Do Closing Minority Depository Institutions Affect Credit in Their Communities

Noara Razzak *

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Abstract

I investigate the role of Minority Depository Institutions (MDIs) in promoting credit accessibility in underserved, racially diverse urban communities. I construct a panel dataset and employ an event-study design, treating MDIs and non-MDIs branch closures within census tracts as interventions. The effects are largely minimal, with a few notable exceptions: 1) Asian MDI branch closures lower large mortgage originations within the Asian community, 2) Hispanic MDI branch closures lower small business loan (SBL) originations for small firms, 3) non-MDI branch closures lower mortgage originations in Black communities served by Black MDIs and 4) non-MDI branch closures lower small-sized mortgage originations. Surprisingly, non-MDI bank branch closures increase total SBL originations. Using lender-level Herfindahl–Hirschman index (HHI), I show branch closures do not lead to more concentrated lending markets, rather encourage entry of non-local and non-bank lenders. The results highlight the evolving role of physical bank branches in an increasingly digital banking landscape.

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*John E. Walker Department of Economics, Wilbur O. and Ann Powers College of Business, Clemson University, Clemson, South Carolina, 29634-1309, USA; email nrazzak@clemson.edu. I want to thank my advisor, Howard Bodenhorn, and members of the Dissertation Committee, the Public Workshop, the IO Workshop, Labor Workshop, participants at the Philadelphia Fed PhD Mentoring and Advising Program (PFMAP) workshop at the FRB Philadelphia, especially Thorsten Drautzburg, James Vickery, Mitchell Berlin and Andrew Hertzberg, attendees at the Community Banking Research Conference (CBRC) 2024 conference, Claire Labonne of FRB Boston, Jacob Walloga among others for their valuable feedback.

1 Introduction

Minority Depository Institutions (MDIs) are US banks owned and operated primarily by minorities and established to serve minority borrowers that historically had limited access to credit. [1] The Federal Deposit Insurance Corporation (FDIC) defines MDIs as banks serving primarily minority-populated areas, with at least 51% minority ownership or with a majority of the board of directors who are of minority origin. The Office of the Comptroller of the Currency (OCC) may designate any national bank or federal savings association as an MDI given the institution already serves the credit needs of communities consisting primarily of minority borrowers.[2]

In late nineteenth century, banks with minority ownership were set up to address financial exclusion, especially among Blacks, as urban communities of color faced severe obstacles in accessing credit. These institutions were affiliated to Black churches and Black fraternities. Since their inception, Black banks faced difficulty with sound loan underwriting because often they faced pressures to make risky loans based off their affiliations to their parent churches or communities Baradaran (2017), causing many of them to fail. In spite of the obstacles, new Black-owned banks continued to form while the nineteen-sixties saw the establishments of the first Asian-owned and the first Hispanic-owned banks.

Evidence on whether MDIs increase lending to minority borrowers is mixed. Dahl (1996) examines lending patterns of 34 commercial banks during alternate periods of minority and non-minority ownership in the nineteen eighties and nineties. He shows loan growth is slower when banks are owned by minorities than by non-minorities. In contrast, a FDIC (2014) report finds that MDIs originated a larger share of their mortgages to borrowers who live in Lower-Middle Income (LMI) census tracts and to minority borrowers than did

1. Government Accountability Office, GAO (2006) report
2. The OCC can consider a mutual institution as an MDI if women comprise a majority of the board of directors and hold a significant percentage of senior management positions.

non-MDI community banks [3] Despite the mixed evidence, recent research shows MDIs serve their customers more broadly through their in-depth knowledge of the communities they serve. Berger et al. (2022) find that borrowers and lenders sharing minority characteristics reduce informational asymmetries via tacit understandings and mutual trust leading to better lending practices in minority communities. Hurtado and Sakong (2023) show borrowers applying for mortgages in banks whose owners are of the same minority group are nine percentage points more likely to be approved than otherwise identical borrowers in non-minority banks and they are six times more likely to be approved in case of a minority loan officer. Similarly, Toussaint-Comeau et al. (2020), who study MDI failures during the Great Recession, show small businesses in primarily black census tracts faced significant frictions in obtaining credit as a result of the failures, leading to cumulative declines in aggregate small business lending in black neighborhoods that lasted up to 3 years.

I study how closure of bank branches influences credit accessibility within census tracts served by MDIs. To conduct the analysis, I construct a panel dataset, from 2011 until 2021, combining data from the FDIC's Minority Depository Institutions Program, Summary of Deposits (SoDs), Home Mortgage Disclosure Act (HMDA), National Archives, Community Reinvestment Act (CRA) and the 5-year American Community Surveys (ACS). Using an event-study design, where branch closures are considered interventions, I examine whether the closure of MDI branches reduces access to credit in their local markets, measured by mortgage originations and SBL originations within the community sharing the same minority identity as the MDI owners. I compare the results by also estimating how mortgage originations and SBL originations vary due to non-MDI branch closures in the same local markets. This design lets me disentangle the impact of the closure of a generic bank (non-MDI) branch versus a mission-oriented bank (or MDI) branch.

The number of MDI branch offices fell more than non-MDI branch offices in the aftermath

3. Qualitative information from the GAO (2006) report shows MDIs often provide financial literary services and serve customers who prefer to do banking in person rather than through other less costly alternatives such as mobile phones or internet, resulting in higher operating costs.

of the Great Recession. In my sample of 1085 census tracts, from 2011 to 2021, the number of MDI branches fell by 30 percent, while the number of non-MDI branches fell by 9 percent. Office closures, branch closures due to mergers and failures of MDIs resulted in branch office losses between this time period. The effect of the Great Recession was more pronounced for MDIs for two reasons. First, many failed MDIs were located in zip codes with a higher fraction of subprime borrowers (Mian and Sufi, 2009; Justiniano et al., 2016) and therefore, experienced higher default rates. Second, MDIs have limited ability to raise capital making them more vulnerable to financial shocks. The combined assets of $330 billion of the 147 MDIs (in 2024) represents just 1% of U.S. bank assets (Toussaint-Comeau and Newberger, 2023). Moreover Eberley et al. (2019) suggests, due to their high operating costs, MDIs have high expenses relative to earnings (efficiency ratio),[4] and have higher overhead expenses relative to average assets compared to other financial institutions of similar asset sizes.

My analysis reveals five key findings regarding the differing effects of MDI and non-MDI branch closures on credit accessibility. Although the negative impacts on credit due to MDI and non-MDI branch closures are largely minimal for most racial communities, in instances where there is any significant impact, the effect is large. I find when Asian owned MDI branches close, large mortgage originations decrease only within the Asian community by 20-24 percent; when Hispanic owned MDI branches close, SBL originations to firms less than $1 million in assets fall within the immediate community by 13 percent; when non-MDI branches close mortgage originations to the Black community decrease by 35-40 percent in the tracts that are served by Black MDIs. Furthermore, when non-MDI branches close small-sized mortgage originations to all communities decrease by 6-7 percent. Contrary to common expectations, total SBL originations of less than $1 million in volume increase by 25-30 percent following the closure of non-MDI branches.

I further analyze the causes behind MDI and non-MDI branch closures and whether

4. Eberley et al. (2019) define efficiency ration as the ratio of noninterest expenses to net operating income. Efficiency ratio = noninterest expense / (net interest income + noninterest income), where a higher efficiency ratio indicates an institution that is less efficient at generating revenue per dollar of noninterest expense.

the closures lead to more concentrated lending markets. Most MDI and non-MDI branch closures are simple branch closures and not a result of mergers or failures among parent banks. Over 85 percent of MDI branch closures have parent banks less than $10 billion in assets. Conversely, 62 percent of non-MDI branch closures have parent banks more than $10 billion in assets. This finding implies branch closures impacted very small-sized MDIs and relatively large-sized non-MDIs. Using a lender-level Herfindahl–Hirschman index (HHI), I show branch closures do not lead to more concentrated lending markets, rather encourage entry of "non-local" or "non-bank" lenders, implying sustained demand for credit in these markets.

My paper relates broadly to research studying the causal effect of bank branch closures on credit accessibility within census tracts (Nguyen and Barth, 2020; Toussaint-Comeau et al., 2020). It draws upon recent literature on the proliferation of online banking followed by a reduction of bank branches. Calzada et al. (2022), Jiang et al. (2024) and Koont (2024) highlight how banks reduce branches in markets with staggered 3G roll-out or after introducing online applications for iOS and Android devices. Furthermore, Jiang et al. (2024) show banks with low branch reliance are more likely to close their branches due to internet penetration when compared to banks with higher branch reliance. I find entry of "non-local" or "non-bank" mortgage lenders in majority of census tracts that experience MDI branch closures which underscores the expansion of fintech firms and non-banks in the mortgage lending market post Great Recession, as substitutes of traditional banks (Buchak et al., 2018; Fishback et al., 2022; Corbae et al., 2023).

My findings also provide supporting evidence to recent research that study the interaction between bank presence and SBL originations. Salvo (2021), who studies 30 metropolitan statistical areas (MSAs)[5], show large "non-local" banks dominate the market for smaller loans. These large banks originate business credit cards that account for the majority of the

5. with over 2 million population

SBL originations, dominating the market for small business loans. [6] Both Gopal and Schnabl (2022) and Cornelli et al. (2024) show post Great Recession, fintech lenders increasingly replace traditional banks (especially community banks) in supplying small business loans. Furthermore, Minton et al. (2024) show a decrease in community bank branches, due to mergers among local community banks, positively affects community investment through SBL originations. Additionally, I provide a mechanism for this phenomenon by drawing on research on the effect of increasing deposit concentration (due to branch closures) on SBL originations (Drechsler et al., 2021; Li et al., 2023).

Moreover, my findings highlight the heterogeneous effects of branch closures on SBL originations and mortgage originations. I find Hispanic MDI branch closures lead to a decrease in SBL originations to very small firms, those with assets less than 1$ million, given over 80% of small businesses owned by Hispanics can be categorized as very small firms Federal Reserve Banks (2021). Similarly, I find closures of Asian MDI branches reduces large-sized mortgages among the Asian community by 30 percent, a result supported by Hurtado and Sakong (2023) who study the failure of an Asian MDI in New York city and show Asian borrowers in the most exposed census tracts experienced declines in mortgage approvals in the range of 20 to 40. These findings imply when Asian or Hispanic MDI branches close, language barriers may impact credit accessibility within their most immediate communities.

My paper advances the broad-ranging literature on the impact of community banks within their immediate communities and the role internet banking, fintechs and non-banks play to fill the credit gap left by decreasing bank branches. This paper is the first to compare the closures of MDI and non-MDI branches within their local markets and makes three contributions. This is the first paper to look at the impact of the closure of MDI branches on mortgage originations within the communities sharing the same minority identity as the MDI owners. Since I can obtain mortgage originations information by racial composition

6. Banks, both large and small, have a minimum loan size below which credit evaluation is completely automated. For small local banks the threshold is $10,000, whereas for large banks the threshold is much higher at $60,000 leading these banks to make a larger quantity of small-sized loans.

and by census tracts, I can study the effect of branch closure of an MDI, that was, as an example, designated as a Black depository institution, on mortgage originations to the Black community within that census tract. Second, I study the effect of branch closure of an MDI on SBL originations in the immediate community. Third, I evaluate what happens to credit accessibility in these racially diverse communities when a non-MDI bank branch closes in the local market.

2 Financial Inclusion of Minority Communities

Two federal institutions established in earlier twentieth century exacerbated credit access among minority communities. The Home Owner's Loan Corporation (HOLC) established in 1933 and the Federal Housing Administration (FHA) established in 1934, were designed by the federal government to facilitate refinancing and insuring nonfarm residential mortgages. In the late 1930s, HOLC created color-coded maps that evaluated neighborhoods in more than 200 cities and exacerbated restricted mortgage activity in predominantly minority neighborhoods. By color coding urban neighborhoods and "redlining" the most vulnerable urban areas, the HOLC maps highlighted economically struggling areas(Jackson, 1985). [7] Because HOLC maps served as a dominant source of information for private lenders, the HOLC and the FHA restricted the geographic scope of their mortgage activity as mortgages in areas shaded red were not insured. These areas also happened to be low income urban neighborhoods where a majority of Black Americans resided (Rothstein, 2018; Fishback et al., 2022).

Aaronson et al. (2021) find that the HOLC maps led to decreased home ownership rates, house values and rents and exacerbated racial segregation in the US in the following decades. "Redlining" also adversely impacted SBL originations within primarily minority populated urban areas (Bates et al., 2022) and its ramifications persists to the present day. Immergluck

7. Urban neighborhoods coded green (designated as A) were considered "new, homogeneous, and in demand as residential locations in good times and bad times.", while areas coded blue (designated as B) were termed "reached their peak", but were "still desirable". Finally, areas coded yellow (designated as C) were termed as "definitely declining" and those coded red (designated as D), the lowest rating, were considered as areas "in which the things taking place in C areas have already happened"

(2002) studies the Philadelphia metropolitan area and shows that census tracts that are predominantly black received fewer loans after controlling for firm density, firm size, industrial mix, neighborhood income, and the credit quality of local firms. Similarly, Bates and Robb (2015) find that firms are penalized if their owners are Black, Hispanic or Asian American and experience "unmet credit needs".

Minority-owned banks represent a very small percentage of depository institutions in the US. Although minority share of the population stands at 38 percent and minorities operate 19 percent of all businesses in the US, the proportion of MDIs is modest and stands at 2.8 percent (Barth and Xu, 2020). In spite of their small numbers, MDI institutions, especially Black MDIs are more likely to locate near historically "redlined" neighborhoods compared to non-MDIs (Razzak, 2025). Since MDIs are mission oriented, it is crucial to understand how their closures affect the immediate and long-term credit outcomes of the communities that share the same minority identity as the MDI owners. Table 1 provides the number of all MDI institutions and their corresponding branches in existence in the year 2021.

3 Conceptual Framework

Two concepts inform my approach to understanding the effect of MDI closures: the supply of bank branches and the role of relationship banking in providing access to credit. Between 2011 and 2021, the number of MDI institutions decreased from 180 to 138. In the studied tracts, the number of MDI branches decreased from 1411 to 934. This decreases in the number of bank branches likely affected the time to travel to a branch and relationship banking with minority borrowers in the local markets.

3.1 Supply of bank branches

Bank branch closings decrease the number of available branches, leaving fewer bank branches to serve a customer base, assuming the remaining branches do not expand credit to offset the decline in the number of suppliers. The median census tract that lost an MDI branch had two bank branches rather than three, the median census tract that still had an

operating MDI branch. One way the disappearance of a bank branch may affect access to credit is by increasing the physical distance between a potential borrower and a bank branch. Herpfer et al. (2022) study the impact of distance to bank branches on lending and show that lower travel time increases the likelihood of initiating a new banking relationship and lowers transaction costs. Nguyen (2019) show that bank branch closings causes a persistent decline in local small business lending. If MDIs play a prominent role in providing credit within their immediate communities, the closure of an MDI branch, even in the presence of other bank branches, may increase the cost of obtaining credit in unforeseen ways; for example, households or small business owners may need to invest more time looking for credit.

3.2 Relationship banking

Relationship banking's role in supplying credit have been widely studied. Peterson and Rajan (1994) show that maintaining long term relationships to creditors increases the availability of financing for small business and to a lesser extent reduces the price of credit. Cole (1998) finds that a potential lender is more likely to extend credit to a firm if they share a pre-existing relationship, however the length of this relationship is not important. Bodenhorn (2003), analyzing historical data from nineteenth century, shows that firms that maintained long term relationship with lending banks could access credit at lower costs, required fewer personal guarantees and had a greater possibility of their loan terms being renegotiated during a financial crisis and subsequent recession. Avery and Samolyk (2004) and Minton et al. (2024) study bank consolidation in recent decades and find that consolidation activity involving big banks is related to lower loan growth, whereas community bank consolidations and a greater concentration of community banks lead to higher loan growth. Nguyen and Barth (2020) also support the previous finding and show that community banks still provide 30 percent more small business funding than non-community banks, especially after the Great Recession.

Small businesses primarily owned and operated by minorities may also be more reliant on relationship banking. Henderson et al. (2015) study credit score discrimination among

small business owners and examine the degree to which availability of business credit lines is influenced by racial and gender-related factors, beyond would-be borrowers' credit scores. They find that Whites are more favorably treated when it comes to access to credit lines than are Blacks, Hispanics, and Asians with the same firm characteristics, owner characteristics, and credit scores. Finally, Barth and Xu (2020) show the population in areas with any black-owned banks is over three times more likely to be black than in the nation on average and the figure rises to more than five times the national average in areas where those banks hold more than 20 percent of deposits, revealing that black-owned banks indeed serve Black communities.

If the fall in the number of branches impact available credit supply to the immediate communities evenly, we can expect the quantity of credit to decrease across all communities. On the other hand, if the influence of relationship banking dominates and MDIs do end up integrating within their communities and play a prominent role in the supply of credit within their racial communities, then the loss of an MDI branch in a census tract would result in a decrease of mortgage originations and business loan originations among some racial communities more than others. A third potential outcome could be that the closure of these bank branches do not significantly impact credit outcomes within any of the racial communities in their local markets because mortgage originations and business loan originations are not impacted by branch presence any longer and one can obtain a mortgage or a business loan without having to physically step inside a bank.

3.3 Role of online banking, non-banks and fintech

As banking and lending activities shift online, credit accessibility may not be heavily reliant on the presence of physical branches and the proliferation of Android and iOS applications introduced by banks may replace branch-based banking. Koont (2024) show that after adopting digital platforms, banks increasingly operate branchlessly in their surrounding markets. Digitalization decreases local and national market concentration by allowing more banks to operate in markets where they physically do not have a branch. This phenomenon

is also observed by Jiang et al. (2024) who find that due to the staggered distribution of 3G mobile networks, banks lend to a greater geographic area and at the same time reduce branch presence in markets adept at adopting newer technologies.

When banks start lending branchlessly, credit history of individuals and businesses become more prominent in deciding who has access to this online credit. Buchak et al. (2018) show fintech lenders serve more creditworthy borrowers compared to traditional banks. Furthermore, fintech lenders charge a premium when providing their services leading to more convenience rather than cost savings for borrowers. As digitization decreases bank branch concentration, it forces banks to rely more on hard information, such as credit histories of individuals and businesses in making loan decisions. This may cause the evolution of small business loans to small firms (less than $1 million in assets), which is more reliant on relationship banking, to diverge from the evolution of total small business loans provided to comparatively larger firms. Similarly, digitization may affect large-sized mortgage originations more than small-sized mortgage originations, since those applying for larger mortgages will need more thorough credit checks.

3.4 Role of MDI branches

The role that MDI branch closures play in these diversified markets is not immediately clear. If indeed MDIs play a crucial role within their communities, small business loans to small firms may be impacted more due to MDI branch closures. Conversely, non-MDI branch closures in these markets may imply a significant presence of banks, non-banks and fintech firms that operate branchlessly or through mobile platforms impacting total SBL originations. Moreover, since mortgage originations are made to individuals, high credit scores alone may not be a sufficient condition for mortgages. In these instances, mortgages borrowers would benefit from the physical presence of bank branches.

4 Data

I construct a panel dataset by combining publicly available datasets: the Summary of Deposits, HMDA Mortgage Originations, National Archives, CRA SBL Originations and 5-year ACS, resulting in a dataset of all census tracts where an MDI branch is present in the year 2011, a total of 1090 tracts. All dollars values are converted to the 2021 dollar value using the Consumer Price Index (CPI) from US Bureau of Labor Statistics (2021) website.

4.1 Summary of Deposits

I obtain information on bank branches from the SoD published on the FDIC website. The SoDs contain information on every operating bank branch in the US, including street addresses, zip codes, geolocation data and individual branch deposits, published at the end of June of every year. Initially I collect the CERT numbers (a unique identification number for each institution assigned by the FDIC) of MDIs from 2011 until 2021. Using the CERT numbers, I collect all zip codes where an MDI is present between the years 2011 and 2021. Then using those zip codes I collect information on all other bank branches that are located within those zip codes from 2011 until 2021. Using this method, I collect data on all bank branches within the zip codes where an MDI branch is present.

The SoD data does not contain the census tract or block where the branches are located so I use the "pygris" package in Python to geolocate latitude and longitude information of each branch to their corresponding census tracts based on the 2010 Census. Many branch locations have missing latitude and longitude data. In case of missing latitude and longitude information, I use the API from OpenStreetMaps to obtain latitude and longitude information from street addresses of each branch. After obtaining the universe of all census tracts with an MDI in 2011, I exclude the most extreme outlier census tract and census tracts with those that have a population fewer than 100, resulting in 1085 census tracts. Figure 1 shows how the number of MDI branches varies in the US counties under study between 2011 and 2021.

I calculate the lender-level HHI from the mortgage data containing individual mortgage loan information. I also calculate deposit level HHI from the deposit shares of each bank branch at the census tract level to account for deposit market concentration. A deposit HHI of 10,000 means the presence of a monopoly within a market whereas a HHI close to zero denotes perfect competition.[8] Bank branch characteristics are provided in Appendix A. Figure A1 shows the distribution of total bank branches, MDI branches and total branches in neighboring census tracts in 2011. Approximately a third of the census tracts under study has only one branch in 2011 and 80 percent of census tracts has only one MDI branch. Figure A2 shows plots of log of branches versus log of assets. MDIs have lower asset sizes and comparatively fewer branches than non-MDIs.

I divide the data into four sets of tracts: tracts with at least one MDI, tracts with Black MDIs, tracts with Hispanic MDIs and tracts with Asian MDIs, respectively. Figure 2 shows MDI and non-MDI branch closures over time in the four sets of tracts. In the first panel of Figure 2, the "treated" tracts are those that undergo at least one MDI branch closure with non-MDI bank branches remaining constant. In the second panel of Figure 2, the "treated" tracts are those that face at least one non-MDI branch closure with the number of MDI branches remaining constant.

Figure 3 shows proportion of branches that close as a result of mergers, failures or simple branch closures. About 80 percent MDI branch closures and 60 percent non-MDI branch closures are simple branch closures without the parent banks merging or failing. Figure 4 shows proportion of branch closures by asset sizes of parent banks. 46 percent (44 percent) of MDI branch closings have parent banks with assets less than $1 billion (with assets less than $10 billion). 16 percent (46 percent) of non-MDI branch closings have parent banks with assets greater than $10 billion (with assets greater than $50 billion). Hence, MDIs have smaller asset sizes and furthermore smaller-sized MDIs tend to close more branches whereas non-MDIs have higher asset sizes and larger-sized non-MDIs tend to close more branches.

8. Since 10,000 is an upper bound, a census tract that eventually lose all bank branches also receive a HHI of 10,000 in the data.

Further branch characteristics within the studied tracts are provided in the appendix. Tables A1 and A2 provide mean, median and standard deviation of bank branches, along with deposit HHI and lender-level (mortgage originations) HHI in all the studied census tracts in 2011. In Table A1, the "treated" tracts are those that face at least one MDI branch closure while non-MDI branches remain constant. In Table A2, the "treated" tracts are those that face at least one non-MDI branch closure with the number of MDI branches remaining constant. [9]

4.2 HMDA Mortgage Originations

I collect data on mortgage originations from the HMDA and the National Archives websites. The HMDA data contains information of individual mortgage applications by census tract, race, income and other characteristics and whether the application is approved or denied. Outcome variable characteristics are provided in Appendix B. Figure B1 show the distribution of total mortgage originations by race in all the census tracts under study. As expected, the data is mostly skewed to the right with a few extreme outliers. The Black community has the lowest value of total mortgage loans, with over 800 of the tracts giving out total mortgages of less than $5 million per tract to Blacks. Loans to the Hispanic community were the second lowest with a over 600 of the tracts giving out total mortgages of less than $5 million per tract to Hispanics.

I also collect median home price data from 2011 until 2021 from the Federal Reserve Bank of St. Louis (FRED) website in order to divide each mortgage originations from the HMDA data into small-sized and large-sized mortgages. Small-sized mortgage originations were below 50 percent of the median US home prices in their corresponding year. I do not use a fixed number (for example $100,000 as small mortgages) because median home prices in the US generally rise and a $100,000 mortgage in 2011 is not the same as a $100,000

9. I account for all bank branches within the neighboring tracts of each census tract under study. I calculate the average deposit HHI from the deposit shares of each bank branch within the neighboring tracts. I obtain the neighboring tracts by matching the census tracts under study to the data provided by Spatial Strucures in the Social Sciences, Brown University (2023)'s website.

mortgage in 2021. Any mortgage larger than 50 percent of the median US home prices is lumped as a large-sized mortgage.

Tables B1 and B2 provide total mortgage loan summary statistics for "treated" and "not treated" tracts, based on the year 2011. In Table B1, the "treated" tracts are those that experience at least one MDI branch closure while the non-MDI branches remain constant. Meanwhile in Table B2, the "treated" tracts are those that encounter at least one non-MDI branch closure with the number of MDI branches remaining constant. The tables show that "treated" and "not treated" tracts have comparable total mortgage originations, total mortgage originations to Whites, Asians, Hispanics and Blacks. However, "treated" tracts on average gave out slightly higher total loans.

4.3 CRA SBL Originations

I collect SBL originations data from the CRA website. The CRA data are available by tract only and do not contain specific information on the race of the applicants or other characteristics. CRA denotes small firms as those with assets of less than $1 million dollars and lists total small business loans to small firms as a separate category. Figure B2 show distribution of total SBL originations in the census tracts in 2011.

Summary statistics on SBL originations are provided in Tables B3 and B4. In Table B3, the "treated" tracts are those that undergo at least one MDI branch closure with non-MDI branches remaining constant. Similar to the mortgage originations data, in Table B4, the "treated" tracts are those that face at least one non-MDI branch closure with the number of MDI branches remaining the same.

4.4 American Community Survey

Finally, I collect census tract characteristics from the 5-year ACS website. Census tract characteristics are provided in Appendix C. Tables C1 and C2 show that MDIs are locate in markets that have a high percentage of the population sharing the same minority identity as the MDI owners. For example, Black MDIs were located in census tracts with 70% Black population on average, Hispanic MDIs were located in census tracts with 52% Hispanic pop-

ulation on average and Asian MDIs were located in census tracts with 32% Asian population on average.

5 Empirical Analysis

I use census tracts as the primary local markets because most MDIs tend to locate in large counties such as the Los Angeles county, Miami-Dade county and Cook county, to name a few. Hence, analyzing the data at the county level may abstract away from the local impact that these institutions have in their immediate communities. Furthermore, several studies on bank branches and credit supply use census tracts as the primary local markets (Nguyen, 2019; Toussaint-Comeau et al., 2020; Avramidis et al., 2021; Calzada et al., 2022).

I use two different treatments in this study. First, I consider "treated" tracts as those that encountered at least one MDI branch closure with the number of non-MDI branches in the tracts remaining constant. I drop tracts where the number of non-MDI branches decrease along with MDIs. Second, I designate "treated" tracts as those tracts that lose at least one non-MDI branch with the number of MDI branches in those tracts remaining constant.

5.1 Isolating the effect of branch closures

I drop tracts where the number of MDI branches decrease along with non-MDI branches. I also drop tracts where a non-MDI branch close two years prior to an MDI branch closure and vice versa. This ensures that the number of bank branches in the census tracts does not decrease for at least two years before an MDI or a non-MDI branch close. This enables me to attribute the effect on credit outcomes due to either MDI branches or non-MDI branches closing.

5.2 Estimation

If a census tract represented by unit i loses at least one MDI branch at time t with non-MDI branches remaining constant, I will consider the tract as treated at that time. Similarly, if a census tract loses at least one non-MDI branch at time t with MDI branches remaining constant, I will consider it as treated at that time.

$$D_{i,t} = \begin{cases} 1, & if\ unit\ i\ is\ treated\ in\ period\ t \\ 0, & otherwise \end{cases} \tag{5.1}$$

I consider a census tract as treated if two conditions are observed: 1. it loses at least one MDI branch from the previous year and 2. if the total number of non-MDI branches in that tract remain constant. This serves two purpose, first, I can isolate the effect of the bank branch closure only to one or more MDI branches closing. Second, if an MDI merges with another bank or MDI and the branch just loses its MDI designation but continues to operate without being physically closed, I do not consider the census tract to be a treated tract. However, if an MDI merges either with another bank or an MDI and as a result closes a branch previously operating in the tract, I will consider the tract as treated. A similar approach is taken by Nguyen (2019) who studies credit outcome in census tracts where bank branches close due to mergers.

If an MDI fails and has to close a branch in a particular tract, I consider the tract as treated as long as the above two conditions hold. This allows me to explore what happens when a branch that was designated as an MDI and operated primarily to serve the credit needs of a particular racial community closes, which may happen either due to bank mergers, bank failures or simply branch closures. The relationship that the MDI branch had with its immediate community will be affected regardless of the reasons behind its closure. The same reasoning is applied when the "treated" tracts are those that lose at least one non-MDI branch but the number of MDI branches remain constant.

I use two different groups of estimators to estimate the Average Treatment on the Treated (ATT): the first is the interaction weighted estimator by Sun and Abraham (2021) while the second is the more generalized model for staggered treatment adoption by Callaway and Sant'Anna (2021). Once a census tract loses an MDI branch or a non-MDI branch, it is considered to be treated for the remaining period, reflecting the continued loss of connection with its community. I do observe multiple branches closing in a few tracts over the period of

eleven years however this observation does not contradict the treated status of those tracts.

I use the following specification:

$$Y_{i,t} = \alpha_i + \lambda_t + \beta X_{i,t} + \sum_{l=-K}^{-2} \mu_l D_{i,t}^l + \sum_{l=0}^{L} \mu_l D_{i,t}^l + \nu_{i,t} \tag{5.2}$$

In the above specification, $Y_{i,t}$ is the outcome of interest for unit i at time t. α_i and λ_t are census tract and year fixed effects. $X_{i,t}$ is census tract time varying controls, which are population and percent of the racial community sharing the same minority identity as the owners of the MDI. β are the coefficients of the time-varying covariates.

$D_{i,t}^l := \mathbb{1}\{t - E_i = l\}$ is an indicator for census tract i being l periods away from initial treatment at calendar time t. E_i is the time for unit i to initially receive a binary absorbing treatment, whether an MDI branch closed or not (or whether a non-MDI branch closed or not). For never-treated census tracts $E_i = \infty$) and I set $D_{i,t}^l = 0$ for all l and all t.

The parameters of interest are the coefficients of $D_{i,t}^l$ which are $\hat{\mu}_l$. Sun and Abraham (2021) define the Cohort-specific Average Treatment effect on the Treated (CATT) l periods from initial treatment as:

$$CATT_{e,l} = E[Y_{i,e+l} - Y_{i,e+l}^{\infty} | E_i = e] \tag{5.3}$$

Here $Y_{i,e+l}^{\infty}$ are the never treated units. Each $CATT_{e,l}$ represents the average treatment effect l periods from the initial treatment for the cohort of units first treated at period e. The $CATT_{e,l}$ estimator is unbiased and consistent when the observations satisfy parallel trends in baseline outcome and display no anticipatory behavior prior to treatment. The data in this paper satisfies both parallel trends and no anticipatory behavior assumptions since banks do not announce in a year in advance when closing a branch. Treatment effect homogeneity, which requires that each cohort experiences the same path of treatment effects, is a sufficient but not a necessary condition for the CATT estimator to be unbiased and consistent.

5.3 Robustness checks

I check the robustness of the results using the doubly robust estimators of Callaway and Sant'Anna (2021). A brief discussion on Callaway and Sant'Anna (2021) are provided in Appendix D. Moreover, in Appendix E, I show results for the full sample of 1085 census tracts.

5.4 Advantages over traditional Two-way Fixed Effects (TWFE) estimators

Each of these estimation methods provide more plausible estimates over traditional dynamic Two-way Fixed Effects (TWFE) estimators because they take into account treatment group heterogeneity and avoid negative weighting of cohorts, which can sometimes be the case in Ordinary Least Square (OLS) estimations. Moreover, these estimators make explicit which control groups are being considered. In this paper, the "never treated" group serves as the control; these are tracts where the total number of bank branches does not fall between 2012 and 2021. Some branches lose (or gain) MDI designation in these tracts either due to mergers with non-MDIs (or MDIs) or because these branches are purchased by non-MDIs (or MDIs). The standard errors are clustered at the census tract level following the recommendations of Abadie et al. (2023).

6 Results

6.1 Impact on mortgage originations

Table 2 provides estimates on changes in mortgage originations between "treated" and "control" tracts. Panel A show ATT estimates for small-sized mortgages and Panel B show ATT estimates for large-sized mortgages. The plots in Figure 5 and Figure 6 show the effect of MDI and non-MDI branch closures on small-sized mortgage originations by race respectively. Similarly, the plot estimates in Figure 7 and Figure 8 show the effect of MDI and non-MDI branch closures on large-sized mortgage originations by race.

6.1.1 Small-sized mortgages

The estimation results show largely minimal negative effects of MDI closures and non-MDI closures on small-sized mortgage originations. The results from Table 2, Panel A imply that the decrease in the number of available bank branches, resulting from MDI branch closures has minimal impact on the quantity of small-sized mortgage loan originations. However, non-MDI branch closures reduce small-sized mortgage originations to all communities by 6-7 percent, seen on the last column of Table 2, Panel A.

6.1.2 Large-sized mortgages

The third column of Table 2, Panel B show that large-sized mortgage originations to the Asian community decrease between 20-24 percent due to an Asian MDI branch closure. Noticeably, large mortgage originations to the Black community is not impacted at all by MDI branch closures but rather by non-MDI closures. The fifth column of Table 2, Panel B show that when non-MDI branches close, large-sized mortgage originations to Blacks fall by 35-40 percent. Large-sized mortgage originations to Hispanics and total large-sized mortgage originations are not impacted by either MDI or non-MDI branch closures.

Figure 13 partially explains the results of Table 2, Panel B. Here, I plot the number of unique mortgage lenders and the total number of branches in each set of tracts. The number of unique mortgage lenders in tracts with Black MDIs, Hispanic MDIs and tracts with any MDI increase with MDI branch closures. Hence MDI closures does not necessarily reduce the number of unique mortgage lenders in their corresponding local markets. Notably, Figure 13 shows that the number of unique lenders providing mortgages fall with the number of MDI branch closures in tracts served by Asian MDIs. This phenomenon reduces the large-sized mortgage originations in the Asian community.

Similarly, Figure 14 explains the negative impact on large-sized mortgage originations for the Black community due to non-MDI branch closures. The number of unique mortgage lenders also fall along with non-MDI bank branches in tracts served by Black MDIs. As

a result, large-sized mortgage originations to the Black community fall when a non-MDI branch closes in these tracts since online banking or non-banks do not replace the role of the traditional bank branches. Unsurprisingly, Figure 14 shows the number of unique mortgage lenders do not decrease with non-MDI branch closures in tracts with Asian and Hispanic MDIs, implying online banking and non-banks do fill the credit supply gaps in these markets left by closing bank branches.

6.2 Impact on SBL originations

Table 3 provides estimates on changes in SBL originations between "treated" and "control" tracts. Panel A show the ATT estimates for SBL originations to small firms for each set of treated tracts, while Panel B show the ATT estimates for total SBL originations of less than $1 million for each set of treated tracts.

6.2.1 SBL originations to small firms

The plot estimates in Figure 9 and Figure 10 show the effect of MDI and non-MDI branch closures on SBL originations to small firms respectively. The second column of Table 3, Panel A shows that SBL originations to small firms decreases by 13 percent due to MDI branch closures in tracts served by Hispanic MDIs. However, SBL originations to small firms are not impacted with statistical power in the other sets of tracts. There are two possible explanations for this result. One, SBL originations data do not account for race and it is quite likely that MDI branch or non-MDI branch closures do not create a dent in the total volume of small business loans to small firms dispersed in the local market. At the same time, the CRA requires banks with assets over $1 billion to report business loan commitments and most MDIs have asset sizes of less than a billion dollars and therefore their business lending activity may not show up in the data.

6.2.2 Total SBL originations of less than $1 million

The first four columns of Table 3, Panel B show that MDI branch closures do not statistically impact total SBL originations, however, the signs on the estimates are negative. Conversely, the last four columns of Table 3, Panel B show that non-MDI branch closures show an increase of total SBL originations of less than $1 million. The increases are between 25-30 percent in each set of tracts.

The plot estimates in Figure 11 and Figure 12 show the effect of MDI and non-MDI branch closures on total SBL originations of less than $1 million respectively. It is apparent from Figure 12 that as non-MDI branches close, total SBL originations of less than $1 million in the four sets of tracts increase substantially.

7 Further Evidence and Implications

It may be argued that closure of bank branches in their local markets are not exogenous shocks but endogenous decisions of the banks based on their assessment of expected future loans within their local markets. Although, some degree of endogeneity can not be ruled out because banks will indeed close branches that are not profitable any longer, I show that the closure of the branches are not directly related to expected future loans at the census tract level.

7.1 Increasing number of lenders

The findings of Calzada et al. (2022) and Koont (2024) provide circumstantial evidence consistent with these results as they confirm that banks optimize and close branches in tracts where they have a substantial presence through online banking. Furthermore, as Jiang et al. (2024) show, banks already less reliant on branches are likely to close more branches. Figure 13 show that as MDI branches close, the number of unique mortgage lenders do not generally fall. This finding support Buchak et al. (2018), Fuster et al. (2018) and Corbae et al. (2023) who document non-banks and fintech lenders taking up substantial market share for mortgage originations since the Great Recession.

Another supporting evidence is observed in Figure 15 and Figure 16. These show even though MDI and non-MDI branches physically close down, the number of unique SBL lenders per county actually increase with time. Salvo (2021) and Adams et al. (2020) suggests non-local banks issue a large proportion of small business loans through business credit cards because they can quickly approve more of these smaller loans for larger small businesses. Furthermore, Gopal and Schnabl (2022) and Cornelli et al. (2024) show how, post Great Recession, fintech firms also replace traditional bank branches in providing SBL originations. This explains why even though the estimates of total SBL originations are negative with MDI closures, they do not have statistical power.

7.2 Lender-level HHI

I construct lender-level HHI from the mortgage data to show bank branch closures are not a direct consequence of expected future loans at the local market level. I estimate the effect of both MDI and non-MDI branch closures on the change in lender-level HHI. Table 4, Panel A shows estimates of changes in lender-level HHI in census tracts where either MDI branches or non-MDI branches close. If indeed banks close branches based on expected future loans, we would expect the lender-level HHI to increase. In other words, the results would show that only a few lenders dominate the local market as more and more bank branches close, with banks correctly predicting future expected loans.

In fact, I do not observe any increase in lender-level HHI. In fact, as branches close, the lending market do not get more concentrated and the sign on the coefficients are negative; however, the results are not statistically significant. The plot estimates in Figure 17 and Figure 18 show how lender-level HHI changes in the corresponding tracts due to MDI branch and non-MDI branch closures respectively. The plots demonstrate that lender-level HHI does not change noticeably either before or after branch closures. The findings of Salvo (2023) also confirm my results who study lender and deposit market concentration at the 34 largest MSAs and show decreasing concentration for both mortgage loans and small business loans between 2010 and 2019. Meanwhile, Corbae et al. (2023) show concentration in mortgage

lending has decreased due to the proliferation of fintechs and non-banks and a reduction in concentration among bank lenders.

7.3 Deposit level HHI

Even though the lender-level market does not get concentrated, the deposit market does get concentrated. The plot estimates in Figure 19 and Figure 20 show how deposit HHI changes in the census tracts due to MDI and non-MDI branch closures respectively. The results in Table 4, Panel B show that deposit HHI increase due to both kinds of closures; although the increase in deposit level HHI is more prominent when non-MDI branches close, as evident in the last four columns of the table. In each sets of tracts, HHI increases by 20-25 percent when non-MDI branches close. This phenomenon may explain why total SBL originations increase when non-MDI branches close as the remaining branches accumulate a greater proportion of the deposit share leading them to give out a greater quantity of small business loans.

7.4 Possible mechanisms

The fact that total SBL originations of less than $1 million increase due to non-MDI branch closures is likely because the credit supplier gap left by the closing of non-MDI branches is picked up by existing branches, online branchless banking and fintechs. Deposit level HHI also increases in each set of treated tracts. The results in this paper support previous research on deposit market power of banks. Drechsler et al. (2021) show that a larger deposit core causes banks to earn interest income that is insensitive to fluctuating market interest rates and enables the banks to lend long term at fixed rates. Similarly, Li et al. (2023) show that banks with more deposit market power give out longer maturity loans and at the same time charge lower maturity premiums, leading to more loans. It is not immediately clear why total SBL originations remain unaffected due to MDI branch closures even though deposit level HHI also increase in these markets and may be grounds for future research.

8 Conclusion

I study impact on credit accessibility due to branch closures, as demonstrated by mortgage originations issued to different racial communities and SBL originations at the census tract level. I consider two kinds of treatments. In the first, treated tracts are those where MDI branches close with non-MDI branches remaining constant. In the second, treated tracts are those where non-MDI branches close with MDI branches remaining constant. I control for covariates such as population and percent of the racial community sharing minority identity with the MDI owners.

I show similarities and differences between MDI and non-MDI branch closures, A majority of MDI and non-MDI branch closures are simple branch closures and not a result of mergers or failures. Over 85 percent of MDI branch closures have parent banks less than $10 billion in assets. Conversely, 62 percent of non-MDI branch closures have parent banks more than $10 billion in assets.

Closure of MDIs and non-MDIs reveal differential impacts on credit access within different racial communities. Non-MDI branch closures reduce small-sized mortgages among all communities while MDI and non-MDI closures impact large-sized mortgage originations. When MDI branches close, large-sized mortgage originations decrease only within the Asian community. However, when non-MDI branches close, mortgage loan originations to the Black community decrease within the tracts served by Black MDIs. In both cases, the number of unique mortgage lenders per census tract fall along with branch closures. I also show in the other scenarios, MDI and non-MDI branch closures is followed by increases in unique mortgage lenders at the census tract level and unique SBL lenders at the county level.

Non-MDI branch closures increase total SBL originations of sizes less than $1 million. I show that deposit level HHI increases in markets where non-MDI branches close. The result suggests that the increase in SBL originations arise due to relatively larger non-MDI banks closing their physical branches or merging with other banks in markets that are saturated and possibly supplying SBL through credit cards as documented by Adams et al. (2020) and

Salvo (2021). The results also confirm the findings of both Koont (2024) and Jiang et al. (2024) who show that banks tend to close physical branches in areas where they develop a substantial presence through online banking.

I also find that MDI branch closures cause total business loan originations of less than $1 million to remain unaffected, even with increasing deposit level HHI in the local markets. The closure of MDI branches do not increase the quantity of small business credit even in the presence of increasing unique SBL lenders by county and increasing deposit level HHI. Therefore, the presence of physical MDI branches may play a prominent role in supplying small business credit in these markets. I also find Hispanic MDI branch closures negatively impact SBL originations to small firms in census tracts served by Hispanic MDIs.

To conclude, I contrast the differential impacts on credit accessibility due to MDI and non-MDI branch closures, demonstrating that MDI and non-MDI branch closures do not impact all racial communities similarly. The results in the paper highlight that even though non-MDI branches tend to play a less prominent role in supplying small business credit, their closures negatively impact large-sized mortgage originations in predominantly urban and black census tracts. I also find that MDI branches still play a relevant role in supplying SBL to small firms and mortgages in their local markets, implying that their customer base could be slower to adapt technological innovations such as fintechs, non-banks or online banking.

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Table 1: States with total number of MDIs and corresponding branches operating in 2021

State	Number of MDIs	Number of MDI branches
California	43	337
Texas	37	327
New York	28	120
New Jersey	18	34
Florida	14	85
Georgia	13	39
Oklahoma	11	51
Illinois	11	25
Alabama	6	10
Washington	5	16
Pennsylvania	5	8
Massachusetts	4	13
Maryland	4	10
Nevada	4	7
Virginia	4	7
Hawaii	3	27
North Carolina	2	23
Missouri	2	5
Washington DC	2	5
Michigan	2	4
Wisconsin	2	4
Kansas	2	2
Montana	2	2
Louisiana	1	10
Minnesota	1	7
New Mexico	1	6
Arizona	1	2
South Carolina	1	2
Tennessee	1	2
Colorado	1	1
Iowa	1	1
Kentucky	1	1
Mississippi	1	1
North Dakota	1	1

Table 2: Change in mortgage loans (in millions of dollars) estimated using Callaway and Sant'Anna (2021) and Sun and Abraham (2021). Standard errors, in parenthesis, are clustered at the census tract level. Baseline means are in millions.

	Panel A: Small-sized mortgages							
		MDI Closures				Non MDI Closures		
	Loans to Blacks	Loans to Hispanics	Loans to Asians	Loans to All	Loans to Blacks	Loans to Hispanics	Loans to Asians	Loans to All
C&S ATT	0.212	-0.185	-0.080	0.063	-0.209	-0.106	0.036	0 -0.218*
	(0.202)	(0.199)	(0.049)	(0.161)	(0.179)	(0.124)	(0.057)	(0.122)
S&A ATT	0.242	-0.030	-0.064	0.212	-0.203	-0.263**	0.052	-0.228**
	(0.192)	(0.191)	(0.055)	(0.183)	(0.180)	(0.121)	(0.054)	(0.114)
Baseline mean	1.52	1.62	0.43	3.20	1.05	1.83	0.48	3.18
Fixed Effects by:								
Year:	11	11	11	11	11	11	11	11
Census Tracts:	141	452	355	996	140	457	379	1020
Observations	1,551	4,972	3,905	10,956	1,540	5,027	4,169	11,220
R^2	0.907	0.897	0.693	0.899	0.892	0.896	0.730	0.897
Within R^2	0.145	0.056	0.046	0.062	0.060	0.056	0.052	0.054
	Panel B: Large sized mortgages							
		MDI Closures				Non MDI Closures		
	Loans to Blacks	Loans to Hispanics	Loans to Asians	Loans to All	Loans to Blacks	Loans to Hispanics	Loans to Asians	Loans to All
C&S ATT	0.107	-0.320	-5.569**	-2.879	-1.438**	1.305	3.357	1.807
	(0.715)	(0.967)	(2.804)	(2.354)	(0.708)	(0.871)	(3.292)	(1.970)
S&A ATT	0.247	-0.297	-4.630*	-3.379	-1.207*	0.756	3.733	1.353
	(0.739)	(0.807)	(2.501)	(2.293)	(0.635)	(0.751)	(2.476)	(1.628)
Baseline mean	4.88	8.71	22.87	37.31	3.38	8.86	25.65	45.54
Fixed Effects by:								
Year:	11	11	11	11	11	11	11	11
Census Tracts:	141	452	355	996	140	457	379	1020
Observations	1,551	4,972	3,905	10,956	1,540	5,027	4,169	11,220
R^2	0.816	0.765	0.783	0.803	0.813	0.766	0.790	0.806
Within R^2	0.082	0.072	0.045	0.089	0.047	0.070	0.060	0.088

Note: *p<0.1; **p<0.05; ***p<0.01

Table 3: Change in small business loans estimated using Callaway and Sant'Anna (2021) and Sun and Abraham (2021). Standard errors, in parenthesis, are clustered at the census tract level. Baseline means are in millions.

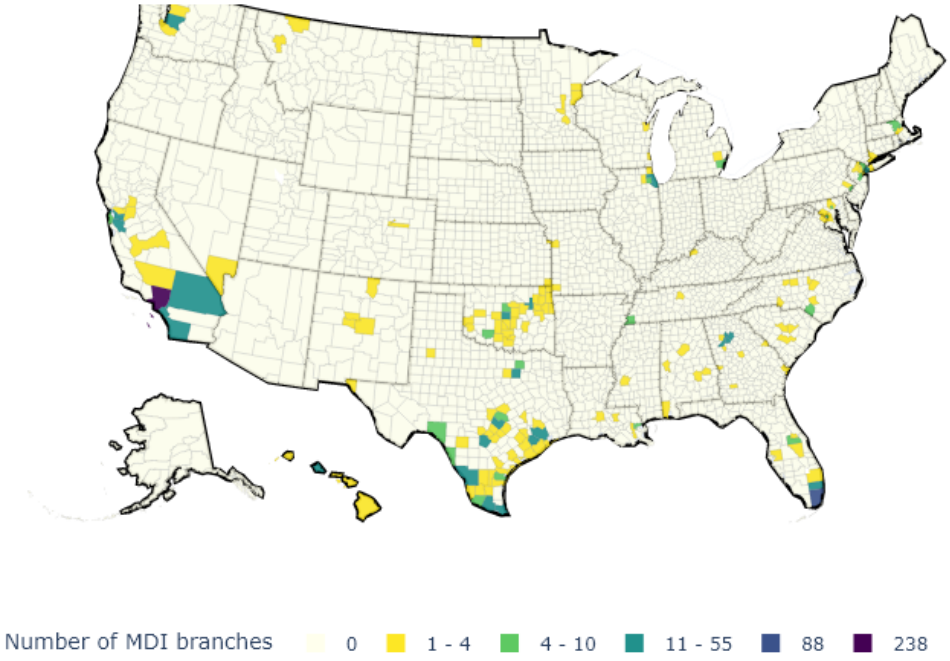
	Panel A: SBL to small firms (less than $1 million assets)							
	MDI Closures				Non MDI Closures			
	Blacks tracts	Hispanics tracts	Asians tracts	All tracts	Blacks tracts	Hispanics tracts	Asians tracts	All tracts
C&S ATT	0.006	-0.229*	0.114	-0.013	0.312	0.230	0.172	0.184
	(0.185)	(0.122)	(0.198)	(0.088)	(0.462)	(0.251)	(0.268)	(0.161)
S&A ATT	0.052	-0.231*	0.147	-0.053	0.201	0.095	0.193	0.124
	(0.196)	(0.121)	(0.151)	(0.081)	(0.311)	(0.218)	(0.169)	(0.125)
Baseline mean	1.00	1.75	2.69	1.90	4.76	2.81	3.49	3.18
Fixed Effects by:								
Year:	11	11	11	11	11	11	11	11
Census Tracts:	141	452	355	996	140	457	379	1020
Observations	1,551	4,972	3,905	10,956	1,540	5,027	4,169	11,220
R^2	0.901	0.853	0.892	0.878	0.911	0.859	0.905	0.889
Within R^2	0.041	0.077	0.082	0.059	0.169	0.074	0.083	0.061
	Panel B: Total SBL less than $ 1 millions							
	MDI Closures				Non MDI Closures			
	Blacks tracts	Hispanics tracts	Asians tracts	All tracts	Blacks tracts	Hispanics tracts	Asians tracts	All tracts
C&S ATT	-1.191	-0.200	-0.540	-0.167	5.241*	2.444**	3.665**	3.462***
	(0.921)	(0.438)	(1.152)	(0.449)	(3.099)	(0.778)	(1.619)	(0.782)
S&A ATT	-1.030	-0.491	-0.350	-0.604	3.030*	1.925***	2.980***	2.274***
	(0.902)	(0.444)	(0.734)	(0.356)	(1.639)	(0.650)	(0.917)	(0.510)
Baseline mean	3.53	5.51	9.45	6.37	18.58	8.89	12.32	10.74
Fixed Effects by:								
Year:	11	11	11	11	11	11	11	11
Census Tracts:	141	452	355	996	140	457	379	1020
Observations	1,551	4,972	3,905	10,956	1,540	5,027	4,169	11,220
R^2	0.848	0.877	0.896	0.890	0.904	0.886	0.901	0.897
Within R^2	0.054	0.050	0.107	0.060	0.246	0.087	0.130	0.088

Note: *p<0.1; **p<0.05; ***p<0.01

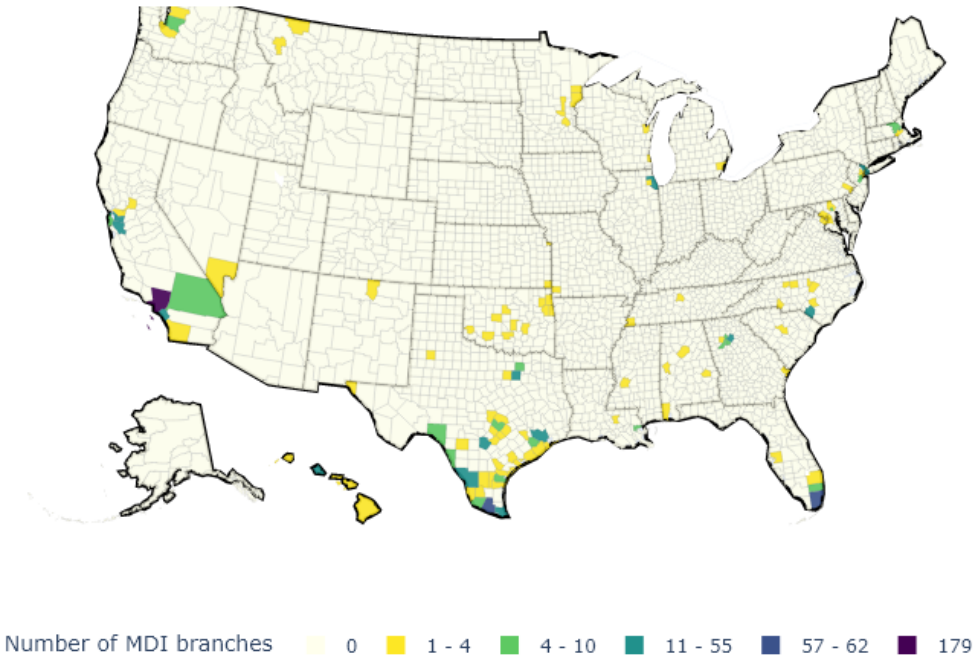
Table 4: Change in HHI (in thousands) estimated using Callaway and Sant'Anna (2021) and Sun and Abraham (2021). Standard errors, in parenthesis, are clustered at the census tract level. Baseline means are in thousands.

	Panel A: HMDA lender-level HHI							
		MDI Closures				Non MDI Closures		
	Blacks tracts	Hispanics tracts	Asians tracts	All tracts	Blacks tracts	Hispanics Tracts	Asians tracts	All tracts
C&S ATT	0.072	-0.180	0.118	-0.029	-0.194	-0.012	-0.034	-0.010
	(0.180)	(0.096)	(0.090)	(0.063)	(0.389)	(0.106)	(0.101)	(0.073)
S&A ATT	0.030	-0.187	0.095	-0.047	-0.131	-0.015	-0.042	-0.012
	(0.155)	(0.095)	(0.080)	(0.058)	(0.343)	(0.090)	(0.143)	(0.065)
Baseline mean	1.31	0.96	1.05	1.06	1.75	0.99	1.09	1.11
Fixed Effects by:								
Year:	11	11	11	11	11	11	11	11
Census Tracts:	141	452	355	996	140	457	379	1020
Observations	1,551	4,972	3,905	10,956	1,540	5,027	4,169	11,220
R^2	0.390	0.457	0.595	0.502	0.398	0.450	0.588	0.499
Within R^2	0.070	0.021	0.031	0.009	0.086	0.018	0.031	0.010
	Panel B: Deposit HHI							
		MDI Closure				Non MDI Closure		
	Blacks tracts	Hispanics tracts	Asians tracts	All tracts	Blacks tracts	Hispanics tracts	Asians tracts	All tracts
C&S ATT	0.690**	0.465**	1.153**	0.776**	1.053**	1.203**	1.209**	1.241**
	(0.254)	(0.119)	(0.156)	(0.089)	(0.318)	(0.130)	(0.160)	(0.101)
S&A ATT	0.716**	0.453***	1.159***	0.779***	1.158***	1.209***	1.193***	1.231***
	(0.225)	(0.126)	(0.160)	(0.092)	(0.257)	(0.124)	(0.143)	(0.089)
Baseline mean	8.25	6.81	5.56	6.63	5.17	4.97	4.34	4.79
Fixed Effects by:								
Year:	11	11	11	11	11	11	11	11
Census Tracts:	141	452	355	996	140	457	379	1020
Observations	1,551	4,972	3,905	10,956	1,540	5,027	4,169	11,220
R^2	0.878	0.892	0.887	0.892	0.913	0.900	0.885	0.899
Within R^2	0.043	0.033	0.092	0.044	0.127	0.087	0.154	0.117

Note: *p<0.1; **p<0.05; ***p<0.01

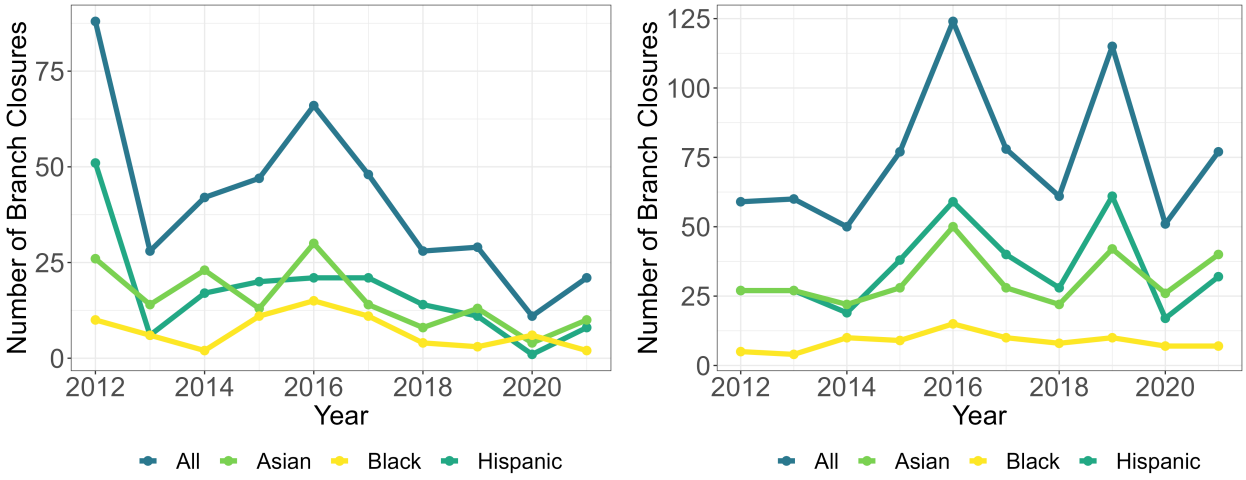


(a) MDI branches in counties under study in 2011



(b) MDI branches in counties under study in 2021

Figure 1: The figure shows how the number of MDI branches changed in the counties under study between 2011 and 2021.



(a) MDI branch closures

(b) Non-MDI branch closures

Figure 2: **Branch closures over time -** 2012 until 2021.

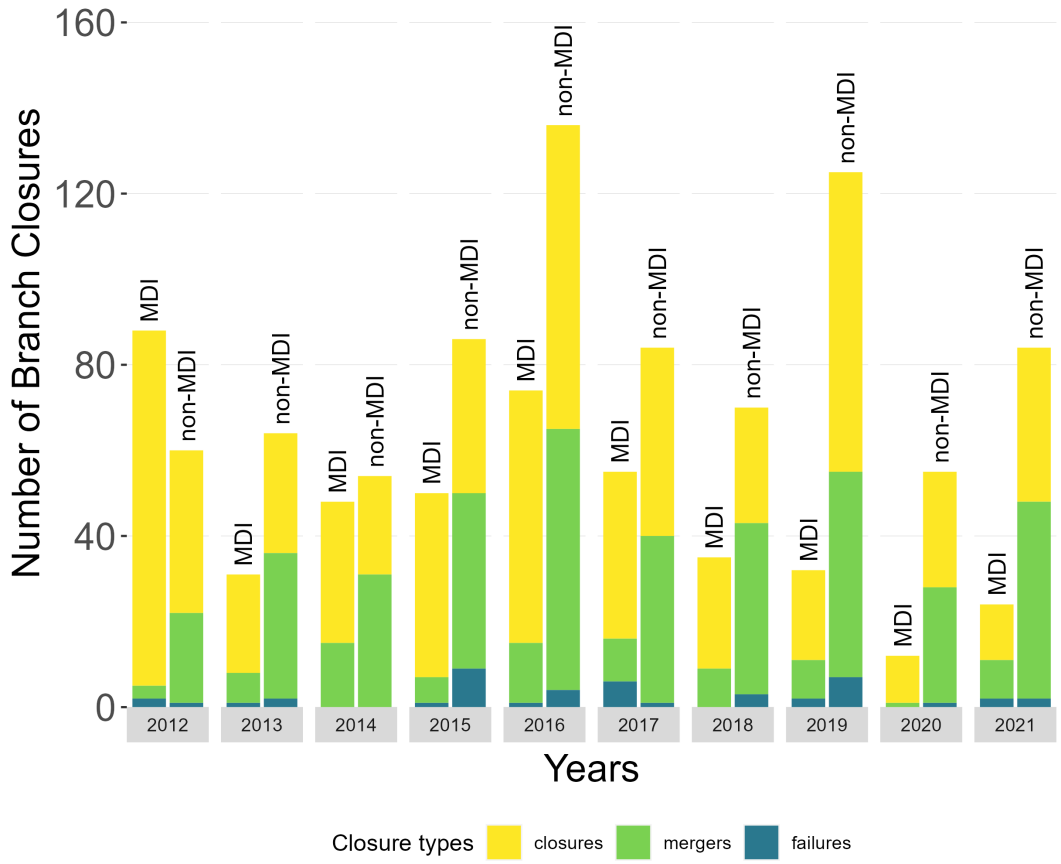


Figure 3: **Branches closures by type -** Bar chart showing why branches close in the studied tracts.

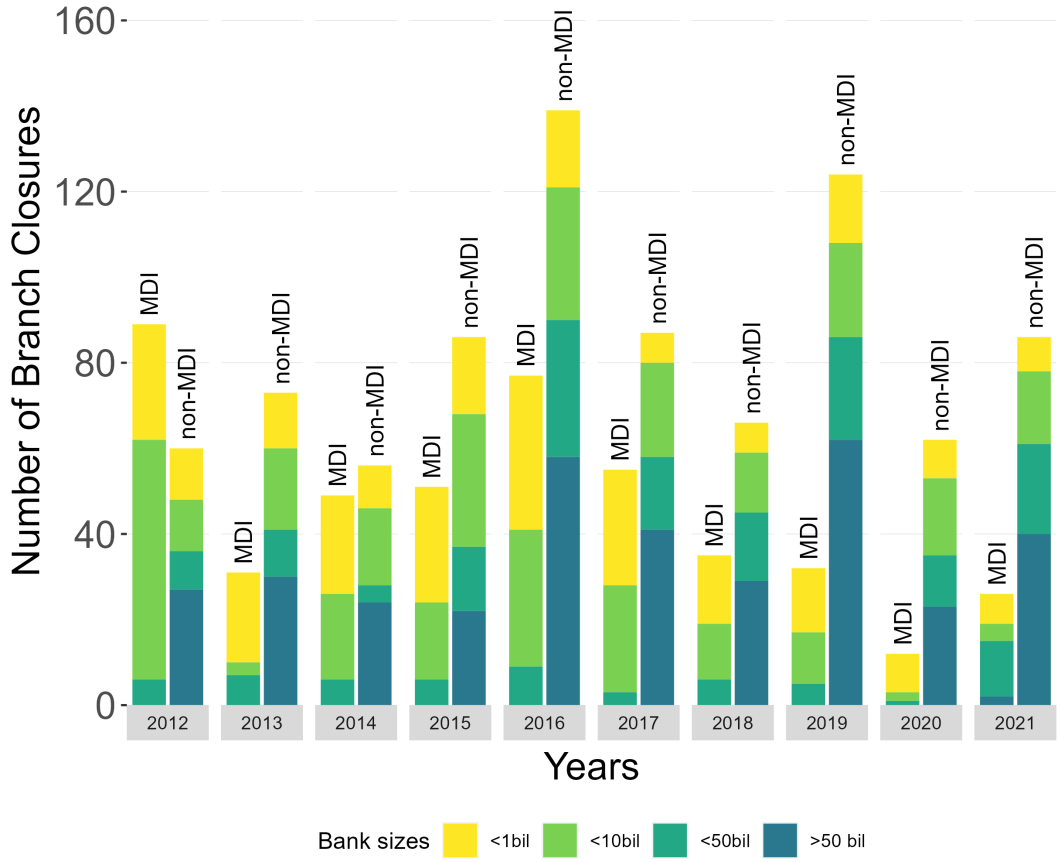


Figure 4: **Branches closure by asset size of banks - Bar chart showing which sized banks tend to close branches in the studied tracts.**

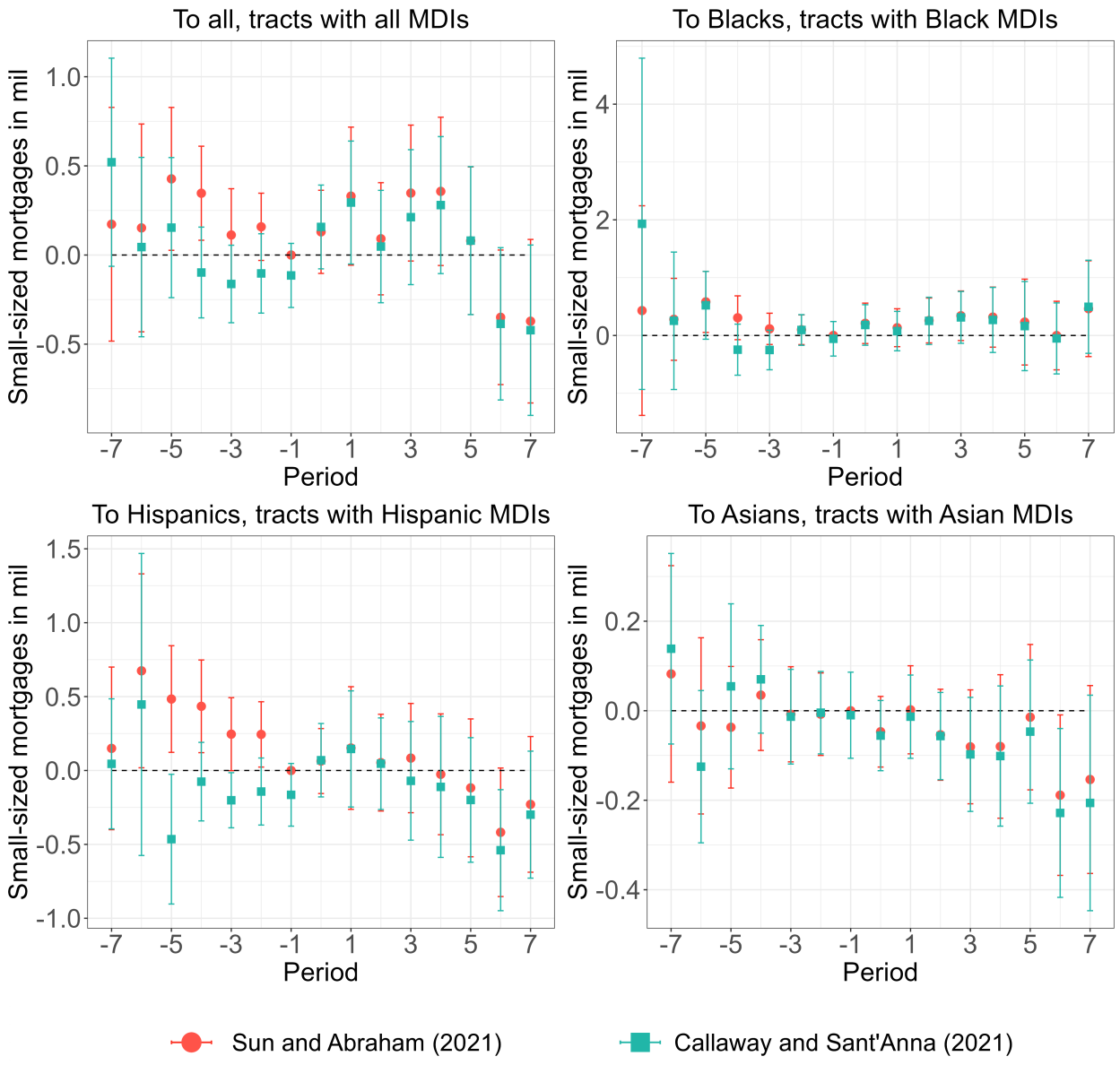


Figure 5: **MDI branch closures and small-sized mortgages -** Effect on small-sized mortgage originations due to the closing at least one MDI branch in a census tract seven calendar years before and after the closing.

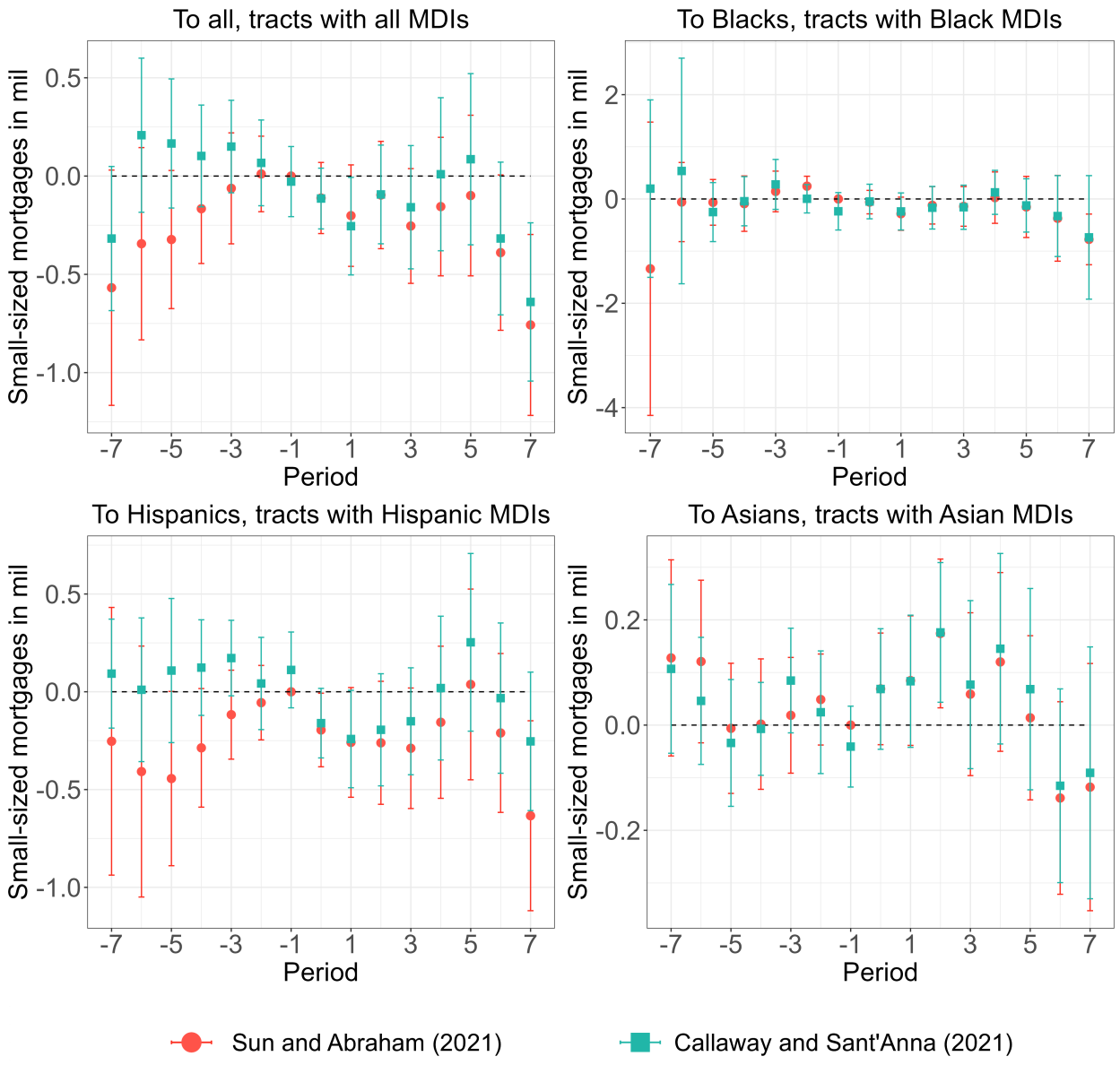


Figure 6: **Non-MDI branch closures and small-sized mortgages-** Effect on small-sized mortgage originations due to the closing at least one non-MDI branch in a census tract seven calendar years before and after the closing.

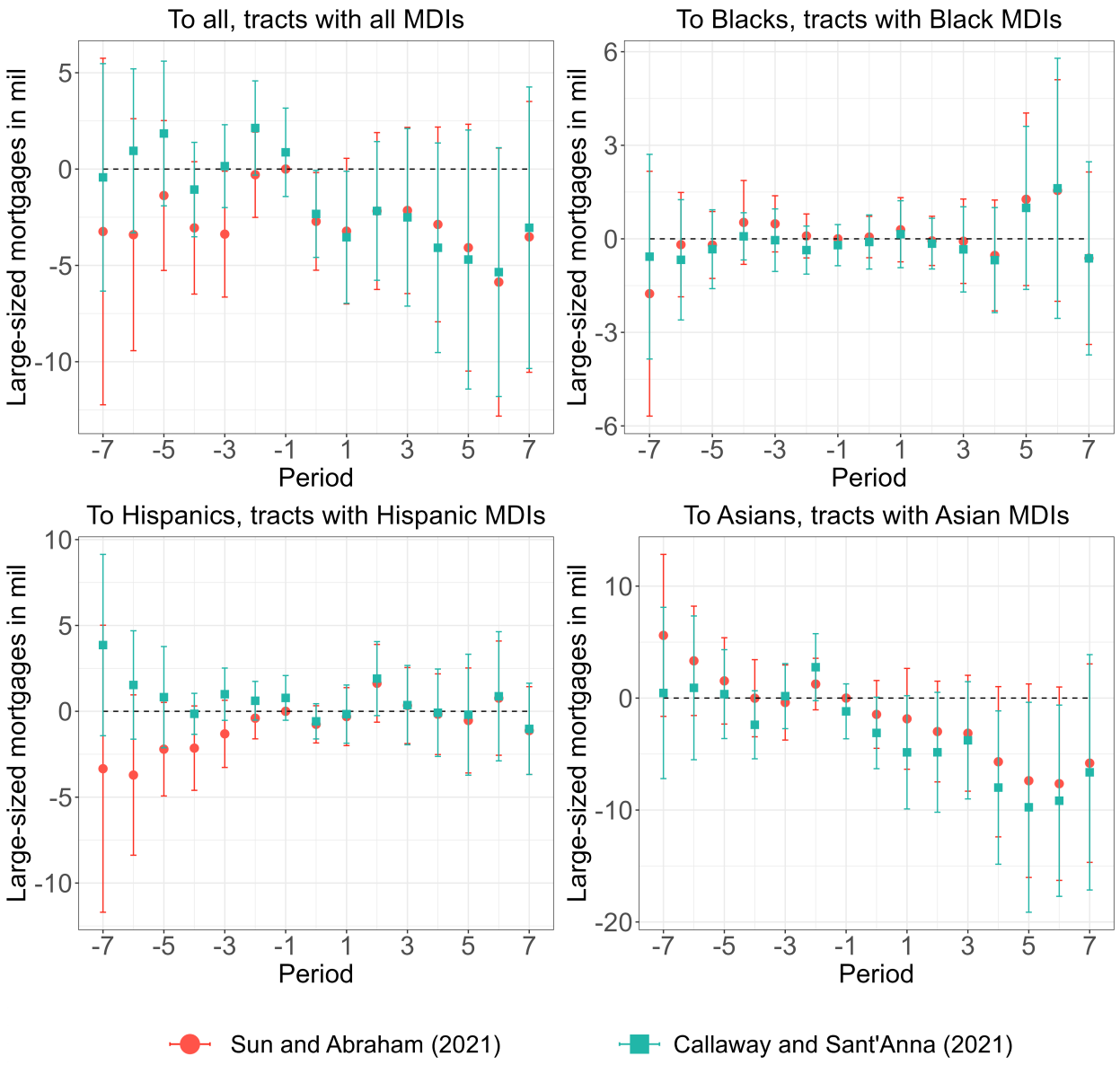


Figure 7: **MDI branch closures and large-sized mortgages -** Effect on large-sized mortgage originations due to the closing at least one MDI branch in a census tract seven calendar years before and after the closing.

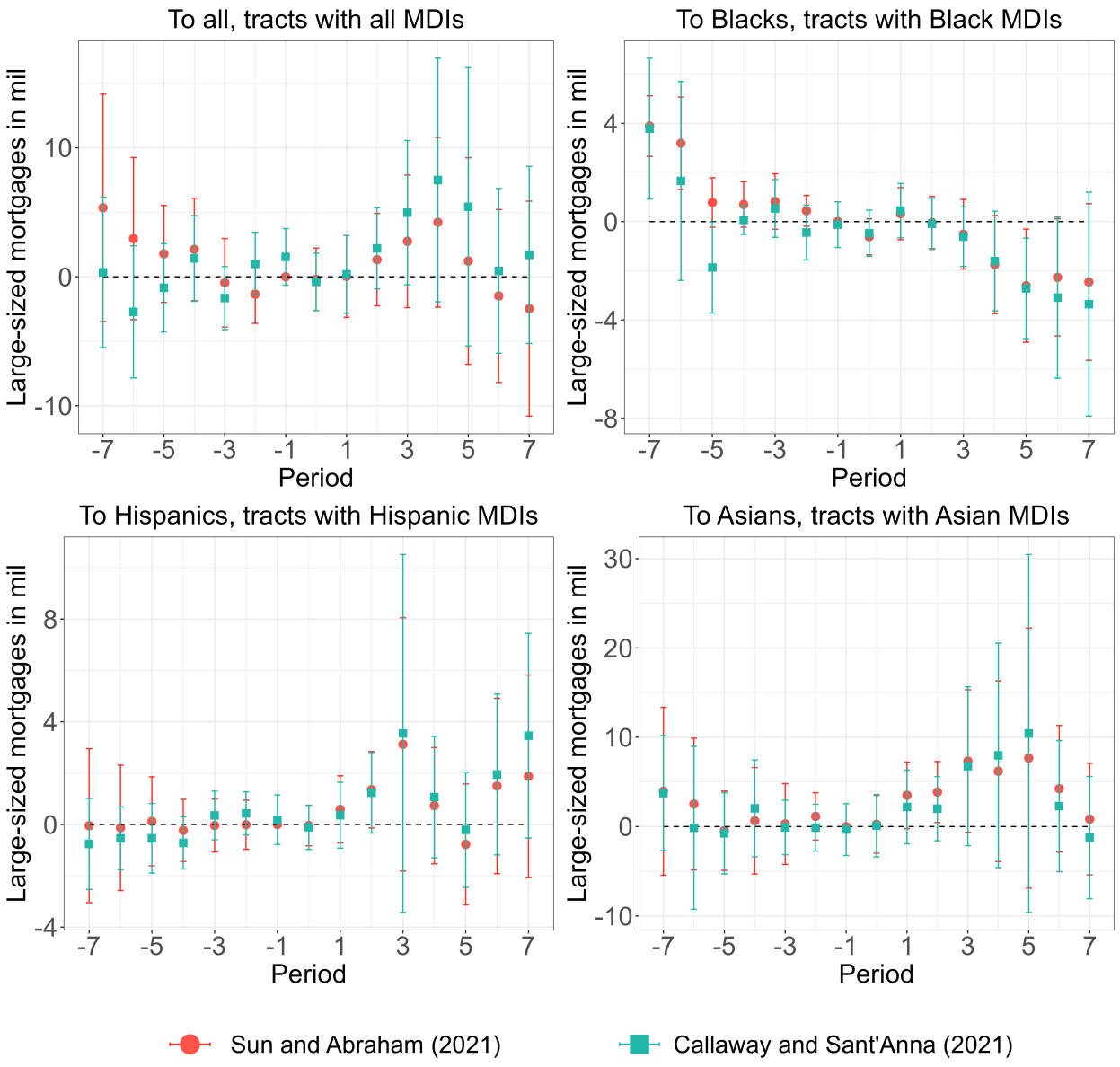


Figure 8: **Non-MDI branch closures and large-sized mortgages -** Effect on large-sized mortgage originations due to the closing at least one non-MDI branch in a census tract seven calendar years before and after the closing.

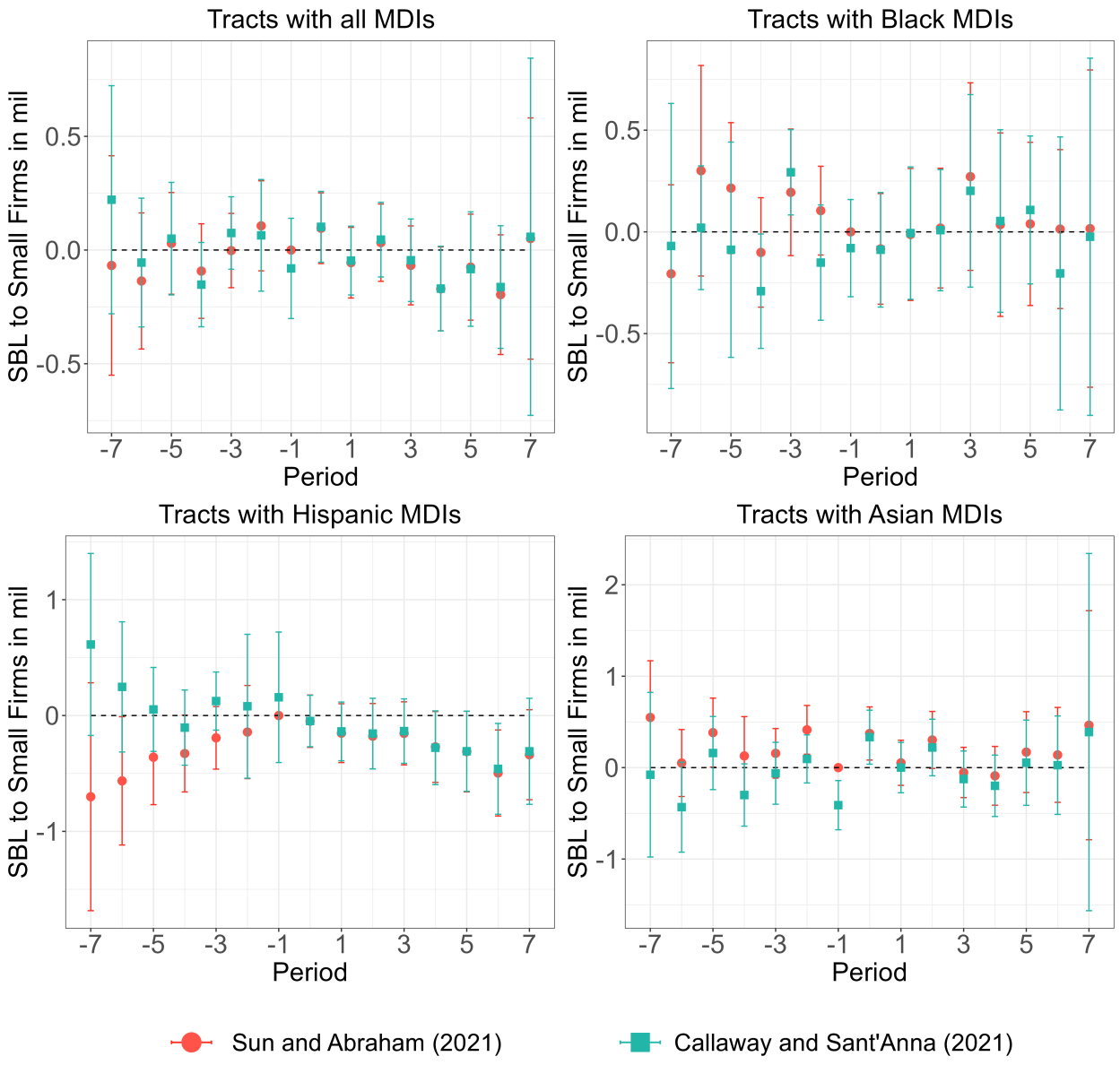


Figure 9: **MDI branch closures and SBL originations to small firms-** Effect on SBL originations to small firms (less than $1 million in assets) due to the closing at least one MDI branch in a census tract seven calendar years before and after the closing.

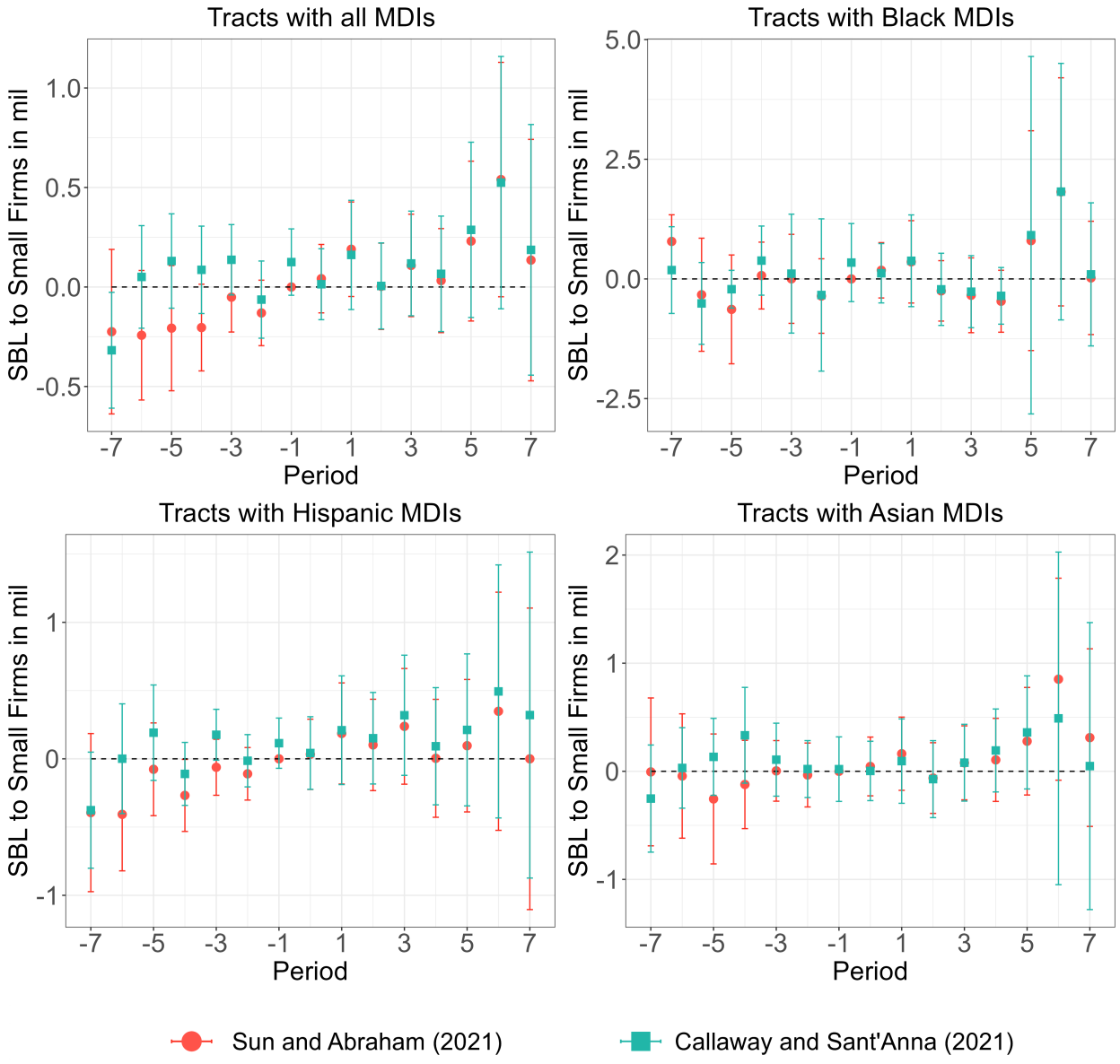


Figure 10: **Non-MDI branch closures and small business originations to small firms-** Effect on SBL originations to small firms (less than $1 million in assets) due to the closing at least one non-MDI branch in a census tract seven calendar years before and after the closing.

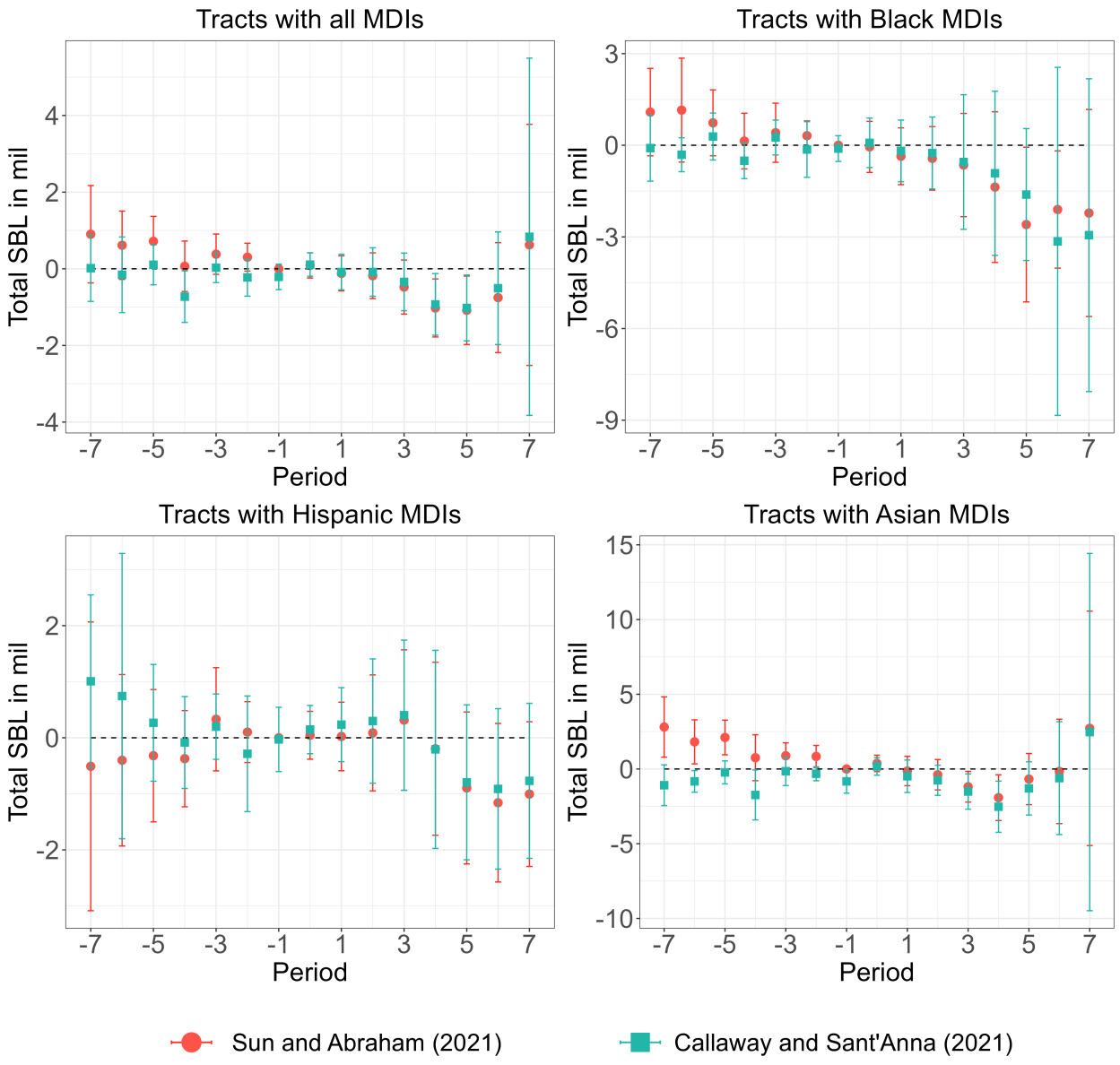


Figure 11: **MDI branch closures and total small business originations** Effect on total SBL originations of sizes less than $1 million due to the closing at least one MDI branch in a census tract seven calendar years before and after the closing.

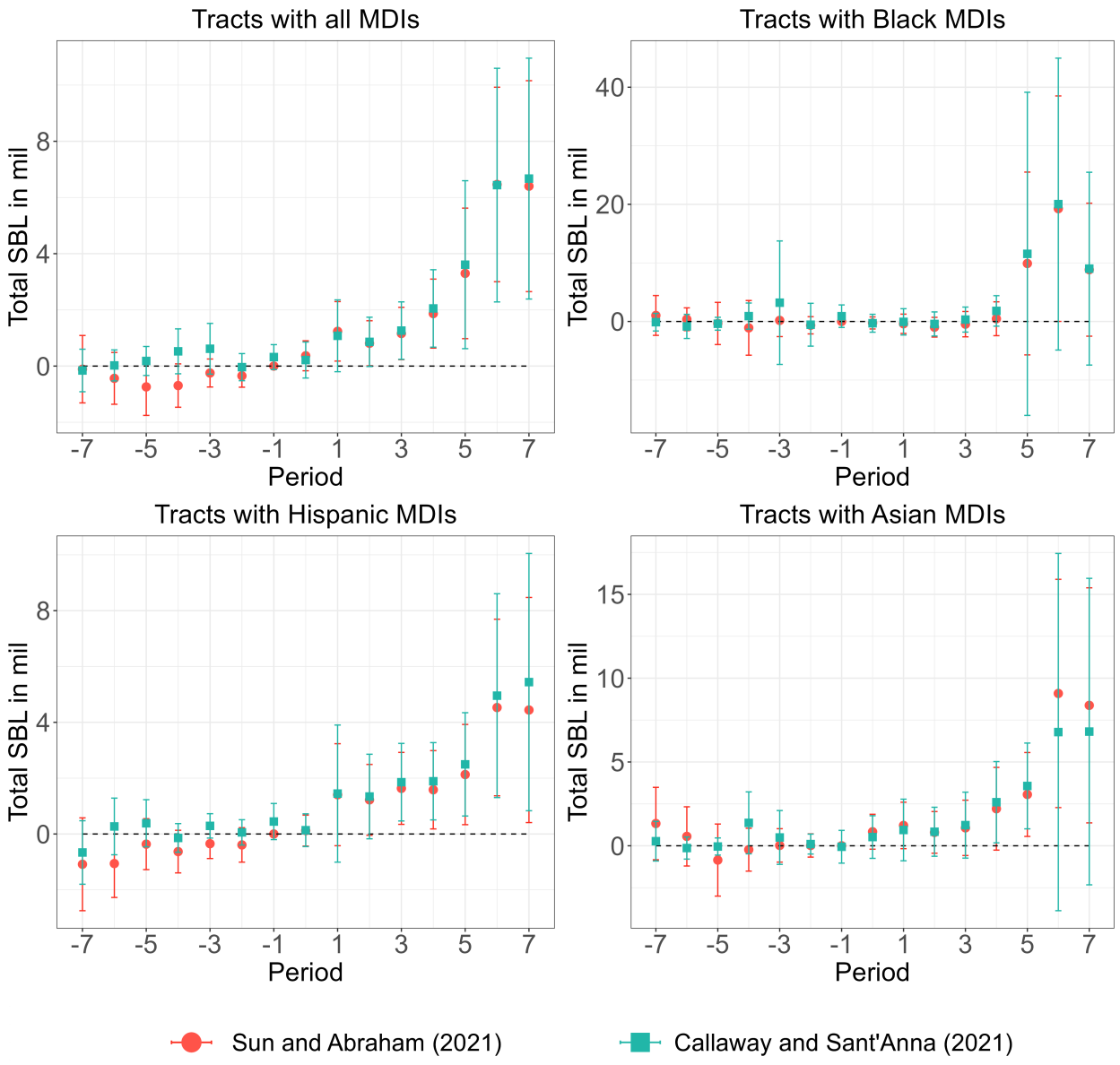


Figure 12: **Non-MDI branch closures and total SBL originations-** Effect on total SBL originations of sizes less than $1 million due to the closing at least one non-MDI branch in a census tract seven calendar years before and after the closing.

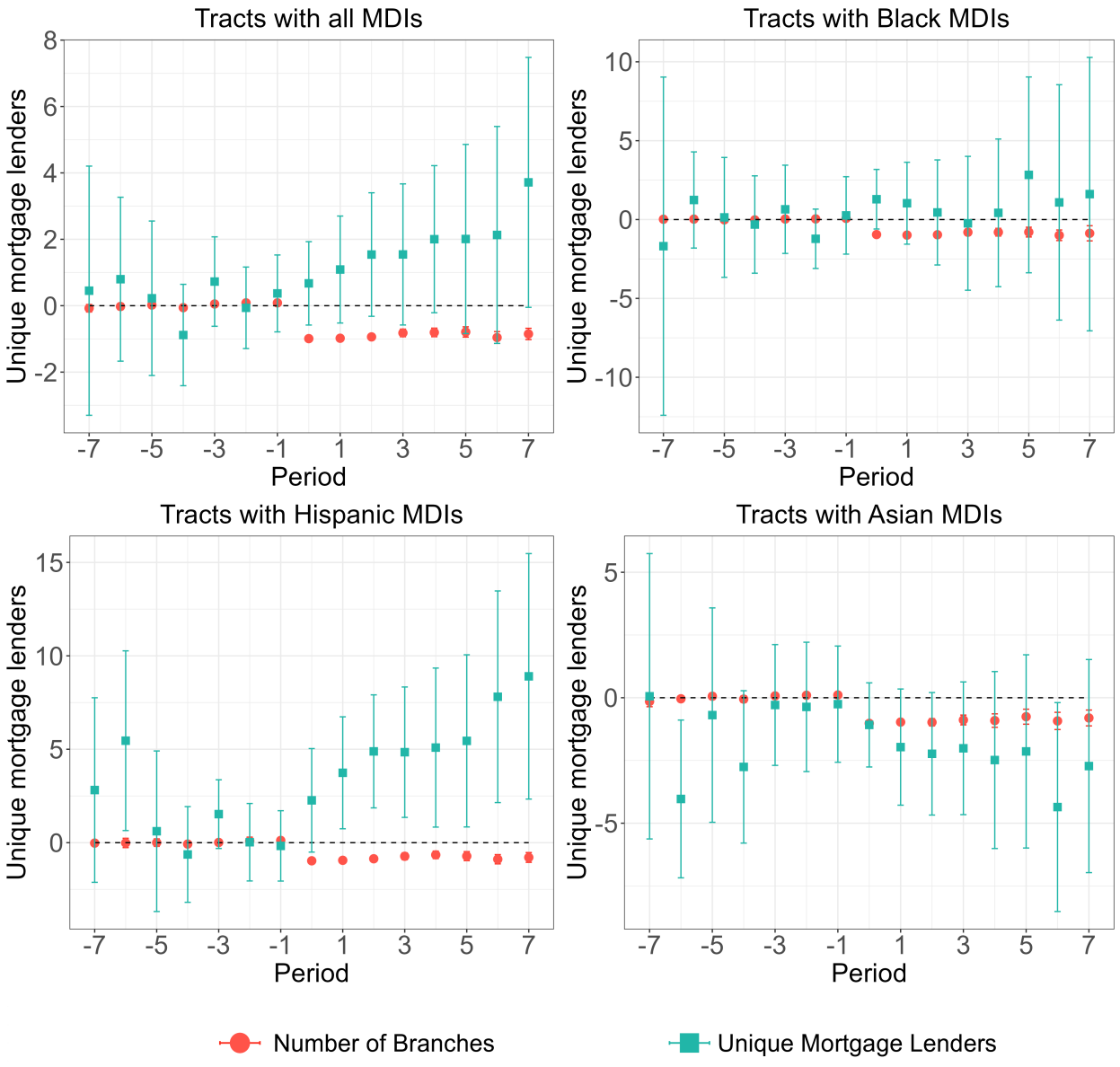


Figure 13: **MDI branch closures and unique mortgage lenders -** The plots represent estimates from Callaway and Sant'Anna (2021).

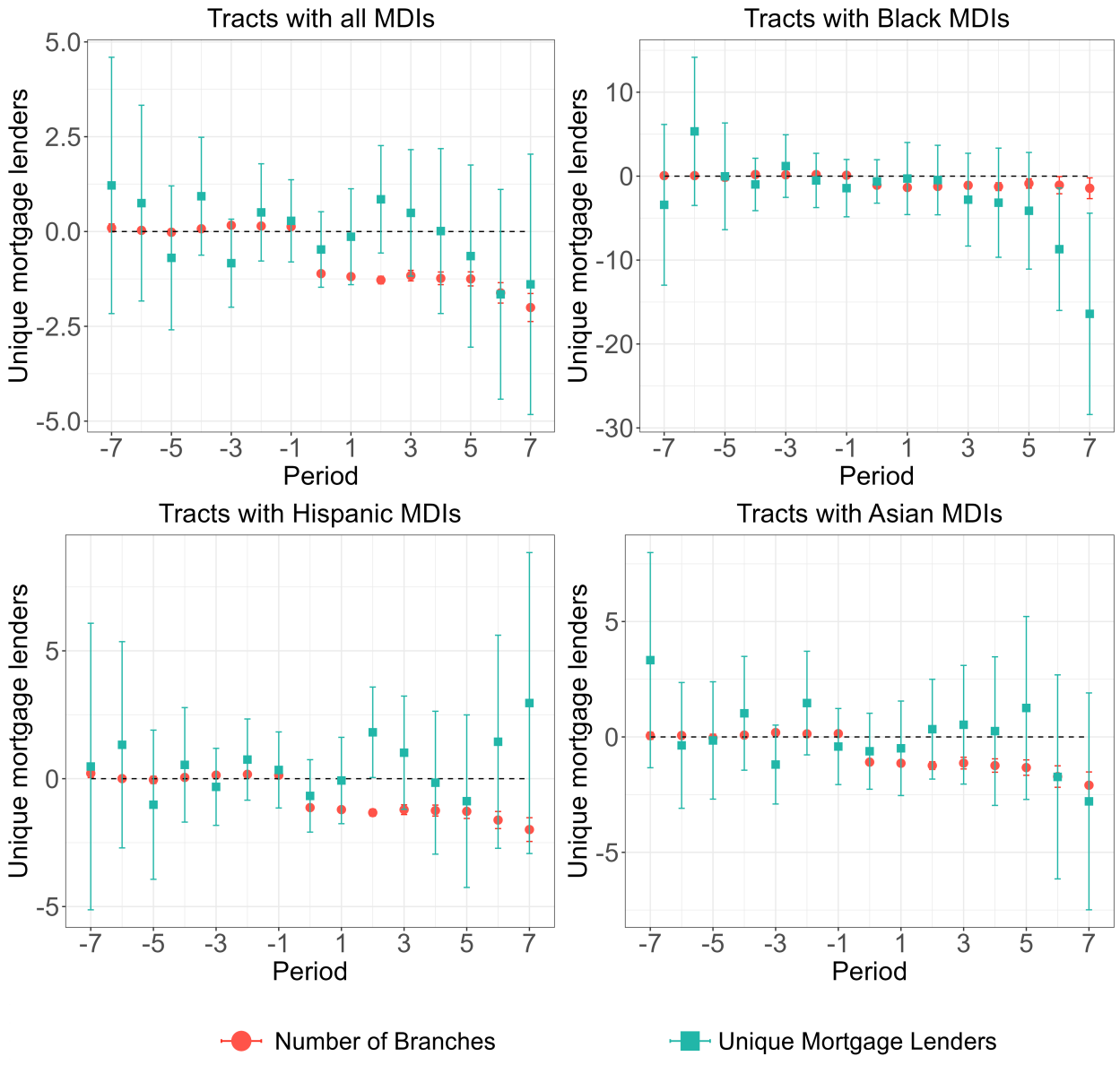


Figure 14: **Non-MDI branch closures and unique mortgage lenders-** The plots represent estimates from Callaway and Sant'Anna (2021).

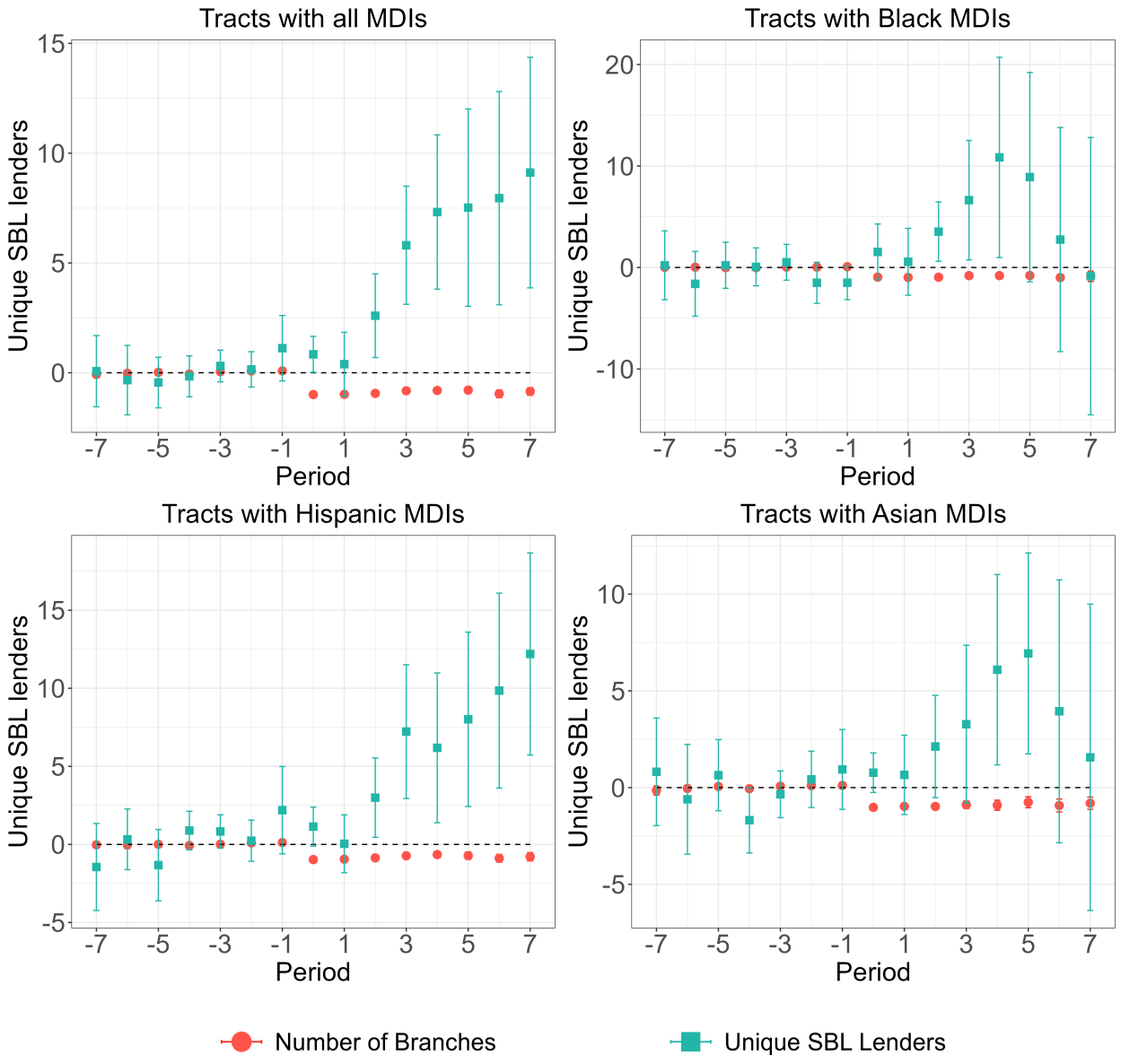


Figure 15: **MDI branch closures and unique SBL lenders per county-** The plots represent estimates from Callaway and Sant'Anna (2021).

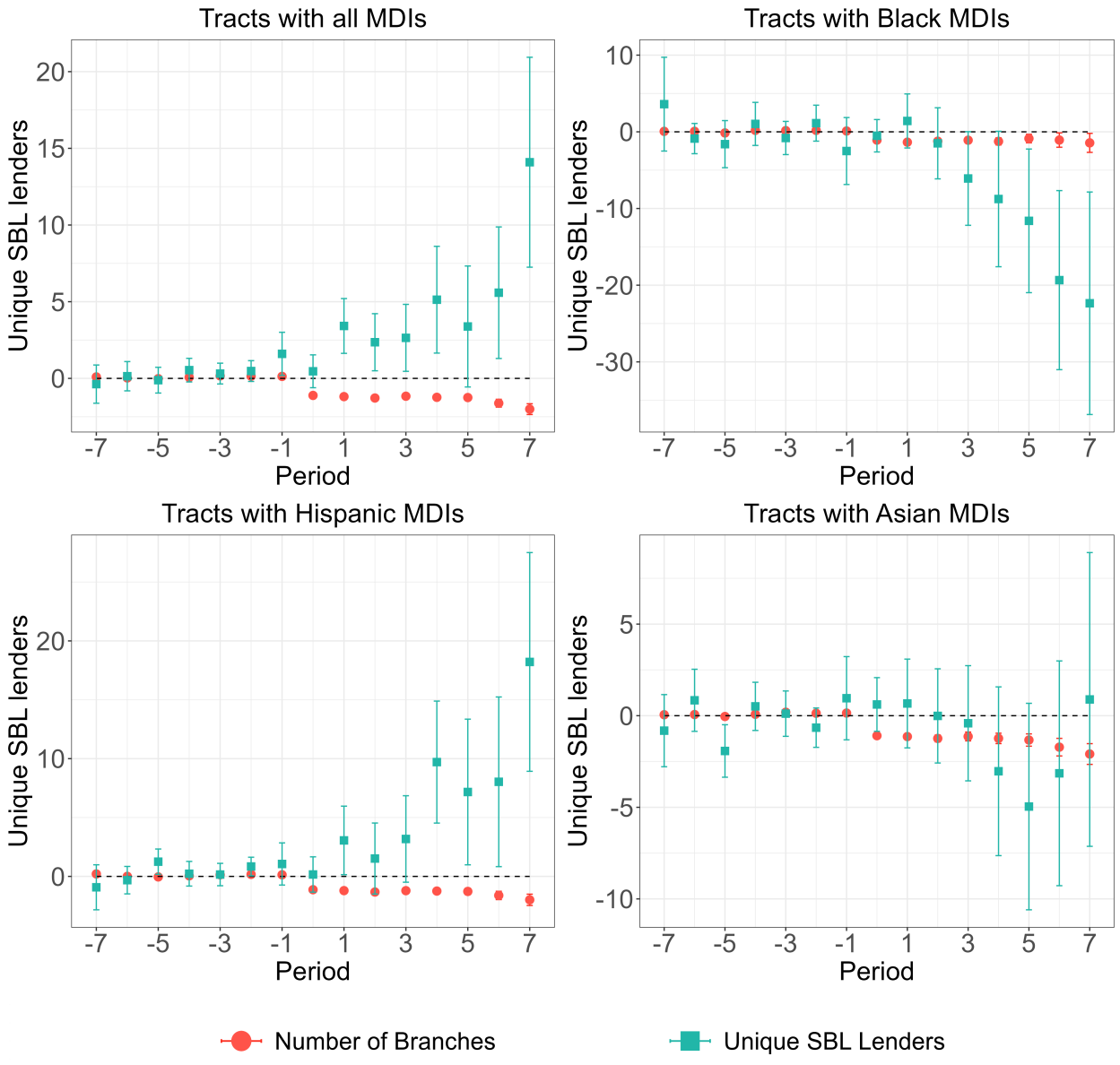


Figure 16: **Non-MDI branch closures and unique SBL lenders per county -** The plots represent estimates from Callaway and Sant'Anna (2021).

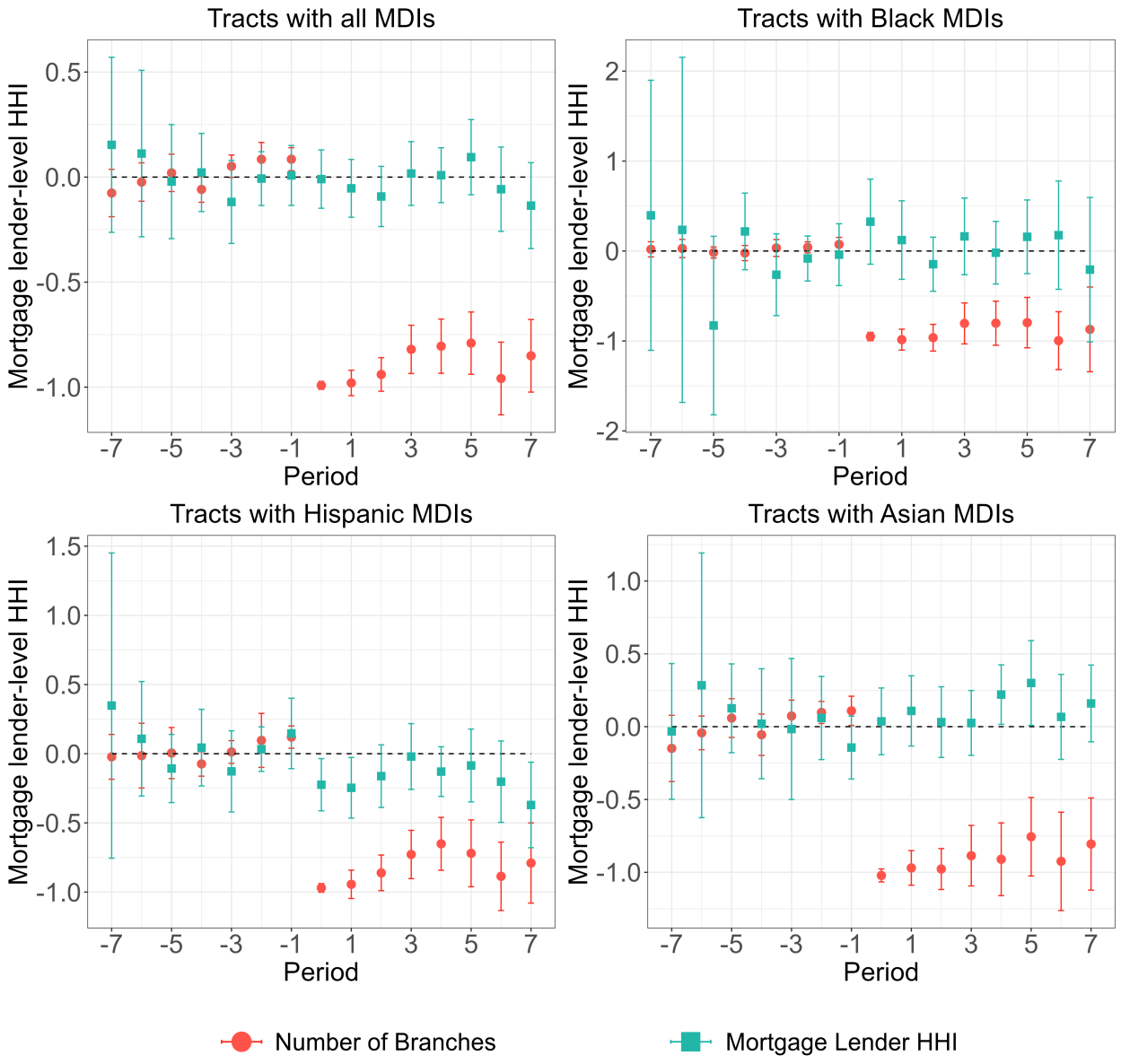


Figure 17: **MDI branch closures and mortgage lender-level HHI (HMDA data) -** The plots represent estimates from Callaway and Sant'Anna (2021).

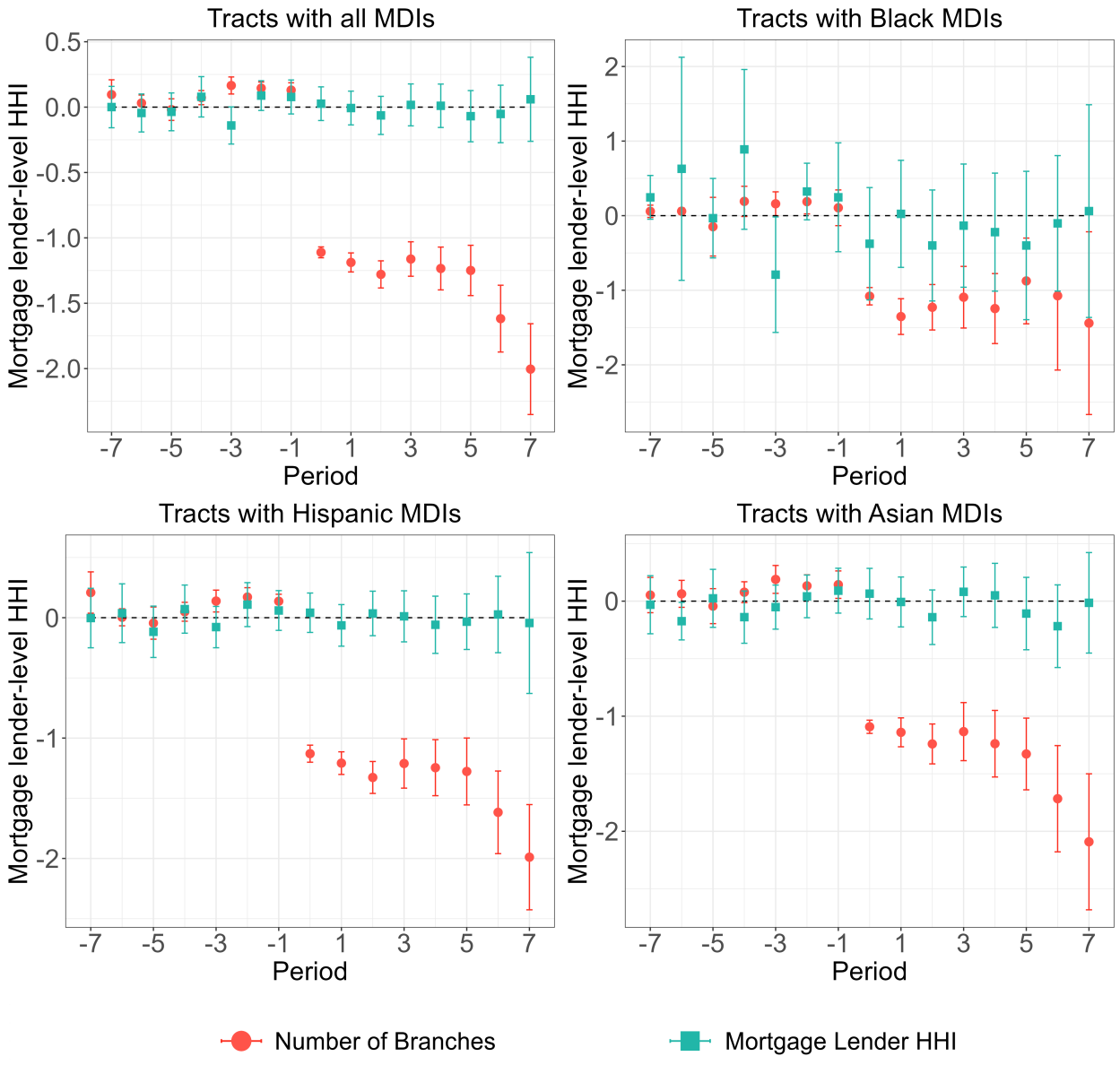


Figure 18: **Non-MDI branch closures and mortgage lender-level HHI (HMDA data)-** The plots represent estimates from Callaway and Sant'Anna (2021).

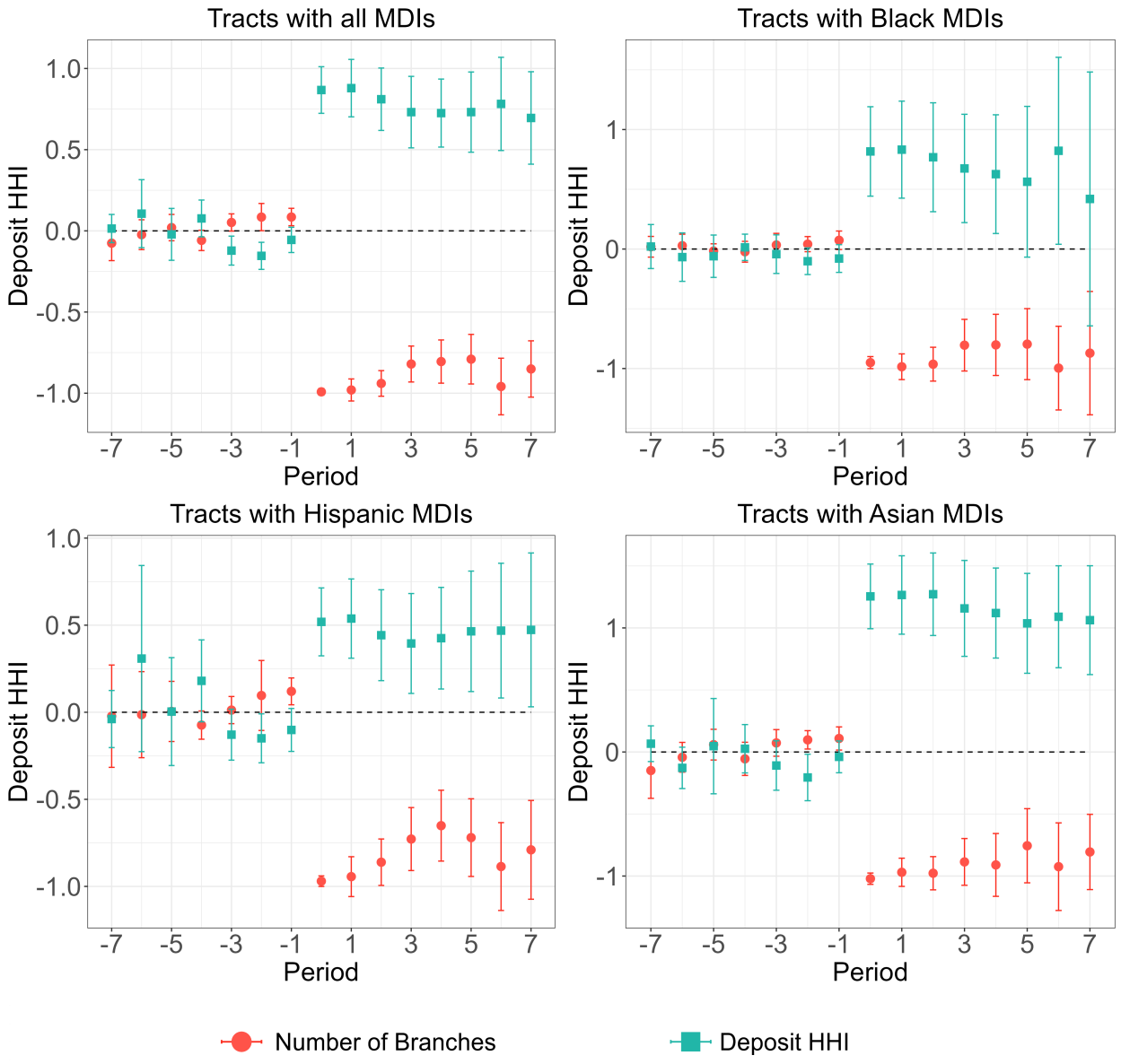


Figure 19: **MDI branch closures and deposit HHI-** The plots represent estimates from Callaway and Sant'Anna (2021).

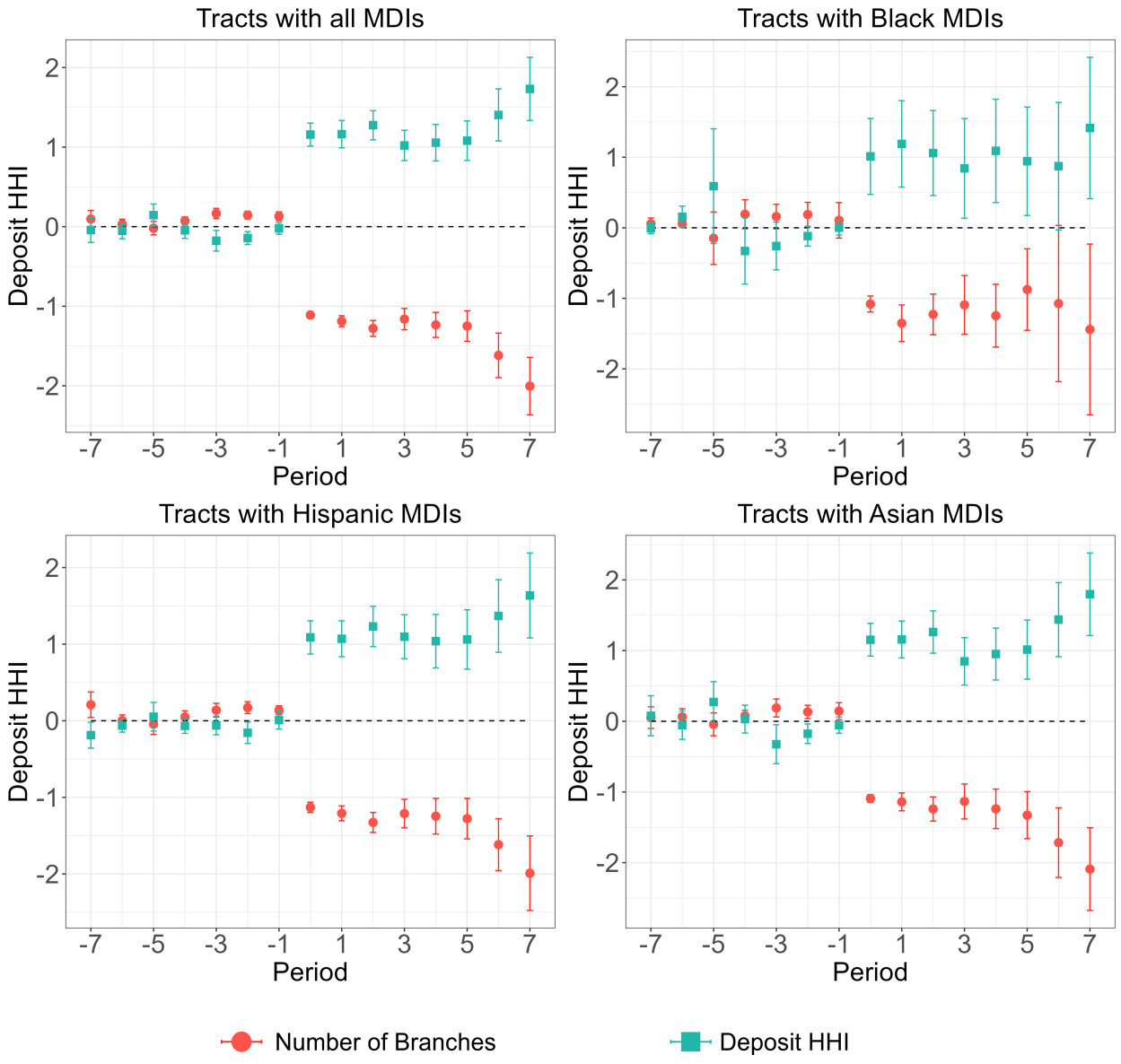


Figure 20: **Non-MDI branch closures and deposit HHI-** The plots represent estimates from Callaway and Sant'Anna (2021).

A Appendix: Bank branch characteristics

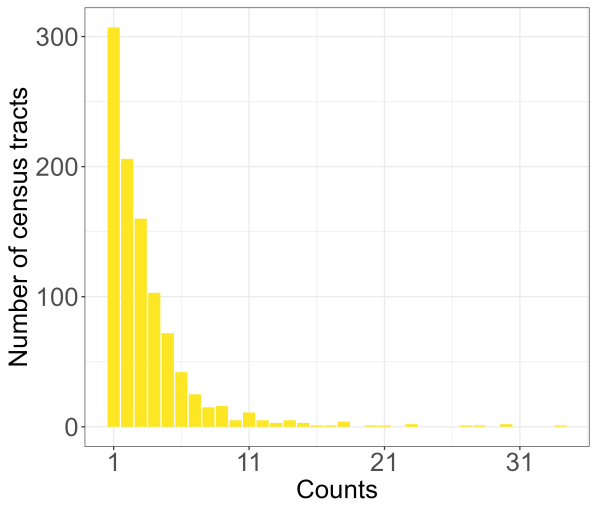
Summary statistics for bank branches in the census tracts under study in the year 2011. HHI values are in thousands. The standard deviation is in second brackets followed by the median in third brackets.

Table A1: Treatment involves closing of at least one MDI branch with non-MDI branches remaining constant.

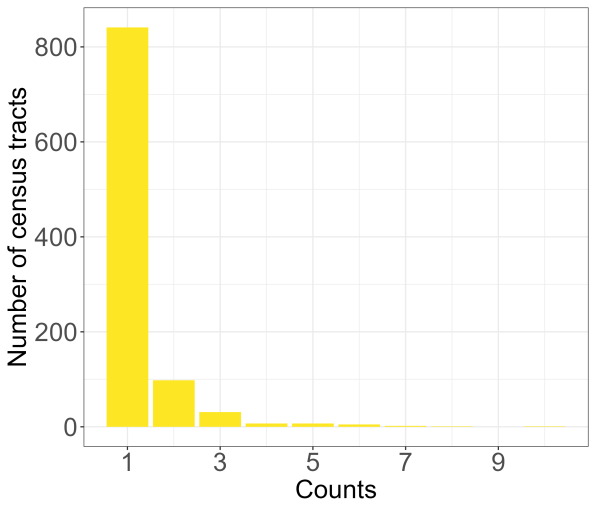
		Not Treated				Treated		
Statistic	All tracts	Black MDI tracts	Hispanic MDI tracts	Asian MDI tracts	All tracts	Black MDI tracts	Hispanic MDI tracts	Asian MDI tracts
Non-MDI branches	2.33	2.35	2.49	2.49	1.85	0.80	2.29	1.97
	(3.51)	(4.87)	(3.66)	(3.40)	(2.73)	(1.30)	(3.46)	(2.83)
	[1]	[1]	[2]	[2]	[1]	[0]	[1]	[1]
MDI branches	1.18	1.04	1.15	1.36	1.40	1.04	1.25	1.79
	(0.59)	(0.20)	(0.53)	(0.79)	(1.06)	(0.21)	(0.81)	(1.53)
	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]
Deposit HHI	6.21	7.46	6.14	5.51	6.62	8.25	6.81	5.56
	(2.91)	(2.82)	(2.80)	(3.02)	(3.09)	(2.52)	(3.09)	(3.04)
	[5.51]	[8.96]	[5.50]	[4.86]	[6.38]	[10.0]	[6.50]	[5.10]
Lender (HMDA) HHI	1.01	1.23	1.00	0.92	1.06	1.31	0.96	1.05
	(1.02)	(0.99)	(1.05)	(0.89)	(1.16)	(1.51)	(0.85)	(1.30)
	[0.70]	[0.92]	[0.71]	[0.65]	[0.71]	[0.82]	[0.71]	[0.68]
Neighboring tract branches	7.16	3.79	7.75	8.77	8.32	2.82	8.19	11.44
	(6.78)	(4.83)	(6.78)	(8.22)	(9.89)	(2.99)	(9.16)	(11.72)
	[5]	[3]	[6]	[6]	[5]	[2]	[5]	[9]
Deposit HHI (neighboring tracts)	7.31	8.59	7.31	6.78	7.34	8.36	7.49	6.58
	(2.13)	(1.82)	(2.08)	(2.04)	(2.23)	(2.10)	(2.19)	(2.11)
	[7.46]	[9.73]	[7.46]	[6.90]	[7.38]	[10.0]	[7.51]	[6.64]

Table A2: Treatment involves closing of at least one non-MDI branch with MDI branches remaining constant.

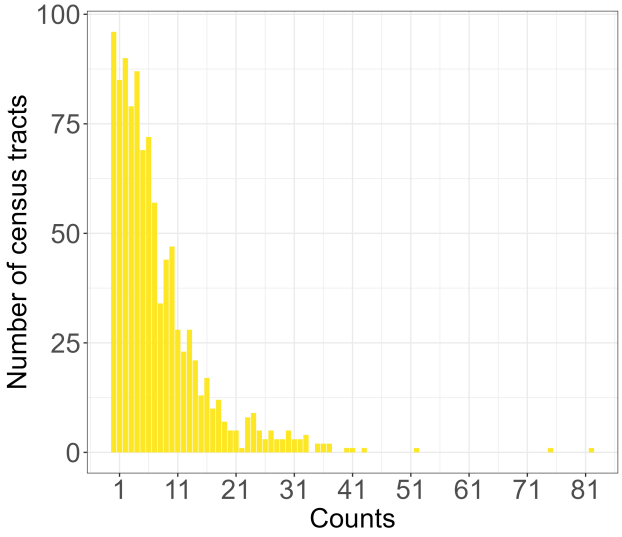
			Not Treated				Treated	
Statistic	All tracts	Black MDI tracts	Hispanic MDI tracts	Asian MDI tracts	All tracts	Black MDI tracts	Hispanic MDI tracts	Asian MDI tracts
Non-MDI branches	0.99	0.45	1.01	1.19	3.99	5.36	3.89	4.06
	(1.42)	(0.87)	(1.43)	(1.65)	(4.98)	(6.32)	(1.43)	(5.42)
	[1]	[0]	[1]	[1]	[3]	[3]	[3]	[3]
MDI branches	1.18	1.04	1.08	1.39	1.36	1.07	1.29	1.64
	(0.58)	(0.20)	(0.33)	(0.88)	(0.95)	(0.26)	(0.84)	(1.28)
	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]
Deposit HHI	7.59	8.70	7.74	6.77	4.79	5.17	4.97	4.34
	(2.79)	(2.19)	(2.66)	(3.07)	(2.51)	(2.72)	(2.51)	(2.43)
	[10.0]	[10.0]	[9.94]	[6.45]	[4.27]	[4.42]	[4.47]	[3.75]
Lender (HMDA) HHI	1.11	1.21	0.99	0.88	1.11	1.75	0.99	1.09
	(1.25)	(1.24)	(0.89)	(0.88)	(1.15)	(1.66)	(1.07)	(1.22)
	[0.78]	[0.82]	[0.72]	[0.67]	[0.77]	[1.12]	[0.70]	[0.69]
Neighboring tract branches	6.52	2.92	6.45	9.20	9.41	4.57	9.70	10.99
	(7.60)	(4.01)	(6.68)	(9.61)	(8.814	(4.57)	(8.56)	(10.17)
	[5]	[2]	[2]	[5]	[7]	[3]	[1]	[7]
Deposit HHI (neighboring tracts)	7.44	8.50	7.44	6.77	7.07	8.34	7.26	6.55
	(2.25)	(2.08)	(2.21)	(2.20)	(2.02)	(1.65)	(1.94)	(1.96)
	[7.55]	[10.0]	[7.56]	[6.75]	[7.12]	[8.30]	[7.36]	[6.75]



(a) Total bank branches

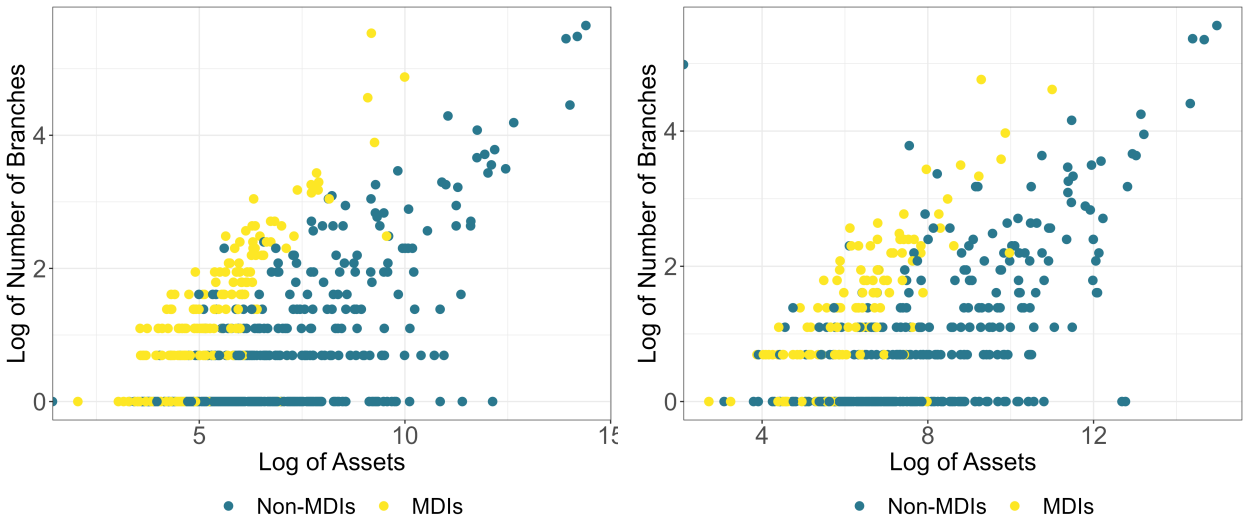


(b) MDI branches



(c) Total neighboring tracts branches

Figure A1: Distribution of Non MDI branches, MDI branches and total neighboring branches per tract over the study period, 2011 until 2021.



(a) MDIs and non-MDIs in 2011

(b) MDIs and non-MDIs in 2021

Figure A2: Log of number of branches versus log of assets in the census tracts under study between 2011 and 2021.

B Appendix: Outcome variable characteristics

The first two tables provide summary statistics for total mortgage loans (in millions) by race from in the census tracts under study in the year 2011. The last two tables provide summary statistics for SBL originations (in millions) in the census tracts under study in the year 2011. The standard deviation is in second brackets followed by the median in third brackets.

Table B1: Treatment involves closing of at least one MDI branch with non-MDI branches remaining constant.

	Not Treated				Treated			
Statistic	All tracts	Black MDI tracts	Hispanic MDI tracts	Asian MDI tracts	All tracts	Black MDI tracts	Hispanic MDI tracts	Asian MDI tracts
Total loans	$57.04	$30.49	$42.52	$92.97	$56.06	$28.66	$51.64	$79.93
	(77.72)	(45.71)	(54.68)	(104.13)	(72.38)	(68.67)	(64.80)	(87.86)
	[$28.72]	[$13.30]	[$22.62]	[$60.19]	[$28.56]	[$12.24]	[$26.72]	[$58.28]
Counts of loans	186	105	177	226	190	103	210	208
	(169)	(101)	(165)	(182)	(206)	(97)	(257)	(170)
	[134]	[65]	[123]	[196]	[128]	[71]	[125]	[183]
Loans to Whites	$20.88	$11.20	$18.57	$28.52	$20.77	$9.54	$20.01	$28.99
	(31.51)	(24.66)	(31.42)	(35.29)	(34.08)	(34.95)	(29.47)	(43.25)
	[$8.69]	[$3.07]	[$6.99]	[$15.81]	[$6.52]	[$1.79]	[$6.88]	[$10.98]
Loans to Blacks	$1.81	$ 8.23	$1.01	$1.37	$2.64	$8.89	$2.38	$1.27
	(4.18)	(12.01)	(2.45)	(2.37)	(6.39)	(11.79)	(7.89)	(2.24)
	[$0.41]	[$3.07]	[$0.19]	[$0.60]	[$0.60]	[$1.79]	[$0.38]	[$0.46]
Loans to Hispanics	$6.50	$1.11	$10.14	$4.90	$6.30	$ 1.63	$10.33	$4.10
	(10.63)	(2.08)	(13.94)	(5.85)	(9.62)	(3.92)	(12.73)	(4.36)
	[$2.48]	[$0.28]	[$4.52]	[$3.01]	[$2.88]	[$0.19]	[$5.66]	[$2.79]
Loans to Asians	$12.32	$1.53	$2.32	$32.15	$10.50	$1.68	$4.30	$23.31
	(38.41)	(3.81)	(6.70)	(59.75)	(24.14)	(8.71)	(13.21)	(33.48)
	[$1.05]	[$0.07]	[$0.40]	[$12.58]	[$1.12]	[$0.12]	[$0.58]	[$11.28]
Percent Denials	16.32	21.81	17.27	13.45	16.84	22.74	17.06	14.11
	(8.13)	(9.29)	(8.19)	(5.97)	(8.83)	(9.48)	(8.45)	(7.58)
	[14.0]	[21.0]	[16.0]	[12.0]	[15.0]	[22.0]	[16.0]	[12.0]

Table B2: Treatment involves closing of at least one non-MDI branch with MDI branches remaining constant.

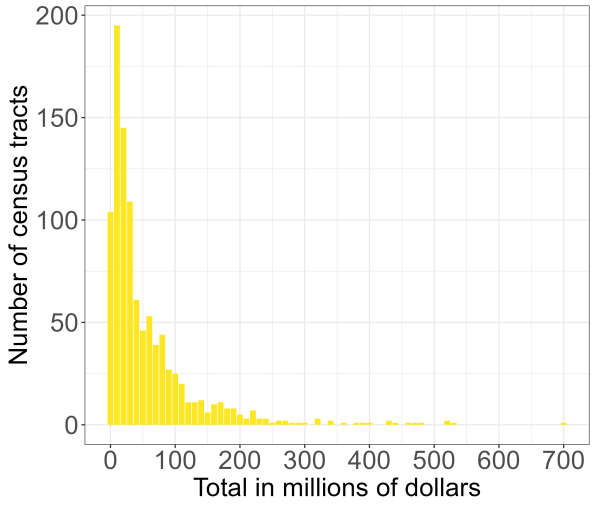
	Not Treated				Treated			
Statistic	All tracts	Black MDI tracts	Hispanic MDI tracts	Asian MDI tracts	All tracts	Black MDI tracts	Hispanic MDI tracts	Asian MDI tracts
Total loans	$49.36	$26.11	$37.92	$84.53	$68.22	$46.08	$54.70	$91.38
	(69.72)	(57.55)	(49.25)	(96.69)	(83.63)	(79.51)	(66.70)	(98.04)
	[$24.55]	[$12.10]	[$19.74]	[$55.26]	[$41.88]	[$15.66]	[$31.09]	[$61.26]
Counts of loans	170	101	167	211	208	129	214	219
	(164)	(97)	(178)	(166)	(205)	(149)	(228)	(183)
	[121]	[69]	[107]	[182]	[159]	[69]	[152]	[193]
Loans to Whites	$17.06	$8.75	$14.54	$26.04	$26.79	$19.95	$24.17	$32.12
	(28.38)	(29.51)	(24.10)	(37.51)	(38.04)	(42.45)	(35.84)	(40.34)
	[$1.72]	[$3.07]	[$4.98]	[$11.75]	[$11.36]	[$5.19]	[$9.25]	[$17.66]
Loans to Blacks	$2.27	$6.74	$1.33	$1.18	$1.91	$4.43	$1.74	$1.44
	(4.92)	(8.50)	(3.30)	(1.87)	(5.20)	(5.69)	(6.51)	(2.59)
	[$0.47]	[$4.06]	[$0.18]	[$0.49]	[$0.49]	[$2.00]	[$0.28]	[$0.51]
Loans to Hispanics	$5.85	$1.57	$9.76	$4.36	$7.02	$1.32	$10.69	$4.61
	(10.02)	(3.52)	(13.69)	(4.59)	(10.38)	(2.70)	(13.34)	(5.88)
	[$2.14]	[$0.19]	[$4.48]	[$2.86]	[$3.12]	[$0.28]	[$5.19]	[$2.65]
Loans to Asians	$10.75	$1.41	$2.39	$29.48	$12.74	$2.77	$3.57	$26.13
	(32.28)	(7.20)	(10.16)	(50.59)	(34.89)	(5.54)	(8.34)	(49.86)
	[$0.67]	[$0.07]	[$0.34]	[$11.80]	[$2.25]	[$0.29]	[$0.66]	[$10.98]
Percent Denials	16.67	21.01	17.26	13.26	16.36	18.93	17.01	14.50
	(8.75)	(11.80)	(8.73)	(6.45)	(7.97)	(10.80)	(7.78)	(6.87)
	[15.0]	[19.0]	[16.0]	[12.0]	[15.0]	[17.0]	[15.50]	[13.0]

Table B3: Treatment involves closing of at least one MDI branch with non-MDI branches remaining constant.

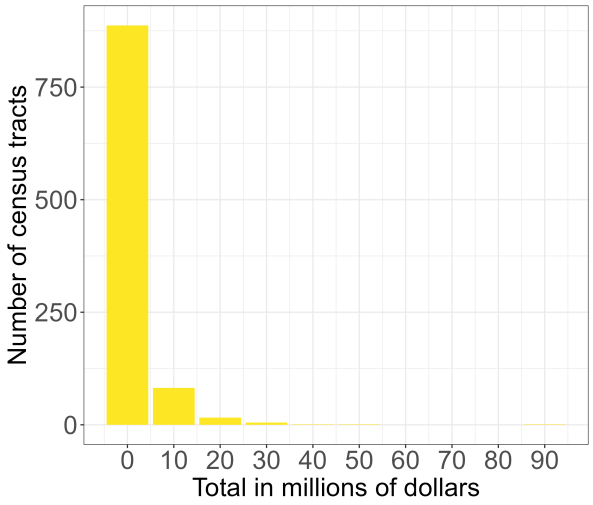
			Not Treated				Treated	
Statistic	All tracts	Black MDI tracts	Hispanic MDI tracts	Asian MDI tracts	All tracts	Black MDI tracts	Hispanic MDI tracts	Asian MDI tracts
Total loans to Small Firms	\$2.25	\$2.26	\$2.11	\$2.72	\$1.90	\$1.00	\$1.75	\$2.68
	(3.81)	(4.27)	(3.70)	(4.06)	(2.59)	(1.56)	(2.15)	(3.54)
	[\$1.13]	[\$0.55]	[\$1.09]	[\$1.64]	[\$1.06]	[\$0.26]	[\$1.14]	[\$1.61]
Counts of loans to Small Firms	58	40	53	79	54	21	52	78
	(87)	(65)	(82)	(103)	(74)	(30)	(63)	(102)
	[36]	[17]	[35]	[52]	[32]	[13]	[31]	[46]
Total loans to Small Businesses	\$7.07	\$7.72	\$6.34	\$9.22	\$6.37	\$3.53	\$5.51	\$9.45
	(14.91)	(15.96)	(14.51)	(16.96)	(13.22)	(6.11)	(8.73)	(19.43)
	[\$3.04]	[\$1.23]	[\$2.99]	[\$3.99]	[\$2.69]	[\$1.15]	[\$2.77]	[\$3.39]
Count of loans to Small Businesses	137	99	127	191	131	51	123	193
	(219)	(176)	(218)	(256)	(201)	(71)	(150)	(286)
	[80]	[34]	[76]	[123]	[75]	[26]	[72]	[106]

Table B4: Treatment involves closing of at least one non-MDI branch with MDI branches remaining constant.

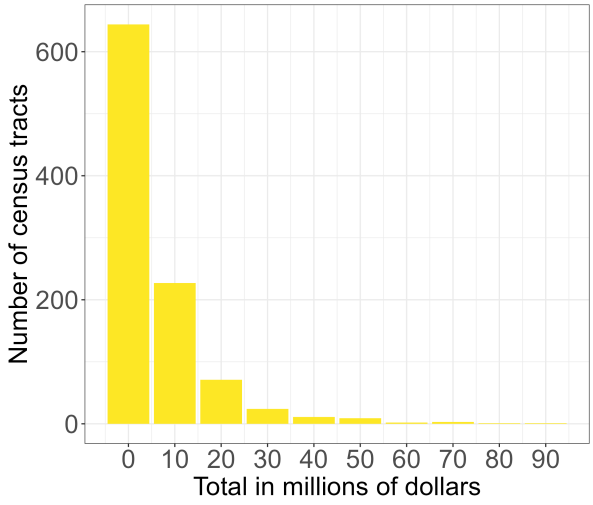
			Not Treated				Treated	
Statistic	All tracts	Black MDI tracts	Hispanic MDI tracts	Asian MDI tracts	All tracts	Black MDI tracts	Hispanic MDI tracts	Asian MDI tracts
Total Loans to Small Firms	\$1.49	\$0.77	\$1.30	\$2.23	\$3.19	\$4.46	\$2.81	\$3.48
	(2.20)	(1.21)	(1.69)	(3.06)	(5.01)	(7.22)	(4.20)	(5.41)
	[\$0.85]	[\$0.26]	[\$0.77]	[\$1.25]	[\$1.72]	[\$1.95]	[\$1.56]	[\$1.92]
Count of loans to Small Firms	42	17	36	70	82	81	73	99
	(62)	(24)	(38)	(92)	(116)	(112)	(101)	(137)
	[25]	[11]	[25]	[43]	[49]	[37]	[45]	[61]
Total loans to Small Businesses	\$4.71	\$2.22	\$3.72	\$7.78	\$10.74	\$18.57	\$8.89	\$12.32
	(11.15)	(3.87)	(6.12)	(17.59)	(20.77)	(33.06)	(17.16)	(22.16)
	[\$2.14]	[\$0.94]	[\$2.17]	[\$2.96]	[\$4.36]	[\$5.32]	[\$3.95]	[\$4.82]
Counts of loans to Small Businesses	100	38	85	170	201	217	178	245
	(162)	(53)	(89)	(249)	(304)	(349)	(271)	(349)
	[59]	[22]	[56]	[95]	[115]	[87]	[101]	[138]



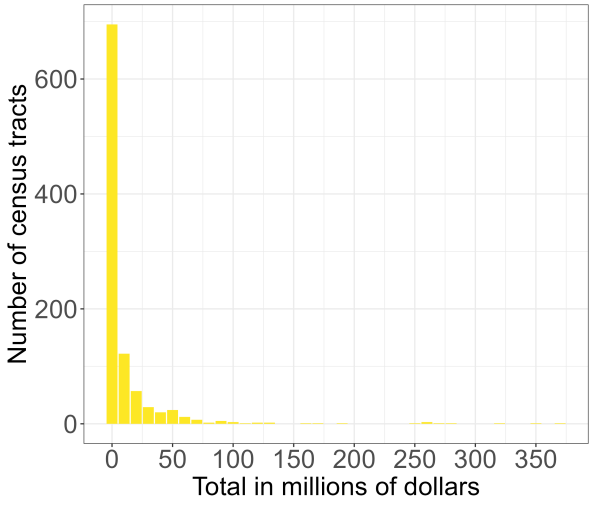
(a) Total Mortgages.



(b) Mortgages to Blacks.

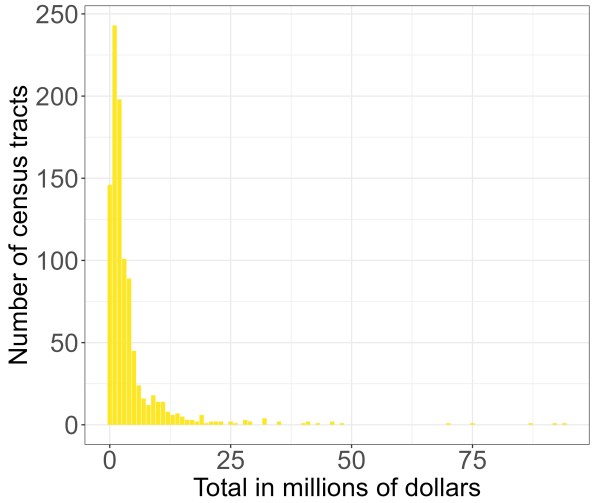


(c) Mortgages to Hispanics.

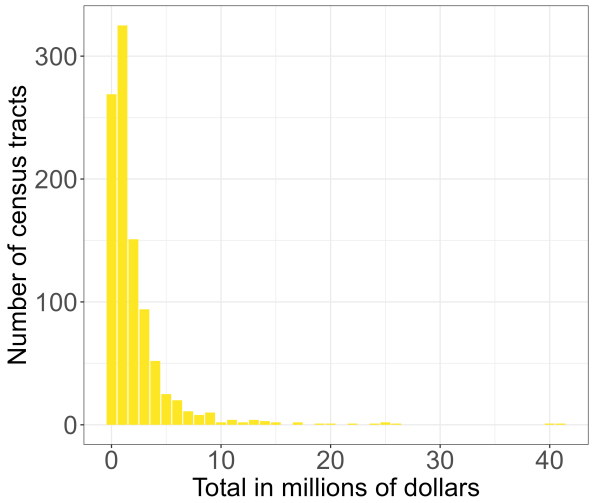


(d) Mortgages to Asians

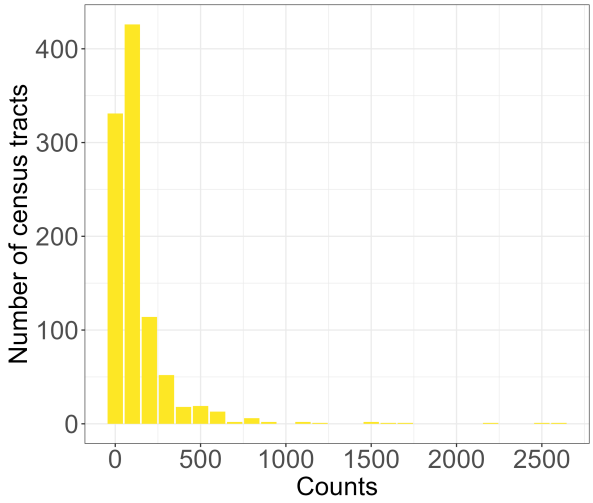
Figure B1: **Distribution of the mortgages in millions of dollar in 2011** - The left most bar represents loans between 0 and 9 million, while the second left most bar represents loans between 10 to 19 million and so on.



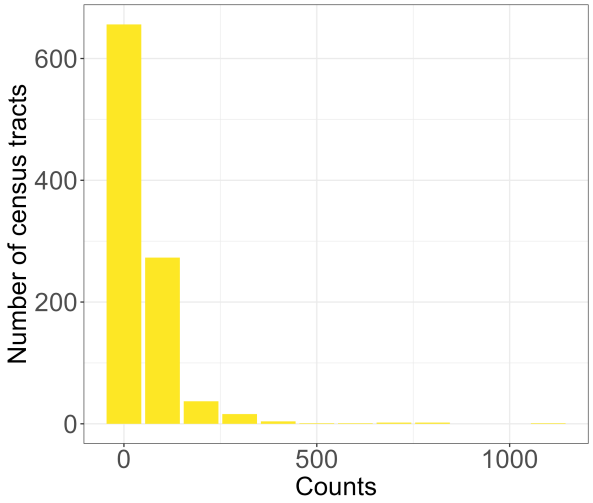
(a) Total small business loans (of sizes less than 1 million dollars.)



(b) small business loans to Small Firms (assets less than $1 million).



(c) Number of small business loans.



(d) Number of small business loans to Small Firms

Figure B2: **Distribution of small business loans in millions of dollars in 2011**- Total loans are in millions of dollars. The left most bar represents loans between 0 and .9 million, while the second left most bar represents loans between 1 and 1.9 million and so on. The count of the loans are in hundreds. Left most bar represents counts between 0 and 99, while the second left most bar represents counts between 100 and 199 and so on.

C Appendix: Census tract characteristics

Census tract level characteristics such as population, percent of different races, percent high school graduated, percent college graduated, percent in labor force, percent of mortgages in owner occupied units, percent of households on SNAP, median rent value, median household income and median home prices are collected from the 5 year American Community Survey (ACS) data. Summary statistics of these demographics within all the tracts under study are provided in Tables C1 and C2 respectively. In Table C1, the "treated" tracts are those that encounter at least one MDI branch closure with non-MDI branches remaining constant. As before, in Table C2 the "treated" tracts are those that experience at least one non-MDI branch closure with the number of MDI branches remaining constant.

Table C1: Summary statistics of demographic variables from all tracts with an MDI present in year 2011. Median household income, median rent and median home value are in thousands. Treatment involves closing of at least one MDI branch with non-MDI branches remaining constant.

		Not Treated			Treated			
Statistic	All tracts	Black MDI tracts	Hispanic MDI tracts	Asian MDI tracts	All tracts	Black MDI tracts	Hispanic MDI tracts	Asian MDI tracts
Population	4650	3420	5041	4585	4780	3536	5260	4780
	(2220)	(2101)	(2396)	(1831)	(2452)	(1616)	(2853)	(1937)
Percent Whites	58.43	23.72	74.46	48.33	53.26	21.18	71.68	46.31
	(27.59)	(23.68)	(19.44)	(22.50)	(29.27)	(22.65)	(22.40)	(23.15)
Percent Blacks	15.50	67.50	7.36	7.80	20.08	71.42	9.62	8.70
	(24.32)	(28.40)	(11.27)	(9.76)	(29.57)	(28.09)	(15.72)	(13.47)
Percent Hispanics	34.01	9.17	52.31	23.93	34.55	10.67	52.44	25.76
	(31.80)	(13.89)	(33.35)	(21.12)	(30.13)	(15.43)	(30.88)	(21.48)
Percent Asian	13.45	4.07	4.64	31.49	14.91	3.93	5.82	31.99
	(19.38)	(5.78)	(7.79)	(22.83)	(20.61)	(3.94)	(9.18)	(24.34)
Percent High-School Graduates	24.33	26.71	25.03	20.72	24.69	30.35	24.11	21.95
	(9.50)	(10.14)	(8.92)	(8.94)	(9.16)	(8.61)	(8.93)	(8.53)
Percent College Graduates	18.87	14.90	17.17	23.91	18.91	12.97	18.97	22.47
	(9.50)	(9.16)	(9.76)	(10.61)	(9.16)	(8.63)	(11.67)	(11.08)
Percent in Labor Force	63.47	59.95	63.55	65.42	64.48	59.67	65.35	65.99
	(10.23)	(13.05)	(10.05)	(8.56)	(9.39)	(11.04)	(8.92)	(8.37)
Percent Households on SNAP	13.89	22.41	16.24	7.18	13.98	21.86	15.43	8.22
	(12.32)	(13.31)	(12.76)	(7.44)	(12.17)	(12.37)	(12.21)	(9.20)
Percent Mortgages	65.60	67.55	62.34	70.81	68.24	69.14	67.00	69.80
	(17.72)	(20.35)	(18.61)	(14.33)	(16.60)	(15.82)	(17.82)	(15.25)
Median Rent	$1.38	$0.99	$1.91	$0.96	$0.97	$0.87	$0.96	$1.06
	(10.77)	(0.84)	(15.71)	(0.67)	(0.69)	(0.56)	(0.73)	(0.72)
Median Household Income	$65.07	$47.19	$59.85	$82.16	$64.05	$46.80	$64.70	$72.71
	(34.17)	(26.18)	(29.43)	(37.92)	(31.32)	(22.25)	(29.82)	(34.32)
Median Home Value	$360.40	$314.48	$260.45	$560.22	$366.50	$254.84	$306.65	$513.55
	(283.65)	(255.17)	(213.75)	(294.58)	(267.20)	(215.04)	(231.51)	(282.39)

Table C2: Summary statistics of demographic variables from all tracts with an MDI present in year 2011. Median household income, median rent and median home value are in thousands. Treatment involves closing of at least one non-MDI branch with MDI branches remaining constant.

		Not Treated			Treated			
Statistic	All tracts	Black MDI tracts	Hispanic MDI tracts	Asian MDI tracts	All tracts	Black MDI tracts	Hispanic MDI tracts	Asian MDI tracts
Population	4584	3523	5363	4636	4883	4017	5834	4696
	(2061)	(1818)	(2717)	(1705)	(2563)	(2263)	(3731)	(2057)
Percent Whites	53.97	21.41	72.00	47.01	59.07	30.91	74.14	48.35
	(29.32)	(21.73)	(22.96)	(22.25)	(26.57)	(24.39)	(18.32)	(23.49)
Percent Blacks	19.90	69.79	7.97	8.31	13.38	58.71	8.09	7.92
	(29.55)	(27.54)	(13.71)	(11.91)	(20.72)	(30.13)	(11.17)	(10.34)
Percent Hispanics	35.23	12.08	58.06	26.06	32.03	7.31	48.43	22.08
	(31.76)	(16.85)	(31.58)	(20.84)	(29.98)	(9.48)	(32.04)	(21.16)
Percent Asian	13.09	3.99	4.72	32.21	16.11	5.90	6.14	31.62
	(19.82)	(4.28)	(8.25)	(24.01)	(20.92)	(6.65)	(9.70)	(23.70)
Percent High-School Graduates	26.24	27.13	24.75	22.25	21.99	23.48	21.56	19.92
	(9.10)	(9.60)	(9.03)	(8.90)	(9.25)	(11.33)	(9.26)	(8.68)
Percent College Graduates	16.91	13.87	15.45	22.33	21.66	17.90	20.21	24.55
	(10.39)	(8.33)	(9.45)	(11.22)	(10.73)	(9.96)	(10.71)	(10.31)
Percent in Labor Force	63.05	58.29	59.88	65.59	64.96	57.73	62.86	65.90
	(9.20)	(10.91)	(9.81)	(8.06)	(10.45)	(16.34)	(10.34)	(8.66)
Percent Households on SNAP	15.67	25.89	19.50	8.13	11.59	22.15	15.21	7.42
	(12.94)	(14.48)	(13.30)	(9.09)	(10.73)	(14.70)	(12.85)	(7.03)
Percent Mortgages	65.83	63.61	57.67	69.79	67.24	62.72	59.73	70.19
	(17.29)	(17.62)	(18.52)	(14.57)	(17.77	(19.68)	(16.63)	(15.83)
Median rent	$1.37	$0.78	$1.00	$0.95	$1.08	$1.34	$1.06	$1.08
	(11.45)	(0.46)	(5.4)	(0.61)	(0.81)	(1.06)	(0.85)	(0.75)
Median household income	$61.13	$47.61	$62.12	$76.69	$70.49	$57.27	$72.15	$81.10
	(32.11)	(25.85)	(43.02)	(36.76)	(36.53)	(47.93)	(54.23)	(41.64)
Median home value	$346.18	$275.40	$274.48	$538.17	$397.54	$315.94	$309.99	$558.57
	(281.46)	(275.24)	(244.27)	(309.73)	(286.67)	(340.69)	(266.79)	(299.11)

D Appendix: A brief discussion of the non-parametric generalized difference-in-difference framework

Callaway and Sant'Anna (2021) defines the group-time average treatment effect on the treated as $ATT(g,t) = E[Y_{i,t}(g) - Y_{i,t}(\text{inf})|G_i = g]$. This gives the average treatment effect at time t for the cohort first treated in time g. They identify $ATT(g,t)$ by comparing the expected change in outcome for cohort g between periods $g-1$ and t to that for a control group not-yet treated at period t, after accounting for no anticipation assumptions. Formally, after accounting for parallel trends post-treatment, they define the ATT as:

$$ATT(g,t) = E[Y_{i,t} - Y_{i,g-1}|G_i = g] - E[Y_{i,t} - Y_{i,g-1}|G_i = g^{'}],\ for\ any\ g^{'} > t \tag{D.1}$$

Here $Y_{i,t}$ and $Y_{i,g-1}$ are the outcome variables at times t and $g-1$ respectively where $t \geq g > g-1$. This can be viewed as the multi-period analog of the identification result in the two period model showing difference in population means, $\tau = E[Y_{i,2} - Y_{i,1}|D_i = 1] - E[Y_{i,2} - Y_{i,1}|D_i = 0]$ (Roth et al., 2023). Since this holds for any comparison group $g^{'} > t$, it also holds if averaged over some set of comparisons groups such that $g^{'} > t$ for all $g \in \mathbb{G}_{comp}$.

The $ATT(g.t)$ is defined as:

$$ATT(g,t) = E[Y_{i,t} - Y_{i,g-1}|G_i = g] - E[Y_{i,t} - Y_{i,g-1}|G_i \in \mathbb{G}_{comp}] \tag{D.2}$$

Callaway and Sant'Anna (2021) then estimate the $ATT(g,t)$ by replacing expectations with their sample averages,

$$\hat{ATT}(g,t) = \frac{1}{N_g} \sum_{i:G_i=g} [Y_{i,t} - Y_{i,g-1}|G_i = g] - \frac{1}{N_{\mathbb{G}_{comp}}} \sum_{i:G_i \in \mathbb{G}_{comp}} [Y_{i,t} - Y_{i,g-1}|G_i \in \mathbb{G}_{\mathbb{comp}}] \tag{D.3}$$

Callaway and Sant'Anna (2021) consider two options for $\mathbb{G}_{comp}$. The first uses only the never-treated units ($\mathbb{G}_{comp} = \infty$) and the second uses all the not-yet-treated units ($\mathbb{G}_{comp} = \{g^{'} : g^{'} > t\}$) When there are a relatively small number of periods and treatment cohorts, reporting $\hat{ATT}(g,t)$ for all relevant (g,t) may be sufficient (Roth et al., 2023).

E Appendix: Robustness Checks

Robustness checks are carried out using the full sample of census tracts. The results are similar to the ones provided in the main body of the paper.

Table E1: Change in mortgage loans (in millions of dollars) estimated using Callaway and Sant'Anna (2021) and Sun and Abraham (2021). Standard errors, in parenthesis, are clustered at the census tract level. Baseline means are in millions.

	Panel A: Small-sized mortgages							
		MDI Closures				Non MDI Closures		
	Loans to Blacks	Loans to Hispanics	Loans to Asians	Loans to All	Loans to Blacks	Loans to Hispanics	Loans to Asians	Loans to All
C&S ATT	0.223	-0.132	-0.042	0.112	-0.229	-0.084	0.023	0 -0.222*
	(0.195)	(0.187)	(0.054)	(0.145)	(0.156)	(0.119)	(0.057)	(0.124)
S&A ATT	0.253	-0.009	-0.043	0.242	-0.253	-0.213*	0.044	-0.196*
	(0.192)	(0.178)	(0.045)	(0.169)	(0.171)	(0.113)	(0.054)	(0.109)
Baseline mean	1.52	1.62	0.43	3.20	1.05	1.83	0.48	3.18
Fixed Effects by:								
Year:	11	11	11	11	11	11	11	11
Census Tracts:	147	484	408	1085	147	484	408	1085
Observations	1,617	5,324	4,408	11,935	1,617	5,324	4,408	11,935
R^2	0.907	0.897	0.693	0.899	0.892	0.896	0.730	0.897
Within R^2	0.145	0.056	0.046	0.062	0.060	0.056	0.052	0.054
	Panel B: Large sized mortgages							
		MDI Closures				Non MDI Closures		
	Loans to Blacks	Loans to Hispanics	Loans to Asians	Loans to All	Loans to Blacks	Loans to Hispanics	Loans to Asians	Loans to All
C&S ATT	0.135	-0.028	-5.165**	-2.627	-1.423 **	0.833	3.332	1.828
	(0.723)	(0.849)	(3.132)	(2.063)	(0.720)	(0.903)	(2.273)	(2.142)
S&A ATT	0.269	-0.393	-4.017*	-3.106	-1.261*	0.296	4.282*	1.306
	(0.710)	(0.789)	(2.263)	(2.100)	(0.608)	(0.752)	(2.378)	(1.562)
Baseline mean	4.88	8.71	22.87	37.31	3.38	8.86	25.65	45.54
Fixed Effects by:								
Year:	11	11	11	11	11	11	11	11
Census Tracts:	147	484	408	1085	147	484	408	1085
Observations	1,617	5,324	4,408	11,935	1,617	5,324	4,408	11,935
R^2	0.816	0.765	0.783	0.803	0.813	0.766	0.790	0.806
Within R^2	0.082	0.072	0.045	0.089	0.047	0.070	0.060	0.088

Note: *p<0.1; **p<0.05; ***p<0.01

Table E2: Change in small business loans estimated using Callaway and Sant'Anna (2021) and Sun and Abraham (2021). Standard errors, in parenthesis, are clustered at the census tract level. Baseline means are in millions.

	Panel A: SBL to small firms (less than $1 million assets)							
	MDI Closures				Non MDI Closures			
	Blacks tracts	Hispanics tracts	Asians tracts	All tracts	Blacks tracts	Hispanics tracts	Asians tracts	All tracts
C&S ATT	-0.0601	-0.249**	0.073	-0.026	0.311	0.140	0.157	0.144
	(0.202)	(0.120)	(0.174)	(0.105)	(0.444)	(0.252)	(0.279)	(0.153)
S&A ATT	-0.000	-0.247**	0.079	-0.082	0.201	0.023	0.210	0.095
	(0.193)	(0.116)	(0.136)	(0.077)	(0.311)	(0.207)	(0.160)	(0.119)
Baseline mean	1.00	1.75	2.69	1.90	4.76	2.81	3.49	3.18
Fixed Effects by:								
Year:	11	11	11	11	11	11	11	11
Census Tracts:	147	484	408	1085	147	484	408	1085
Observations	1,617	5,324	4,408	11,935	1,617	5,324	4,408	11,935
R^2	0.901	0.853	0.892	0.878	0.911	0.859	0.905	0.889
Within R^2	0.041	0.077	0.082	0.059	0.169	0.074	0.083	0.061
	Panel B: Total SBL less than $ 1 millions							
	MDI Closures				Non MDI Closures			
	Blacks tracts	Hispanics tracts	Asians tracts	All tracts	Blacks tracts	Hispanics tracts	Asians tracts	All tracts
C&S ATT	-2.109	-0.288	-0.645	-0.449	5.332*	2.046**	3.531**	2.547**
	(1.364)	(0.447)	(0.974)	(0.430)	(2.775)	(0.719)	(1.729)	(0.636)
S&A ATT	-1.703	-0.527	-0.598	-0.886**	2.637*	1.588**	2.997***	2.091***
	(1.059)	(0.442)	(0.696)	(0.376)	(1.423)	(0.622)	(0.871)	(0.482)
Baseline mean	3.53	5.51	9.45	6.37	18.58	8.89	12.32	10.74
Fixed Effects by:								
Year:	11	11	11	11	11	11	11	11
Census Tracts:	147	484	408	1085	147	484	408	1085
Observations	1,617	5,324	4,408	11,935	1,617	5,324	4,408	11,935
R^2	0.848	0.877	0.896	0.890	0.904	0.886	0.901	0.897
Within R^2	0.054	0.050	0.107	0.060	0.246	0.087	0.130	0.088

Note: *p<0.1; **p<0.05; ***p<0.01

F Appendix: How the number of MDI branches in the neighboring tracts changes as MDI and non-MDI branches close in the studied tracts

The two figures in this section show plots for change in number of MDIs when MDI branches close with non-MDI branches remain constant (Figure F1) and when non-MDI branches close with MDI branches remaining constant (Figure F2). Following an MDI closure, the number of MDIs in neighboring tracts increase by 10 percent, while following an Asian MDI closure, the number of MDIs in neighboring tracts increase by 13 percent.

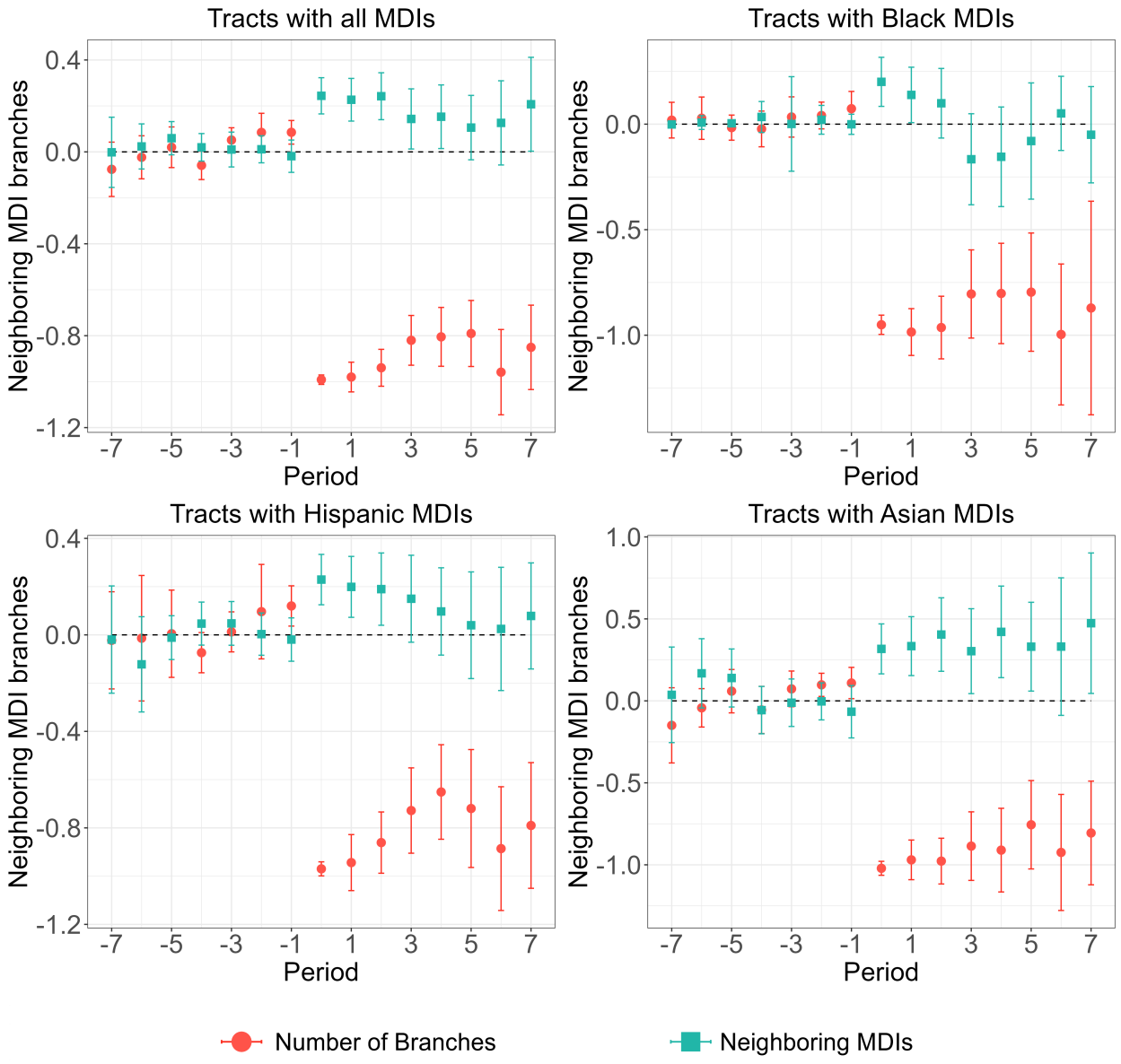


Figure F1: **MDI branch closures and the number of MDIs in neighboring tracts -** The plots represent estimates from Callaway and Sant'Anna (2021).

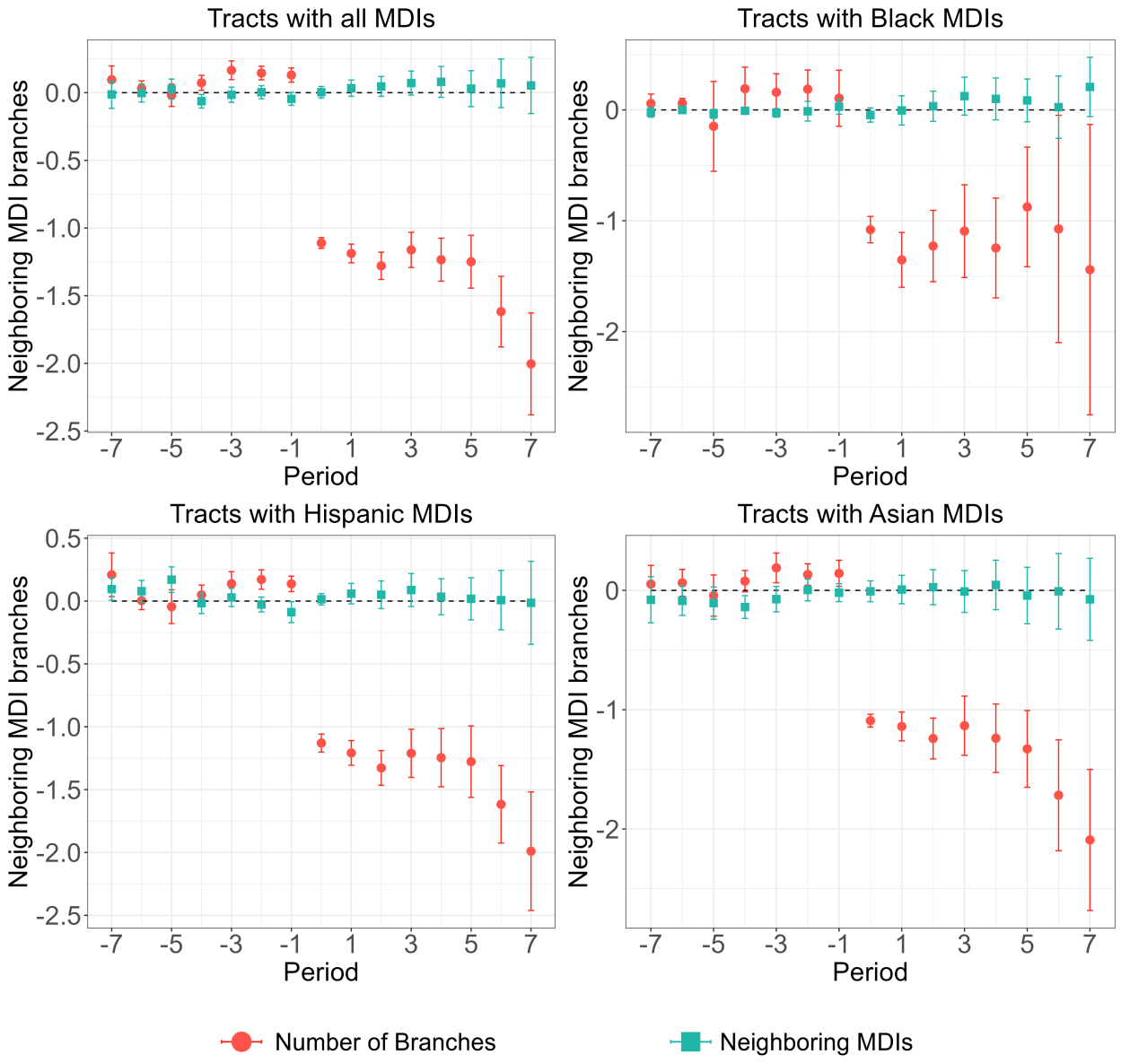


Figure F2: **Non-MDI branch closures and and the number of MDIs in neighboring tracts-** The plots represent estimates from Callaway and Sant'Anna (2021).

G Appendix: Distribution of MDIs and credit unions across the US

Unlike banks and more traditional retail financial institutions, end to avoid places with a high concentration of retail banks and also tend to be located in non metro counties. This implies that credit unions do not follow the "herd" mentality shown by traditional retail banking institutions which tend to locate close to each other. Instead credit unions cluster around common bonds of association. Hence they end up capturing a different market than traditional banks and do not engage in direct competition with retail banks. The figure next page shows the number of MDI branches per county in 2011 and the number of credit unions serving per 10k population per county in 2011 (Deller and Sundaram-Stukel, 2012).

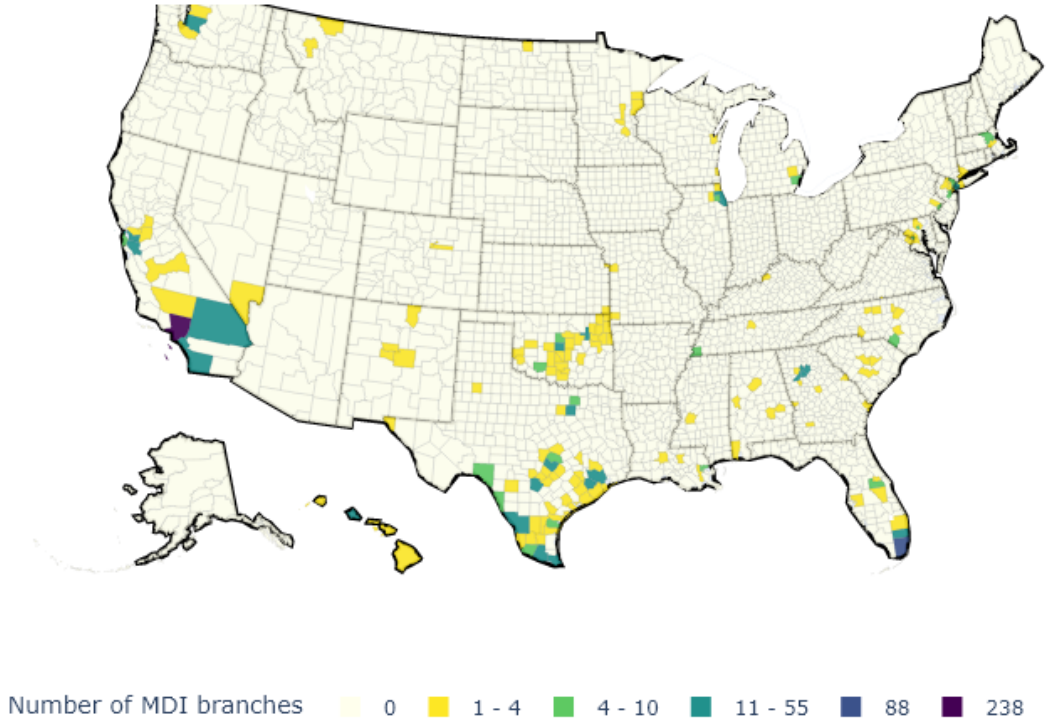


Figure G1: Counties with MDIs in 2011

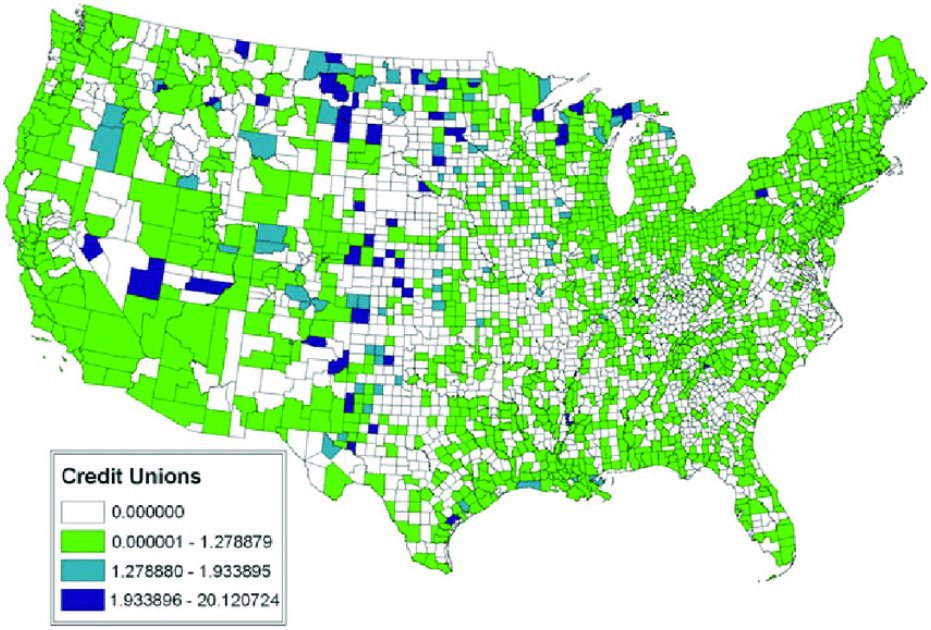


Figure G2: Counties with credit unions per 10k population.

Figure G3: **Credit unions vs MDI branches** Figure shows credit unions per 10k population in 2011 and MDI branches per county in 2011.