0.0101)	(0.00482)	(0.00602)	(0.0101)
Spec	-0.0224***	0.125***	0.196***	-0.0217***	0.0263*	0.00272	-0.0455***	0.139***
	(0.00761)	(0.00761)	(0.00677)	(0.00393)	(0.0150)	(0.00840)	(0.0128)	(0.0211)
ΔFF MktSh	-0.112***	-0.142***	-0.0316	-0.0962***	-0.223***	-0.0749**		-0.00895
	(0.0314)	(0.0269)	(0.0242)	(0.0317)	(0.0822)	(0.0339)		(0.0200)
MktSh	-0.473***	0.266***	-0.967***	-0.429***	-0.429***	-0.454***		-0.543***
	(0.0554)	(0.0477)	(0.0565)	(0.0635)	(0.120)	(0.0578)		(0.0522)
ΔFF Growth	0.00184							
	(0.00185)							
Growth	-0.238***							
	(0.00555)							
Observations	1,395,035	1,223,720	1,557,766	1,557,766	339,808	1,217,958	867,699	867,699
R-squared	0.467	0.443	0.431	0.425	0.395	0.432	0.373	0.376
Bank-Year FE	Y	Y	Y	Y	Y	Y	Y	Y
County-Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Cluster s.e.	Bank&County	Bank&County	Bank&County	Bank&County	Bank&County	Bank&County	Bank&County	Bank&County

Notes. This table estimates the effect of banks' local specialization on the transmission of monetary policy to new mortgage lending growth using additional specifications for robustness. The data are at the bank-county-year level from 1994 to 2019. New lending growth is the new mortgage lending growth in columns (1)-(6) and the new small business lending growth in columns (7)-(8) by a given bank in a given county and year. Column (1) includes a control for the effect of lagged new mortgage lending growth. Columns (2)-(4) replace specialization lagged one period with specialization lagged three periods, an indicator variable for the markets where the bank has a physical branch with positive deposit quantities, or specialization in the spirit of Paravisini et al. (2017), respectively. Columns (5)-(6) focus on an alternative boom period from 2002 to 2005 and exclude such period, respectively. Columns (7)-(8) focus on new small business lending. All other variables are explained in Tables 2 and 3. The data are from the FFIEC, the FDIC, and the FRED. Fixed effects are denoted at the bottom of the table. Standard errors are clustered by bank and county. *, **, *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

Table A4: Lending, Specialization, and Monetary Policy: Alternative mortgage market samples, easing, and tightening

	New mortgage lending growth									
	Alternative mortgage market samples						Easing and tightening			
	Without Filter	To Hold	Jumbo	All Institutions	All Institutions	Income B.	FF<0	FF>0	JK Shocks<0	JK Shocks>0
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
FF Spec	-0.0398***	-0.0186***	-0.0362***	-0.0248***	-0.0217***	-0.0159***	-0.0102*	-0.00155	-0.118***	-0.162
	(0.00344)	(0.00637)	(0.0115)	(0.00378)	(0.00390)	(0.00466)	(0.00551)	(0.0141)	(0.0395)	(0.143)
Spec	-0.275***	-0.0264***	-0.124***	-0.0127	-0.00904	0.182***	0.0296**	-0.0241	-0.00175	0.00491
	(0.0121)	(0.00968)	(0.0260)	(0.00786)	(0.00834)	(0.00902)	(0.0122)	(0.0161)	(0.0105)	(0.0164)
FF MktSh	-0.103***	-0.0401	-0.00423	-0.104***	-0.101***	-0.119***	-0.263***	-0.209**	-0.611**	0.523
	(0.0291)	(0.0383)	(0.0466)	(0.0351)	(0.0373)	(0.0305)	(0.0671)	(0.0894)	(0.281)	(0.844)
MktSh	-1.789***	-0.556***	-1.940***	-0.615***	-0.489***	0.308***	-0.376***	-0.448***	-0.461***	-0.627***
	(0.0868)	(0.0485)	(0.139)	(0.0696)	(0.0775)	(0.0579)	(0.0765)	(0.0868)	(0.0664)	(0.112)
FF Spec Nonbank					-0.0290***					
					(0.00891)					
FF MktSh Nonbank					-0.0438					
					(0.115)					
Spec Nonbank					-0.0567***					
					(0.0219)					
MktSh Nonbank					-1.278***					
					(0.423)					
Observations	2,882,326	1,002,039	220,600	2,411,061	2,411,061	2,953,142	1,031,890	652,887	844,558	713,208
R-squared	0.258	0.457	0.467	0.413	0.413	0.441	0.444	0.367	0.450	0.390
Bank-Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
County-Year FE	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
County-Year-IB FE	N	N	N	N	N	Y	N	N	N	N
Cluster s.e.	Bank&County	Bank&County	Bank&County	Bank&County	Bank&County	Bank&County	Bank&County	Bank&County	Bank&County	Bank&County

Notes. This table estimates the effect of banks' local specialization on the transmission of monetary policy to new mortgage lending growth using alternative mortgage market samples and dividing the sample into easing and tightening periods. The data are at the bank-county-year level from 1994 to 2019. Columns (1)-(3) focus on all bank-county observations including markets where a given bank made less than 5 loans in the previous period, new mortgage lending originated to hold, and jumbo mortgages, respectively. Columns (4)-(5) focus on all institutions including depository and non-depository institutions. Columns (6)-(9) focus on subperiods under decreases of Fed funds rate, increases of Fed funds rate, decreases of monetary policy shocks, and increases of monetary policy shocks, respectively. All other variables are explained in Tables 2 and 3. The data are from the FFIEC and the FRED. Fixed effects are denoted at the bottom of the table. Standard errors are clustered by bank and county. *, **, *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

Table A5: Specialization Channel and Aggregate County Implications: Robustness

	New mortgage growth (1)	HPI growth (2)	Wage growth (3)	Employment growth (4)
Panel A: JK monetary policy shocks				
MP CSpec	-0.715***	-0.0192***	-0.0280***	-0.0229***
	(0.0617)	(0.00630)	(0.0107)	(0.00674)
CSpec	-1.229***	-0.00464	0.00301	-0.000911
	(0.0306)	(0.00312)	(0.00328)	(0.00219)
MP CMktSh	-0.0558	0.0133	-0.00995	-0.0182*
	(0.0617)	(0.00630)	(0.0107)	(0.00674)
CMktSh	0.358***	0.0153***	-0.00101	-0.00247
	(0.0270)	(0.00286)	(0.00283)	(0.00193)
Observations	75,029	62,828	75,011	75,008
R-squared	0.501	0.402	0.230	0.217
County FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Fipszero FE	Y	Y	Y	Y
Additional Controls	Y	Y	Y	Y
Cluster s.e.	County	County	County	County
	New mortgage growth (1)	HPI growth (2)	Wage growth (3)	Employment growth (4)
Panel B: Dependent variable logdi erence				
FF CSpec	-0.151***	-0.0151***	-0.00912***	-0.00173*
	(0.0114)	(0.00159)	(0.00176)	(0.000940)
CSpec	-1.571***	-0.00557*	0.00324	0.000250
	(0.0426)	(0.00305)	(0.00322)	(0.00210)
FF CMktSh	-0.0319	0.000461	-0.00236	-0.00476***
	(0.0253)	(0.00248)	(0.00286)	(0.00142)
CMktSh	0.585***	0.0173***	0.000424	-0.00147
	(0.0397)	(0.00280)	(0.00276)	(0.00178)
Observations	75,029	62,828	75,011	75,008
R-squared	0.463	0.410	0.227	0.217
County FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Fipszero FE	Y	Y	Y	Y
Additional Controls	Y	Y	Y	Y
Cluster s.e.	County	County	County	County
	New mortgage growth (1)	HPI growth (2)	Wage growth (3)	Employment growth (4)
Panel C: 1994 - 2013				
FF CSpec	-0.177***	-0.0159***	-0.00933***	-0.00114
	(0.0109)	(0.00166)	(0.00181)	(0.000987)
CSpec	-1.436***	-0.00384	-0.000374	-0.00262
	(0.0375)	(0.00411)	(0.00413)	(0.00269)
FF CMktSh	0.0228	0.00278	-0.00258	-0.00478***
	(0.0192)	(0.00257)	(0.00306)	(0.00158)
CMktSh	0.439***	0.0259***	0.00353	0.000377
	(0.0293)	(0.00318)	(0.00295)	(0.00212)
Observations	56,754	46,735	56,742	56,733
R-squared	0.545	0.499	0.279	0.238
County FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Fipszero FE	Y	Y	Y	Y
County Controls	Y	Y	Y	Y
Cluster s.e.	County	County	County	County

Notes. This table estimates the effect of county exposure to local specialized banks for the transmission of monetary policy to new mortgage lending, house price, wage, and employment growth using different specifications for robustness. The data are at the county-year level covering the years from 1994 to 2019 for panels A and B and from 1994 to 2013 for panel C. Panel A uses monetary policy shocks following Jarociński and Karadi (2020). Panel B uses as dependent variables the log difference of new mortgage lending, HPI, total wages, and total employment. Panel C focuses on the period from 1994 to 2013. County (not reported) controls are the lagged log of the population, the lagged log of income per capita, the lagged proportion of securitized mortgages, C-HHI-Dep, C-HHI-Expo, and the interactions between these variables and the difference in the Fed funds rate. All other variables are explained in Tables 2 and 5. The data are from the FFIEC, the FRED, the FHFA, and the BLS. Fixed effects are denoted at the bottom of the table. Standard errors are clustered by county. *, *** indicate significance at the 0.1, and 0.01 levels, respectively.

Table A6: Aggregate Bank Specialization and Monetary Policy: Robustness

	Bank's average specialization growth		
	JK Shocks	Logdifference	1994-2013
	(1)	(2)	(3)
ΔFF	-0.0446***	-0.00507***	-0.00483***
	(0.00530)	(0.000767)	(0.000703)
Observations	105,717	105,717	85,771
R-squared	0.048	0.051	0.059
Bank FE	Y	Y	Y
Bank Controls	Y	Y	Y
Cluster s.e.	Bank	Bank	Bank

Notes. This table estimates the effect of changes in the Fed funds rate on bank's average specialization growth using different specifications for robustness. The data are at the bank-year level covering the years from 1994 to 2019 for columns (1)-(2) and from 1994 to 2013 for column (3). Column (1) uses monetary policy shocks following Jarociński and Karadi (2020). Column (2) uses as dependent variables the log difference of bank's average specialization. Column (3) focuses on the period from 1994 to 2013. Bank (not reported) controls are the lagged deposit ratio, lagged liquidity ratio, lagged leverage ratio, and lagged log of total assets. All other variables are defined in Tables 2 and 6. The data are from the FFIEC and the FRED. Fixed effects are denoted at the bottom of the table. Standard errors are clustered by bank. *** indicates significance at the 0.01 level.

Table A7: Correlation Matrix: Distance

Variables	*Spec*	*Dist*
Spec	1.000	
Dist	-0.612	1.000

Notes. This table reports the correlation matrix between bank's local mortgage market specialization and distance to the bank's headquarters. The data are at the bank-county-year level from 1994 to 2019. All variables are defined in Tables 2 and 7. The data are from the FFIEC and the FDIC.

Table A8: Bank Specialization and Distance

	Spec	
	(1)	(2)
Dist	-0.0762***	-0.0436***
	(0.00354)	(0.00199)
MktSh		0.258***
		(0.0436)
Observations	1,362,255	1,362,255
R-squared	0.666	0.672
Bank-Year FE	Y	Y
County-Year FE	Y	Y
Cluster s.e.	Bank&County	Bank&County

Notes. This table estimates the relationship between local specialization and the distance from each local market to the bank's headquarters. The data are at the bank-county-year level from 1994 to 2019. All variables are explained in Tables 2, 3, and 7. The data are from the FFIEC and the FDIC. Fixed effects are denoted at the bottom of the table. Standard errors are clustered by bank and county. *** indicates significance at the 0.01 level.

Table A9: Lending, County and Bank Implications, Same Market Indicator, and Monetary Policy

	Bank-county level		County level								Bank level	
	Lending growth		Lending growth		HPI growth		Wage growth		Employment growth		BSameMkt growth	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
FF SameMkt	-0.0137***	-0.00813***										
	(0.00139)	(0.00203)										
SameMkt	0.0816***	0.117***										
	(0.00214)	(0.00405)										
FF MktSh		-0.100***										
		(0.0314)										
MktSh		-0.613***										
		(0.0551)										
FF CSameMkt			-0.0523***	-0.0523***	-0.00715***	-0.00803***	-0.00266***	-0.00492***	-0.000370	-0.000844		
			(0.00567)	(0.00638)	(0.000791)	(0.000900)	(0.00103)	(0.00108)	(0.000578)	(0.000608)		
CSameMkt			-0.387***	-0.402***	-0.00505***	-0.00547***	0.00305*	-0.000879	-0.000461	-0.00166		
			(0.0132)	(0.0134)	(0.00164)	(0.00171)	(0.00185)	(0.00193)	(0.00130)	(0.00135)		
FF CMktSh				-0.0192		0.00189		-0.00255		-0.00469***		
				(0.0184)		(0.00251)		(0.00281)		(0.00142)		
CMktSh				0.345***		0.0166***		-0.00180		-0.00227		
				(0.0281)		(0.00287)		(0.00265)		(0.00183)		
FF											-0.00496***	-0.00465***
											(0.00101)	(0.00102)
Observations	1,362,781	1,362,781	78,117	74,635	63,965	62,682	78,072	74,617	78,029	74,614	103,396	103,395
R-squared	0.418	0.420	0.459	0.480	0.401	0.411	0.225	0.235	0.214	0.217	0.050	0.051
Bank-Year FE	Y	Y	N	N	N	N	N	N	N	N	N	N
County-Year FE	Y	Y	N	N	N	N	N	N	N	N	N	N
County FE	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N
Year FE	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N
Fipszero FE	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N
Bank FE	N	N	N	N	N	N	N	N	N	N	Y	Y
Additional Controls	N	N	N	Y	N	Y	N	Y	N	Y	N	Y
Cluster s.e.	Bank&County	Bank&County	County	County	County	County	County	County	County	County	Bank	Bank

Notes. This table estimates the relevance of being in the same market where the bank is headquartered as a possible mechanism for the results at the bank-county level in columns (1)-(2), county level in columns (3)-(10), and bank level in columns (11)-(12). The data are at the bank-county, county, or bank level covering the years from 1994 to 2019. BSameMkt growth is the growth of bank's average same market indicator for a given bank and year. SameMkt is an indicator variable that takes the value of one if the headquarters of the bank are located in a given county and year, and zero otherwise. CSameMkt is the average of SameMkt, using the lagged amount of new mortgage lending as weights. Additional (not reported) controls are the lagged log of the population, the lagged log of income per capita, the lagged proportion of securitized mortgages, C-HHI-Dep, C-HHI-Expo, and the interactions between these variables and the difference in the Fed funds rate at the county level, or the lagged deposit ratio, lagged liquidity ratio, lagged leverage ratio, and lagged log of total assets at the bank level. All other variables are defined in Tables 2, 5, and 6. The data are from the FFIEC, the FDIC, the FHFA, the BLS, and the FRED. Fixed effects are denoted at the bottom of the table. Standard errors are clustered by bank and county in columns (1)-(2), by county in columns (3)-(10), and by bank in columns (11)-(12). *, *** indicate significance at the 0.1, and 0.01 levels, respectively.