The Competitive Effects of Megabanks on Community Banks

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NOTE: The analysis, conclusions, and opinions set forth here are those of the author(s) alone and do not necessarily reflect the views of the Federal Deposit Insurance Corporation.

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Abstract

The effects of industry consolidation are felt acutely at the branch level: in 1994, branches of banking organizations with fewer than $1 billion in assets represented 37% of the over 81,000 national bank branches. By 2016, small bank branches had fallen to 26% of the national total despite bank branches increasing by 13% industry-wide. We provide new insights on the effects of consolidation within the banking industry by documenting the variation of these trends across the metropolitan statistical area (MSA) and non-MSA divide. We show that overall branch and deposit growth is highest in MSAs both in relative and absolute terms. While small bank branches and deposits have declined within and outside of MSAs, we find that the decline is steeper in the MSAs, which also happen to be where large bank expansion is concentrated. We employ a difference-in-differences approach to consider the role that large bank competition plays in the performance of community banks. We use large bank expansion through mergers and acquisitions of medium-sized banks as a quasi-experiment to changes in the small bank competitive environment. We find that large bank entrance impacts small banks positively: branches of small banks that are more exposed to large bank entrance do not display worse performance outcomes, and areas of greater exposure exhibit increased small bank expansion following large bank merger activity. These results are supportive of economic theory, survey evidence on bank competition and the existing literature.

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1 Introduction

Two concurrent trends have defined the banking industry in recent decades. From 1994 to 2016, banking organizations with real assets exceeding $50 billion\(^1\) increased their share of industry deposits from 33\% to 68\%. Over the same period, the number of banks with real assets fewer than $1 billion decreased from 10,856 to 5,267, accounting for over 80\% of the total decrease in banking institutions. The effects of industry consolidation are felt acutely at the branch level: in 1994, branches of banking organizations with fewer than $1 billion in assets represented 37\% of the over 81,000 national bank branches. By 2016, small bank branches had fallen to 26\% of the national total despite bank branches increasing by 13\% industry-wide. The literature points to changes in regulation, technology, and competition as the driving force behind these trends.\(^2,3\)

In this paper, we provide new insights by first documenting the variation of these trends across the urban-rural divide. We show that overall branch and deposit growth is highest in metropolitan statistical areas (MSAs) both in relative and absolute terms. This is not surprising, as MSAs have seen more growth in population and income than their non-MSA counterparts. However, while small bank branches and deposits have declined both inside and outside of MSAs, we find that the decline is steeper in the MSAs. The presence of small banks has diminished the most in areas where the economy and the banking sector as a whole have undergone the greatest expansion: there appears to be a “growth-economy small-bank gap.”

Meanwhile, large bank expansion is concentrated in counties that saw the greatest economic and banking sector growth from 1994 to 2016. Large banks’ growth accounted for all of the banking industry gains in branches (16\%) and deposits (136\%) in MSAs, in addition

\(^1\)Unless otherwise noted, all dollar values are in constant 2010 dollars. We define a bank’s size according to bank holding company assets.


\(^3\)Hereafter we refer to banking organizations with less than $1 billion in assets in 2010 dollars as small banks and those with more than $50 billion in assets in 2010 dollars as large banks. We refer to all others as medium-sized banks.
to capturing some of the market that had previously been held by small and medium-sized banks in 1994. (Branches and deposits in non-MSAs grew by 2% and 16%, respectively.) Even as large banks have moved away from retail branches in more recent years, they have done so asymmetrically across the urban-rural divide.

Given the expansion of large banks into MSAs (and growing economies in general) and the decline of small banks in those same geographies, we examine the extent to which large banks impose competitive pressures upon small banks.

Economically, the composition of the banking industry is thought to matter given the role that small banks play in providing small business financing (Berger and Udell (2002) and references therein) and the subsequent role that small and medium-sized enterprises play in driving economic growth (Neumark, Wall, and Zhang (2011)). As large banks expand, understanding the direct competitive effects of their expansion on small banks is needed to understand broader effects in the real economy. Additionally, competition can amplify or dampen other factors contributing to structural changes in the banking sector. For example, if the competitive effects of large banks on small banks are negative, then regulatory or technology changes that benefit large banks will be amplified by industry competition. If, on the other hand, the competitive effects of large banks on small banks are positive, the industry competition mollifies regulatory and technological innovations.

The theoretical effects of large bank competition on small banks are ambiguous. The National Survey of Community Banks finds that small banks point to other small banks and mid-sized banks as their primary competitors for banking products. Survey evidence is further supported by a large literature that argues that small banks offer a differentiated product from large banks. In particular, the literature focuses on small banks’ roles as “relationship lenders,” providing credit and other financial services for opaque borrowers, especially small business.\(^4\) Under this view, the expansion of large banks in particular—especially at the expense of mid-sized banks—could improve the competitive environment from small banks’

\(^4\)See, for example, Berger, Miller, Petersen, Rajan, and Stein (2005), Chakraborty and Hu (2006), and Petersen and Rajan (1995).
Large banks could have a detrimental effect on small banks if large banks have access to technologies that allow them to effectively compete for small bank business (Amel and Prager (2016)). Likewise, large bank competition could have a negative effect on small banks if banks have access to similar technologies but large banks benefit from economies-of-scale (e.g. Berger and White (2007)). For example, DeYoung, Frame, Glennon, and Nigro (????) argue that the historical boundaries that defined the small business lending model of small banks had nearly eroded by 2001. In particular, they attribute large increases in distances between small business borrowers and credit providers to the adoption of small business credit scoring as the source.

We adopt a difference-in-differences approach, using large bank expansion through mergers and acquisitions of medium-sized banks as a quasi-experiment to changes in the small bank competitive environment. Several features make this well-suited to the questions at-hand. First, unlike the creation of a new branch, when a large bank acquires another bank, the effect is not to create new sources of competition but, rather, to alter existing sources of competition; our measure of changes to large bank competition does not conflate changes in the number of branches within a market with changes in the size of existing branches. Second, by restricting our data to merger activity in which a sufficiently large number of branches are acquired, the exact location of any particular branch can be viewed as non-essential to the merger decision, and therefore exogenous. We tease out the identification more explicitly in Section 5.

Our overarching approach is to compare branch performance before and after merger activity between zip codes experiencing large bank merger activity and zip codes within the same county that did not contain an acquired branch. When a large bank expands into an area through a merger or acquisition, it enters the markets previously inhabited by the branches of the acquired bank. As such, large bank expansion occurs in certain areas and is not uniformly distributed across the broader market. We exploit variation between zip codes within a county experiencing large bank expansion. Branches acquired by the large
bank exist in some of the zip codes within the county but not all. Our analysis compares the
performance of bank branches within zip codes experiencing merger activity to that of bank
branches in zip codes within the same county that did not contain a branch acquired by the
large bank.

We find, broadly, that large bank competition has positive effects for small banks. Cons-
sistent with some bank customers preferring a banking relationship with a non-large bank,
we see lower deposit growth in acquired branches after acquisition by a large bank. Small
branches within the same zip code do not see greater deposit growth compared to small
branches in neighboring zip codes, however. Likewise, small branches with greater exposure
to large bank entry display similar rates of branch existence following merger activity to those
with less exposure.

Robust survey evidence reveals that while small banks view medium-sized banks as among
their primary competitors, they do not view large banks as an equal source of competition.
Thus, a large bank replacing a medium-sized bank may confer competitive benefits to small
banks within the target’s market. Yet, small banks better located to benefit from large bank
merger activity do not see stronger deposit growth compared to those located in adjacent
areas. A potential resolution lies in small bank expansion and entry: merger zip codes
experience greater small bank expansion post-merger compared to zip codes within the same
county that did not see any medium-sized branches acquired by a large bank. These findings
are consistent with previous studies (Berger, Bonime, Goldberg, and White (2004)).

Economic theory suggests that if merger activity improves the small bank competitive
environment for a given area, new entrants should target the area and any excess gains
should not persist. Considering only zip codes containing an acquired branch, exposed small
branches closest to the acquired branch – that is, those best-located to see improvement in
banking conditions following the merger – do not display greater deposit growth than those
located further away. We are currently exploring the location decisions of new small branch
entrants into these merger zip codes.

Finally, in ongoing analysis, we explore how demographic changes relate to the small-bank
gap. In particular, we are examining the growth-economy small-bank gap as a function of a number of geographic and demographic characteristics. Given the literature’s finding that small banks have a competitive advantage in relationship banking, we hypothesize that the small-bank gap should be smaller in regions that exhibit more population stability. Furthermore, technologically-savvy consumers may place lesser value on the traditional relationships provided by small banks. Consequently, we are using population turnover statistics and internet penetration as proxies for demographic stability and bank customer technological preferences to re-examine the small-bank gap.

Our paper contributes to a large literature on competition in the banking industry. One of the primary focuses of this literature is how competition affects the ability of community banks to lend on the expectation of repeated customer interactions (that is, “relationship lending”).\footnote{Boot (2000).} Berger, Miller, Petersen, Rajan, and Stein (2005), Chakraborty and Hu (2006), Carter, McNulty, and Verbrugge (2004), and DeYoung, Hunter, and Udell (2004) all find that community banks have a comparative advantage for these types of loans. This advantage may emanate from community banks’ superior knowledge of local markets\footnote{e.g. Petersen and Rajan (1994), Jagtiani and Lemieux (2016)} or through their flatter organizational structure.\footnote{e.g. Petersen and Rajan (1995), Udell (1989).}

The theoretical and empirical effects of large bank competition on community banks’ competitive advantage in relationship lending is ambiguous. Hauswald and Marquez (2006) argue that competition decreases banks’ incentives to acquire information in lending markets and decreases the role of relationship lending. On the other hand, Yafeh and Yoshia (2001) argue that increased competition through reduced regulation causes increased investment in relationship lending to create endogenous barriers to entry. Empirically, Presbitero and Zazzaro (2011) show that large out-of-market banks are detrimental to relationship lending. Petersen and Rajan (1995) also argue that competition erodes community banks’ competitive advantage.

Differences in operating costs and access to capital markets may also affect the competitive
market for deposits between large banks and community banks. Park and Pennacchi (2008) demonstrate that large multi-market bank mergers decrease deposit rate competition as the larger banks are less inclined to compete for this funding source given their alternatives. Consistent with this view, Hannan and Prager (2004) show that multi-market banks offer lower retail deposit rates than single market banks. Furthermore, a greater presence of multi-market banks depresses deposit rates at single market banks.

In contrast to most of the existing literature, our primary focus is to determine the cumulative competitive effects of large banks on small banks. The above literature suggests that large banks compete with small banks’ core lending (relationship loans) and funding (retail deposits) in ambiguous ways. With these mechanisms in mind, we address whether the net effect on small banks has contributed to their declining presence. We also differ from the aforementioned literature by making use of the localized manner through which banks compete. For example, Nguyen (2017) uses tract level data to show that aggregate small-business lending outcomes from branch closings dissipate within six miles. We rely on similar within-county variation in competition to estimate the effects of large bank competition on community banks.

Our paper also contributes to a broader literature on the competitive effects of large firms on local businesses. Jia (2008) finds that chain store entry into a market makes roughly 50% of small discount retail competitors unprofitable. As a result, 40-50% of the net change of small discount stores from the late 1980s to the late 1990s can be accounted for by Walmart’s expansion during this period. Basker (2005) also looks at Walmart’s expansion and uses an instrumental variables approach to understand the effect of entry on labor market outcomes. Our study considers a similar environment in which a large industry player enters a new market. However, a number of institutional features of the banking industry make it particularly interesting for examining the issue. First, all banks must submit detailed regulatory filings, giving researchers an insight into the often-opaque small, local-firm-side of competition. Second, large banks often expand via merger rather than the establishment of new branches. This lends itself to different methods and analysis, discussed further in Section 5.
Our paper is structured as follows. Section 2 documents the small bank gap. Section 3 discusses major regulatory changes affecting the banking industry during our sample period while Section 4 describes our data. Section 5 discusses mergers in the banking industry, the data, and empirical strategy. Section 5.2 discusses the results. Section 6 concludes and discusses possible directions for future empirical work.

2 Small-Bank Growth-Economy Gap

Though much of the literature documents the declining presence of small banks, we are the first to our knowledge to document the growth-economy small-bank gap. In Figure 1, we document changes in the number of banks, bank branches, and bank deposits by bank size. Panel A depicts changes to the total number of banks using Call Report data and shows that the overall number of banks has declined, but that the vast majority of this decline has come from small banks. Panel B plots the total number of bank branches over this time. While the total number of bank branches increased from 1994 to 2016, small bank branches declined, medium-sized bank branches were roughly constant, and large bank branches expanded. Panel C demonstrates a similar trend to Panel B using deposits.

Population grew collectively by more than 23% in MSA counties from 1994 to 2015, while non-MSA counties’ population grew by less than 7%. MSA counties’ nominal economic growth was 60% from 1994 to 2015, while non-MSA counties’ nominal economic growth was 40%. The overall banking sector reflects these differences: real deposit growth more than doubled in MSAs from 1994 to 2015, with non-MSA real deposit growth increasing by about 15%. Total bank branches increased by more than 16% in MSAs, but by less than 3% in non-MSAs.

In Figure 2 we show how the trends from Figure 1 differ between MSAs and non-MSAs.

\(^8\) Critchfield, Davis, Davison, Gratton, Hanc, and Samolyk (2004) study 1984-2003 and find that the fall in community banks was similar independent across differences in regional economic factors and urban distinctions. However, the time period of study and focus of their study preclude an examination of the inverse relationship between bank industry performance and the performance of small banks that we document.
Panel A shows the real deposits for MSAs. For MSAs, real deposits grew by roughly $5.5 trillion dollars, more than doubling, from 1994 to 2016. Large bank domestic deposits grew by $6 trillion dollars; medium bank branch deposits grew by $287 billion dollars; and deposits held by small bank branches declined by $210 billion dollars. Panel B demonstrates these trends for non-MSAs: total real deposits grew by 16%; large bank branch deposits grew by almost $65 billion dollars; medium bank branch deposits grew by $54 billion dollars; and small bank branch deposits declined by $18 billion dollars. Panel C shows the relative change in deposits for small banks and all banks using 1994 as the base year. In relative terms, domestic deposits grew most in MSAs. Panel D plots the difference between cumulative total bank domestic deposit growth against small bank domestic deposit growth (again using 1994 as the base year). Figure 3 depicts similar differences between small bank branches in MSAs and non-MSAs.

Beginning in the mid-1990s small banks began underperforming the banking sector overall with regard to domestic deposits in both MSAs and non-MSAs. Beginning in the early 2000s, small bank deposit growth began significantly falling behind the banking industry overall in MSAs, a trend that abated temporarily in the years around the financial crisis, but continued to accelerate thereafter. By 2015, cumulative banking deposit growth exceeded small bank deposit growth by about 160% in MSAs and by about 20% for non-MSAs since 1994.

Macroeconomic indicators are also more positive in MSAs than non-MSAs. Figures 4 and 5 plot population and gross county product (GCP), respectively, for MSA versus non-MSA counties. In both cases, MSA counties appear to have real activity that would be most conducive to banking activity. Figure 5 shows that from 1994 to 2015, real economic growth in MSA counties was 60%, against only 40% in non-MSA counties. Figure 4 shows that population growth in MSA counties exceeded 20%, while it was about one-third of this amount in non-MSA counties. Despite the auspicious real economic activity and overall success of the banking industry in MSAs, small banks have seen no more success in these regions of the country. We call this the growth-economy small-bank gap.
3 Regulatory Environment

Over the past three decades, major regulatory changes accompanied dramatic changes to the structure of the banking industry. We begin our study after the passage of the 1994 Riegle-Neal Interstate Banking and Branching Efficiency Act, which ushered in a historic new wave of mergers (Berger, Bonime, Goldberg, and White (2004)). Prior to 1994, banks could only branch across state lines based upon state-by-state negotiated agreements that had become increasingly popular in the prior decade. The Riegle-Neal Act effectively removed all restrictions on interstate banking, enabling more cross-state mergers. The ultimate effect of these mergers was to reduce the number of small banks and concentrate an increasing amount of the banking industry in a relatively constant number of medium and large banks (DeYoung, Hunter, and Udell (2002)). Our paper is motivated, in part, by the consolidation during this time period. Furthermore, our identification strategy relies on the heightened merger activity that accompanied this regulatory change.

Congress passed two other major pieces of banking legislation during our sample period, the Financial Services Modernization Act of 1999, also known as the Gramm-Leach-Bliley Act (GLBA), and the Dodd-Frank Wall Street Reform and Consumer Protection Act in 2010. Despite limited academic research surrounding GLBA and Dodd-Frank, a robust discussion in the popular press in both cases highlights the supposed effects of these acts on consolidation. GLBA removed the remaining barriers that had been erected by the Glass-Steagall Act of 1933 between banks and securities companies and insurance companies. Avraham, Selvaggi, and Vickery (2012) note that nonbank subsidiaries grew dramatically subsequent to GLBA. The expansion in the scope of bank holding companies contributed to the increased concentration of bank holding companies’ assets among the largest ten entities, which rose by approximately ten percentage points from 1998 to 2015. Meanwhile, the Dodd-Frank Act instituted a number of new rules ranging from stress tests to those governing mortgage lending. Some

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9 For an excellent summary of changes to banking regulation and the industry structure leading up to and including much of this time period, see DeYoung, Hunter, and Udell (2004).
10 For example, Sorkin (2016) and Nichols (2016).
11 Source: Y-9C data.
non-academic papers and press (e.g., Peirce, Robinson, and Stratmann (2014)) argue that these rules increase “compliance” costs affecting scale economies in the banking industry and accelerated consolidation.

This paper does not aim to address the effects of these major pieces of legislation on banking industry consolidation directly. However, these federal laws are noteworthy for their role in the public debates about bank industry concentration. The primary focus of this paper is the role that direct competition between large and small banks plays in amplifying or mitigating industry consolidation trends.

4 Data

Our data set is constructed from several sources. Branch-level information, such as deposits and location, is from annual Summary of Deposits (SOD) submissions to the FDIC. We utilize a multi-step process to improve upon the latitude and longitude data contained within SOD.\(^{12}\) We supplement branch observations with annual bank-level information from Consolidated Reports on Condition and Income (referred to as Call Reports). From the June Call Report filings we obtain data on the holdings and performance of the bank. Annual, county-level economic and demographic data from Moody’s Analytics are matched to bank branches.

Our universe of bank mergers is drawn from the FDIC’s Mergers Transactions Database. Our initial selection criteria include all mergers in which a banking organization with at least $25 billion in combined bank assets (real 2010 dollars) acquires and ultimately merges with a bank with at least 10 branches and the resulting banking organization has at least $50b in real combined bank assets. We exclude within-holding-company mergers. Mergers meeting these initial criteria are depicted in Tables 1 and 2.

There are often several distinct dates associated with a merger transaction.\(^{13}\) Our main merger date variable pertains to the day the acquired certificate number is closed by the

\(^{12}\)We thank Alex Marshall for help with this process.

\(^{13}\)See more detailed discussion in Section 5.1.
acquiring bank. This is not the only date possible for our analysis, however. For example, Marquette Bank branches became legally identical to Wells Fargo branches on July 13, 2002 even though the holding company for Wells Fargo took ownership of Marquette Bank on February 1, 2002. Moreover, a purchase agreement was reported in the media at least as early as October 5, 2001.\textsuperscript{14} Between the public announcement date of the merger and the official acquisition date, the acquiring institution has no legal control of the target bank’s actions or strategy. The fuzziness around the precise date when competitive pressures are exerted by the acquirer and not the acquired bank leads us to adopt pre- and post-merger periods that surround but do not include our merger date variable.

From this merger universe, we restrict our attention according to several key factors. First, some of the branches in our data are thrifts that cannot readily be tracked over time. We require our minimum number of acquired branches (10) to apply to branches for which a time-series can be constructed. Second, to ensure the merger represents a tangible difference in competition, we remove mergers in which a large bank takes over another large bank. Third, to avoid potential conflation with other types of competitive effects, we remove mergers between large and small banks. Finally and most significantly, our main analysis retains only the first qualifying merger. That is, some counties saw multiple large bank acquisitions of medium-sized banks during our sample period. Our coefficients of interest are identified off of only the first of these mergers in our data.\textsuperscript{15} Other minor and practical restrictions are also placed upon the data, such as the merger county containing at least one non-acquired small branch. Select merger summary statistics are contained in Table 3.


\textsuperscript{15}We are exploring other approaches to handling multi-merger counties. In particular, it is possible that our treatment and control groups suffer from contamination via subsequent mergers. Ongoing robustness tests using only single-merger counties and placebo tests using mergers between two large banking organizations are in-progress to address these concerns.
5 Identification and Empirical Strategy

Our primary objective is to understand the effect of large bank competition on small banks. However, the real economy and the spatial environment in which banks compete are not randomly assigned. To overcome these challenges, we rely on two key features of the banking sector. First, evidence from the banking literature suggests that bank competition is highly localized. For example, Amel and Brevoort (2005) and Brevoort, Holmes, and Wolken (2010) use survey evidence to show that the median distance of small firms to their supplier of credit is three to five miles. Second, large banks frequently expand via mergers. Therefore, a large bank branch is often observed to enter an existing market in a way that does not disrupt the spatial arrangement of the competitors. We use these two features to argue that a large bank acquisition of a medium-sized bank provides a quasi-experimental environment suitable for our analysis.

Our identification strategy hinges on the assumption that when a large bank acquires a medium-sized bank, the merger decision is not predicated on the within-county location of any single branch of the acquired bank. In particular, we assume that medium-sized banks are sufficiently large so that the merger decision is not driven by otherwise unobservable local fundamentals at the sub-county level or selection into a particular sub-county local market. A small bank branch is affected by the merger decision through a change in the composition its competitors. Whereas it had been competing previously with a medium-sized bank branch, it now competes with a large bank branch in the same location with no changes to competition on the external margin.

To see how this identification strategy works in practice, consider the merger of Wells Fargo and Marquette Bank in 2002 referenced earlier. Figure 6 demonstrates the merger at different geographies and its possible effects on small banks in the area. Starting with the bottom map, we first show the extent of the merger. Wells Fargo acquired 59 branches in the

16Indeed, large banks can and do engage in organic branch expansion by opening up new branches or buying a single branch from an existing bank. Consequently, the desire to open a branch at a specific location within a county can be achieved by means other than acquisition of a medium-sized bank.
merger with the $6 billion Minnesota-based bank, with notable presences in South Dakota and Iowa, as well. A big cluster of acquired branches were in the Minneapolis region. While a larger presence in each of these markets may have been part of the merger decision, it appears unlikely given the size of the acquisition that local fundamentals for a single branch drove the merger decision.

Moving counterclockwise in Figure 6, we zoom into Scott County. Marquette branches that were acquired by Wells as part of the merger are highlighted in large yellow circles, small banks are represented by medium-sized red circles, and other bank branches (medium and large branches not associated with the merger) are depicted as small blue circles. Our identification strategy focuses on the red circles and compares the outcomes of those “close” to the yellow circle to those further away. In Scott County, Marquette branches were acquired in the towns of Shakopee and Prior Lake, while the towns of New Prague and Belle Plaine saw no entry of Wells Fargo from the merger. In our county-level analysis, we compare the outcomes of small bank branches (red circles) in places like Belle Plaine to those in places like Shakopee before and after the Marquette mergers with Wells Fargo.

Finally, we conduct a zip code level difference-in-differences analysis to assess the competitive effects of large banks on small banks. In particular, the identifying assumption relies upon both the economic fundamentals to be similar across treated and affected small bank branches. In addition, we must assume that the merged out mid-sized bank competes with a small bank on the same terms as does any other mid-sized bank that does not undergo a merger during the period. For example, the merged out branches of Marquette Bank lie closer within Scott County (Shakopee and Prior Lake) to the urban center of the MSA than do other bank branches within the county. To make our assumption that economic environments are comparable between affected and unaffected small bank branches more credible, we extend our analysis to examine within zip code competitive effects. Moving counterclockwise to the top right graph, we demonstrate the concept of our empirical design using a zip code level analysis. Again, the merged out Marquette branch is represented by a large yellow dot and small bank branches are represented by medium red dots. We argue in our empirical design
that within Shakopee, the bank branches on the same block should feel the competitive ef-
facts of Wells entry differentially from those on the other side of town. Given the scope of the
merger from the bottom map, we argue that it is quasi-random that within Shakopee, MN a
bank branch in central Shakopee faced a greater change in its competitive landscape relative
to bank branches in west or south Shakopee.

The narrow geography of zip codes is finer than the MSA or county-based measures for
banking markets commonly employed in the literature (e.g. Prager and Hannan (1998) and
Berger, Demsetz, and Strahan (1999)), but is not without precedent. For example, Garmaise
and Moskowitz (2006) argue that the coarser definition of banking markets is based upon data
availability more so than the nature of the market itself. Kwast, Starr-McCluer, and Wolken
(1997) show that the median distance between small businesses and financial institutions that
provide their mortgages is four miles. In addition, Nguyen (2017) shows that the effects of
branch closures on the economy dissipate out by eight miles. Meanwhile, the median county
is 586 square miles.

Given this framework, we use a variety of different approaches to tease out the effect of
large bank competition on small banks. First, we employ a difference-in-differences approach
between small bank presence in affected and unaffected zip codes consequent to large bank
acquisitions of medium-sized banks. An affected zip code is one in which a large bank enters,
while an unaffected zip code is one in which a merger took place within the county but no
large bank enters the zip code from that merger. We compare branches in affected zip codes
to unaffected zip codes within merger counties. For this analysis, we consider both the future
existence and ownership of small bank branches as well as small bank branch deposits. Lastly,
we use distances to acquired branches within a merger zip code to evaluate how proximity to
a large bank affects small bank branches.

We examine these questions using models that broadly fit the following structure:

\[ Y_{ict} = \alpha + \beta \text{treated}_{ict} + \gamma \text{treated}_{ict} \ast \text{Post}_{ict} + \text{Controls} + \epsilon_{ict} \] (1)

15
where $Y$ is an outcome measured for small banks. In different regressions, $Y$ represents small bank branches, small bank branch deposit growth or small bank branch rates on deposit and loan products. For banks with only one branch, we can also consider $Y$ as bank variables.

The index $i$ represents a small bank branch in an area or a collection of small bank branches aggregated to a finer geography than the county (e.g., zip code), $c$ represents the geography affected by a qualifying merger, and $t$ is the year. Depending on the specification, controls may include some subset of county macroeconomic variables, county-time fixed effects, and lagged bank level variables. For analysis in which $i$ represents individual bank branches, we can also include bank fixed effects $\gamma_b$.

The key variable of interest in this regression is $\text{treated}_{ict} \ast \text{Post}_{ict}$. In some specifications, the variable $\text{treated}_{ict}$ is binary, taking on a value of one if the large bank acquisition includes a merger in the same zip code as the small bank. In other specifications, $\text{treated}_{ict}$ represents an intensity of treatment. Treatment intensity can alternatively be measured using the number of large bank target branches in some proximity to the small bank branch or a distance measure of the small bank branch to the nearest large bank target branch. The variable $\text{Post}_{ict}$ takes on the value of one for years after the large bank competitor enters and zero beforehand.

### 5.1 Dates

One challenge in our identification strategy is to determine the precise date at which the competitive environment changes for small banks. There are at least three relevant dates in this setting. First, there is the announcement date of the merger. At this time, the acquirer exerts no control over the target and cannot direct a change in strategy. However, the target bank and its competitors may begin changing behavior already at this date. For example, loan officers at the target bank may leverage the anticipated change in ownership to attract new clientele that might value the services of the larger bank. At the same time, loan officers of competitors may try to poach the target’s clients that prefer the services of a smaller bank.
Behavioral changes may also manifest in branch deposit pricing behavior. The target and competitors may compete for depositors with heterogeneous preferences, while also seeking (or not) funds associated with anticipated changes in loan demand.

A second important date in the merger process is the date of acquisition. Banking organizations, and large banks in particular, are often organized as bank holding companies (BHCs). When banks merge, a BHC typically acquires the target bank as a separate subsidiary before integrating two banks into a single legal entity. Upon acquisition, the BHC has control rights over the operations of all its subsidiaries. Thus, changes resulting from large bank management’s strategic decisions could be reasonably expected to occur after this date. However, the banks may neither be fully integrated at this point nor singly branded. Third, there is the merger date, when the two separate banks become one legal entity. At this point, there is a single bank name as the target bank ceases to exist.

Acknowledging the fuzziness of the event date for our study, we employ varying windows over which we measure pre-merger and post-merger activity. The merger dates in our sample all occur in the second-half of the year. Meanwhile, acquisition dates for the mergers in our sample are often in the first-half of the year. Given that the as-of date for the SOD data is June 30, behavioral changes associated with the merger could reasonably occur in the data year preceding the most recent SOD date.\textsuperscript{17}

\section*{5.2 Results}

\subsection*{5.2.1 Deposit Growth at Acquired Branches}

Survey evidence reveals that small banks do not view large banks as their competitors.\textsuperscript{18} Instead, small bank managers view their banks as operating within a competitive environment composed of regional banks and other small banks. This sentiment is reflected in anecdotal wisdom that acquired branches often experience deposit runoff following acquisition by a large

\textsuperscript{17}Spot checking a few of the mergers, it appears that the announcement dates do not extend to the prior SOD year.

\textsuperscript{18}See, for example, the Community Banking in the 21st Century National Survey conducted by the Federal Reserve and the Conference of State Bank Supervisors.
We formally test for statistically significant differences in deposit growth between acquired and non-acquired branches within the same county. Regression analysis supports the contention of decreased deposit growth at acquired branches. Table 4 presents results of regressions of deposit growth on an interaction term capturing acquired branches post-merger, indicator variables for post-merger and acquired branches, and bank assets.\textsuperscript{19}

The dependent variable for the regression results is constructed in the pre- and post-periods as the difference between a branch's two-year deposit growth rate from the mean two-year deposit growth rate within the county. (The county mean is calculated over all branches within that county.) The pre-period growth rate is computed between years $T = -3$ and $T = -1$ while the post-period growth rate is computed between $T = 1$ and $T = 3$. For example, the aforementioned Wells-Marquette merger took place in July, 2002. The pre-period growth rate is computed between 1999 and 2001 and the post-period growth rate is computed between 2003 and 2005.

The columns of Table 4 differ according to whether the natural logarithm of real assets is included as an explanatory variable and whether standard errors are clustered. Clustered standard errors are specified at the year-of-merger level. Since multiple mergers can take place within the same year in a county, this level of clustering is broader than clustering at the merger-level alone. Year fixed effects are included throughout and between-county variation in deposit growth is addressed by constructing the dependent variable in terms of deviations from county means.

The coefficients on the interaction term are negative and statistically significant. The magnitudes imply a treatment effect of 5-7% lower annual deposit growth for acquired branches even after accounting for size. The regression results provide statistical support for claims that some customers are less inclined to maintain a relationship with a large banking organization. The results suggest some customers view large and medium-sized banks as different but not medium-sized and small banks. These customers do not remain as customers of the

\textsuperscript{19}The largest and smallest 0.5% of deposit growth observations are winsorized in the regressions.
5.2.2 Effects of Merger Activity on Small Branches

We now turn our attention to the effects on small branches of big bank acquisitions. Counties are composed of multiple zip codes, and not all zip codes within a county contain a branch acquired by a large bank during a merger. We begin by displaying branch trends (both overall and small) within merger-counties but separated by affected and non-affected zip codes. Figure 7 depicts these trends in event-time. The large bank acquisition occurs between years $T = 0$ and $T = 1$, denoted with a vertical line. Figure 8 focuses on small branch counts while Figure 9 normalizes branch and small branch counts to their values at the merger-date. While overall branches decline slightly more post-merger in merger zip codes than in non-merger zip codes, small branches decline by less in merger zip codes.

Table 7 presents results from difference-in-differences regressions on the probability that a branch is small. The independent variable is an indicator for whether the branch belongs to a banking organization with fewer than $1$ billion in real assets. The pre-period and post-period match the scales in the preceding graphics. The results, whether using a linear probability model or a logistic regression, indicate that affected zip codes display an overall lower frequency of small branch observations, but that treatment (exposure to a large bank acquiring a medium-sized bank) is associated with a statistically significant increase in small branch probability.

The results in Table 7 do not include clustering of standard errors. Instead, we collapse observations within zip codes and compute two-year growth rates in small branches in the pre- and post-periods. Table 8 shows that affected zip codes continue to exhibit a positive treatment effect on small branch presence. The results suggest that affected zip codes see approximately 2% higher growth annually in the number of small branches post-merger compared to non-affected zip codes within the same county.

Thus far, the graphics and regression results described above are compatible with multiple explanations for why affected zip codes see greater small branch growth following merger
activity than non-affected zip codes. One possibility is that small branches present at the time of merger display a higher likelihood of remaining in existence following treatment in merger zips than in non-merger zips. Another possibility is that extant small branches remain small with greater likelihood. Alternatively, it may be that affected zip codes see greater entry and expansion following merger activity compared to non-affected zip codes within the same county. The following three sets of regression results help disentangle these possibilities.

Table 5 considers the subset of small branches present in the merger county at the time of the merger and computes the probabilities these small branches remain in existence in the ensuing years. The logistic regression results show that small branches extant at the time of merger activity are equally likely to remain in existence over the next five years in both affected and non-affected zip codes within the county. Table 6 provide the same conclusion about whether those branches that remain in existence also remain small.

Finally, we turn to the possibility that the relatively greater growth in small branches post-merger in affected zip codes may be due to new entry and expansion of small banks. Figure 10 displays the proportion of small branches that did not exist in the previous year for affected and non-affected zip codes. It appears that merger zip codes see less decline in small bank expansion following merger activity than non-merger zip codes. Table 10 contains the results of tests of this hypothesis at the branch and zip code level. The dependent variable in the first column is an indicator taking the value of 1 if a branch is small and new in the current year and a value of 0 if a branch is small but not new in the current year.

The dependent variable in the zip code analysis – the second column – sums the total number of new small branches within the zip code between years $T = -3$ to $T = -1$ and $T = 1$ to $T = 3$ and divides these sums by the number of small branches in the zip code at the time of the merger. The results indicate that small branches are more likely to be new post-treatment in affected zip codes compared to non-affected zip codes and that affected zip codes see more small branch expansion post-merger than non-affected zip codes. In a study of merger and acquisition activity in metropolitan markets, Berger, Bonime, Goldberg, and White (2004) find that bank merger activity is associated with increased entry in the relevant
markets.

In combination, the results of Tables 5, 6 and 10 are supportive of small branch expansion accounting for the positive treatment effect in affected zip codes relative to non-affected zip codes seen in Tables 7 and 8.

Our analysis of the effects of merger activity on small branches has, thus far, focused on branch existence. We now turn to whether small branches in affected zip codes display different rates of deposit growth compared to their counterparts in non-affected zip codes. While it appears that merger activity is conferring benefits upon small banks that were previously competing with an acquired medium-sized bank, the greater levels of small branch expansion into these same areas post-merger give reason to expect small branches to not display greater deposit growth in affected zip codes. Indeed, Table 9 reports such results. As in previous regressions, the dependent variable is the county de-meaned two-year deposit growth rate computed between $T = -3$ to $T = -1$ and $T = 1$ to $T = 3$. (The county mean for these regressions is computed using only small branches.) The results show no statistically significant difference in branch deposit growth rates following merger activity.

5.2.3 Distance to Acquired Branch as Exogenous Variation

Small branches exposed to merger activity by being co-located within an affected zip code differ according to their distance to the nearest acquired branch. We calculate the distance in miles between an exposed small branch and all acquired branches within the same zip code and compare deposit growth rates for banks closer and further from an acquired branch within their zip code.

Our subsample for this analysis is composed of exposed branches within merger zip codes. The results of several regression tests are reported in Table 11. There are two sets of three columns each that differ according to the construction of distance measures. The columns within each set vary the minimum number of exposed branches within a zip code required for inclusion in the analysis. The results consistently indicate that exposed small branches closer to an acquired branch within their zip code do not display higher deposit growth rates
compared to exposed small branches located further away. Table 11 employs year-over-year winsorized deposit growth as the dependent variable, but the results are the same when considering two-year growth rates constructed between $T = -3$ to $T = -1$ and $T = 1$ to $T = 3$. (These results are not reported here.)

These results are consistent with our earlier findings. We see evidence of large bank merger activity improving the competitive landscape for exposed small branches. We also see evidence, supported by economic theory, that if there is any improvement in conditions, the improvement is temporary as small banks expand into the areas offering a better market outlook. In light of these dynamics, it is expected that we would see no greater deposit growth for closer small branches compared to those located further from the merger activity but still within the same zip code.

6 Conclusion

This paper studies the competitive effect of large bank merger activity on small branches at differing geographic levels. We find that altered competition through large bank acquisitions of intermediate-sized banks has generally positive effects on the branch vitality of nearby small banks. At the broadest geographic level, large bank merger activity often occurs in MSAs, which display stronger economic and demographic growth than non-MSAs. Small branches, however, appear to fare worse in MSAs relative to their counterparts in non-MSAs. This suggests a possible connection between large bank expansion and small branch declines in number and deposit growth. We do not find evidence of a robust negative channel between large bank merger activity and small bank vitality. Indeed, comparing the performance of small banks within counties experiencing a qualifying merger but separately identifying exposed small branches by whether the merger included an acquired branch within their zip code suggests that the large bank acquisition is not associated with slower deposit growth overall for small branches in merger zip codes, nor is it associated with decreased likelihood of branch existence. While the acquired branches display lower rates of deposit growth than
competing branches, nearby small branches do not display different rates of deposit growth between non-merger and merger zip codes. Narrowing our geographic focus further, we do not find that exposed small branches within a zip code that are closer to an acquired branch display different deposit growth rates than those further away. Squaring these findings, we display evidence of greater small bank expansion into affected zip codes post-merger compared to non-affected zip codes within the same county. These findings are consistent with both robust survey evidence of bank managers about how they view their competition as well as economic theory and previous findings in the literature.

References


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Source: Summary of Deposits, Merger Transactions Database, Call Reports
Table 4: Branch Deposit Growth for Acquired and Non-Acquired Branches: The table regresses growth rates for acquired and non-acquired branches in counties affected by a qualifying merger for the cumulative two year periods around the merger (excluding data from the year of the merger). Post is a binary variable equal to one after the qualifying merger in the county (and zero otherwise). Acquired is a binary variable equal to one if the branch is acquired in the course of the merger (and zero otherwise). Interaction is the product of post and acquired.

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Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1
Table 5: Survival of Small Bank Branches: This table presents logistic regressions of small bank branch survival for one, two, three, four, and five year periods after a qualifying merger in their county. The sample includes all small bank branches in existence in an affected county at the time of a qualifying merger. The left hand side variable is a binary variable equal to one if a branch is in existence \( t \) periods following the qualifying merger and zero otherwise. \( Affected_{zip} \) is a binary variable equal to one if a branch is in a zip code in which a large bank entered as a result of the merger and zero otherwise.

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<td>(0.0818)</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>9,763</td>
<td>9,063</td>
<td>9,063</td>
<td>9,063</td>
<td>9,021</td>
</tr>
<tr>
<td>Unit of Analysis</td>
<td>Branch</td>
<td>Branch</td>
<td>Branch</td>
<td>Branch</td>
<td>Branch</td>
</tr>
<tr>
<td>Model</td>
<td>Logit</td>
<td>Logit</td>
<td>Logit</td>
<td>Logit</td>
<td>Logit</td>
</tr>
<tr>
<td>Year FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses

*** \( p<0.01 \), ** \( p<0.05 \), * \( p<0.1 \)
Table 6: Survival of Branch as a Small Bank Branch: This table presents logistic regressions of bank branch survival as part of a small bank for one, two, three, four, and five year periods after a qualifying merger in their county. The sample includes all small bank branches in existence in an affected county at the time of a qualifying merger. The left hand side variable is a binary variable equal to one if a branch is in existence and part of a small bank \( t \) periods following the qualifying merger and zero otherwise. \( Affected_{zip} \) is a binary variable equal to one if a branch is in a zip code in which a large bank entered as a result of the merger and zero otherwise.

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( Affected_{zip} )</td>
<td>-0.0212</td>
<td>-0.0466</td>
<td>-0.0405</td>
<td>-0.0226</td>
<td>-0.121**</td>
</tr>
<tr>
<td></td>
<td>(0.0951)</td>
<td>(0.0775)</td>
<td>(0.0707)</td>
<td>(0.0625)</td>
<td>(0.0593)</td>
</tr>
<tr>
<td>Constant</td>
<td>3.933***</td>
<td>3.214***</td>
<td>2.376***</td>
<td>1.328***</td>
<td>0.966***</td>
</tr>
<tr>
<td></td>
<td>(0.280)</td>
<td>(0.204)</td>
<td>(0.144)</td>
<td>(0.102)</td>
<td>(0.0946)</td>
</tr>
<tr>
<td>Observations</td>
<td>9,422</td>
<td>8,548</td>
<td>8,335</td>
<td>8,113</td>
<td>7,888</td>
</tr>
<tr>
<td>Unit of Analysis</td>
<td>Branch</td>
<td>Branch</td>
<td>Branch</td>
<td>Branch</td>
<td>Branch</td>
</tr>
<tr>
<td>Model</td>
<td>Logit</td>
<td>Logit</td>
<td>Logit</td>
<td>Logit</td>
<td>Logit</td>
</tr>
<tr>
<td>Year FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1
Table 7: Difference-in-Differences on the Propensity of Small Banks: This table presents a difference-in-differences analysis of the propensity of small bank branches surrounding a qualifying merger in their county in time $t$. The sample includes all bank branches in an affected county for the five years preceding and following a qualifying merger. The left hand side is a binary variable equal to one if the branch is held by a small bank and zero otherwise. The pre-period is defined as the years $t - 5$ through $t - 1$. The post-period is defined as the years $t + 1$ through $t + 5$. The variable post is equal to one if the period is in the post period and zero if it is during the pre-period. Affected$_{zip}$ is a binary variable equal to one if a branch in the zip code is acquired as part of the qualifying merger and zero otherwise. Interaction is the product of Affected$_{zip}$ and post.

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>interaction</td>
<td>0.0139***</td>
<td>0.00741***</td>
<td>0.0607***</td>
</tr>
<tr>
<td></td>
<td>(0.00250)</td>
<td>(0.00258)</td>
<td>(0.0156)</td>
</tr>
<tr>
<td>Affected$_{zip}$</td>
<td>-0.0641***</td>
<td>-0.0608***</td>
<td>-0.101***</td>
</tr>
<tr>
<td></td>
<td>(0.00196)</td>
<td>(0.00198)</td>
<td>(0.0108)</td>
</tr>
<tr>
<td>post</td>
<td>-0.0282***</td>
<td>0.00145</td>
<td>-0.0563***</td>
</tr>
<tr>
<td></td>
<td>(0.00160)</td>
<td>(0.00322)</td>
<td>(0.0106)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.267***</td>
<td>0.352***</td>
<td>-0.844***</td>
</tr>
<tr>
<td></td>
<td>(0.00116)</td>
<td>(0.00914)</td>
<td>(0.0396)</td>
</tr>
</tbody>
</table>

Observations: 415,512
R-squared: 0.004
Number of stcntybr: 704
Unit of Analysis: Branch
Model: Linear
Year FE: NO
County FE: YES

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Table 8: Difference-in-Differences on Small Bank Branch Growth: This table presents a difference-in-differences analysis of small bank branch growth surrounding a qualifying merger in their county in time $t$. The sample includes all zip codes in an affected county. The left hand side is the zip code level growth of small bank branches for the two year periods before $(t - 3$ to $t - 1)$ and after $(t + 1$ to $t + 2)$ the merger. The variable post is equal to one if the period is in the post period and zero if it is during the pre-period. $Affected_{zip}$ is a binary variable equal to one if a branch in the zip code is acquired as part of the qualifying merger and zero otherwise. Interaction is the product of $Affected_{zip}$ and post.

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>Sm Branch Gr</th>
<th>Sm Branch Gr</th>
</tr>
</thead>
<tbody>
<tr>
<td>interaction</td>
<td>0.0483***</td>
<td>0.0462***</td>
</tr>
<tr>
<td></td>
<td>(0.0165)</td>
<td>(0.0164)</td>
</tr>
<tr>
<td>$Affected_{zip}$</td>
<td>0.000440</td>
<td>-0.0124</td>
</tr>
<tr>
<td></td>
<td>(0.0114)</td>
<td>(0.0121)</td>
</tr>
<tr>
<td>post</td>
<td>-0.0152</td>
<td>0.105</td>
</tr>
<tr>
<td></td>
<td>(0.0106)</td>
<td>(0.347)</td>
</tr>
<tr>
<td>Constant</td>
<td>1.066***</td>
<td>0.872*</td>
</tr>
<tr>
<td></td>
<td>(0.0186)</td>
<td>(0.482)</td>
</tr>
</tbody>
</table>

Observations   8,556    8,556
R-squared       0.025    0.014
Unit of Analysis Zip Code Zip Code
Model           Linear   Linear
Year FE         YES      YES
County FE       NO       YES
Number of stcntybr 671    671

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Table 9: Difference-in-Differences on Small Bank Branch Deposit Growth: This table presents a difference-in-differences analysis of small bank branch deposit growth surrounding a qualifying merger in their county in time \( t \). The sample includes all small bank branches in an affected county in existence at time \( t \). The left hand side is branch deposit growth rates relative to the county mean over the two year periods before \((t-3)\) to \((t-1)\) and after \((t+1)\) to \((t+2)\) the merger, winsorized at the 1% level. The variable post is equal to one if the period is in the post period and zero if it is during the pre-period. \( Affected_{zip} \) is a binary variable equal to one if a branch in the zip code is acquired as part of the qualifying merger and zero otherwise. Interaction is the product of \( Affected_{zip} \) and post.

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1) Dep. Growth</th>
<th>(2) Dep. Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>interaction</td>
<td>-0.0187 (0.0312)</td>
<td>-0.0187 (0.0154)</td>
</tr>
<tr>
<td>( Affected_{zip} )</td>
<td>0.00352 (0.0223)</td>
<td>0.00352 (0.0197)</td>
</tr>
<tr>
<td>post</td>
<td>0.00637 (0.0224)</td>
<td>0.00637 (0.00659)</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.000221 (0.0377)</td>
<td>-0.000221 (0.00124)</td>
</tr>
</tbody>
</table>

Observations 15,884 15,884
R-squared 0.000 0.000
Unit of Analysis Branch Branch
Model Linear Linear
Year FE YES YES
Cluster - Merger year

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Table 10: Difference-in-Differences on New Small Bank Branches: This table presents a difference-in-differences analysis of new small bank branches surrounding a qualifying merger in their county in time $t$. The variable post is equal to one if the year is greater than $t$ and zero if it is less than $t$. $\text{Affected}_{zip}$ is a binary variable equal to one if the zip code contains a branch acquired as part of the qualifying merger and zero otherwise. Interaction is the product of $affecte_{zip}$ and post. The sample for Column (1) includes all small bank branches in an affected county from $t-3$ to $t+3$, leaving out the merger year $t$. The left hand side of Column (1) is a binary variable taking on the value one if the small bank branch is a new branch that year and zero otherwise. The sample for Column (2) is all zip codes in an affected county in an affected county from $t-3$ to $t+3$, leaving out the merger year $t$. The left hand side of Column (2) is the number of new small bank branches for a given year, scaled by the total number of small bank branches at time $t$.

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1) New Sm Branch</th>
<th>(2) Sm Br Ent</th>
</tr>
</thead>
<tbody>
<tr>
<td>interaction</td>
<td>0.193***</td>
<td>0.0550**</td>
</tr>
<tr>
<td></td>
<td>(0.0714)</td>
<td>(0.0256)</td>
</tr>
<tr>
<td>post</td>
<td>-0.156***</td>
<td>-0.121***</td>
</tr>
<tr>
<td></td>
<td>(0.0508)</td>
<td>(0.0252)</td>
</tr>
<tr>
<td>$\text{Affected}_{zip}$</td>
<td>0.114**</td>
<td>0.0398***</td>
</tr>
<tr>
<td></td>
<td>(0.0485)</td>
<td>(0.0131)</td>
</tr>
<tr>
<td>Constant</td>
<td>-2.376***</td>
<td>-0.0226</td>
</tr>
<tr>
<td></td>
<td>(0.122)</td>
<td>(0.0594)</td>
</tr>
</tbody>
</table>

Observations: 57,751, 9,469
R-squared: 0.028
Unit of Analysis: Branch, Zip Code
Model: Logit, Linear
Year FE: YES, YES
County FE: NO, YES
Cluster: Merger year
Number of Counties: 663

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Table 11: Difference-in-Differences of Small Bank Branch Deposit Growth Within Merger Zip Codes: This table presents a difference-in-differences analysis of small bank branch deposit growth surrounding a qualifying merger in their zip code in time $t$. The variable post is equal to one if the year is greater than $t$ and zero if it is less than $t$. The sample for Column (1) includes all small bank branches in an affected zip code from $t-3$ to $t+3$, leaving out the merger year $t$. The left hand side is year on year deposit growth. Columns (1), (2) and (3) use Lnmiles as a variable equal to the log distance plus one of miles to the nearest acquired branch with the interpretation that smaller values are more affected by large bank competition. In these columns, interaction reflects the product of post and Lnmiles. Columns (4), (5), and (6) use the variable close, which is a binary variable equal to one if the small bank branch is the closest branch in the zip code to the acquired branch and zero otherwise. In these columns, interaction represents the product of close and post. Minimum exposed branches is the minimum number of small bank branches required in the zip code for the specification.

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dep Gr</td>
<td>Dep Gr</td>
<td>Dep Gr</td>
<td>Dep Gr</td>
<td>Dep Gr</td>
<td>Dep Gr</td>
</tr>
<tr>
<td>interaction</td>
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<td>0.0356</td>
<td>0.0483</td>
<td>-0.00351</td>
<td>0.0112</td>
<td>0.00596</td>
</tr>
<tr>
<td></td>
<td>(0.0301)</td>
<td>(0.0390)</td>
<td>(0.0610)</td>
<td>(0.0145)</td>
<td>(0.0178)</td>
<td>(0.0614)</td>
</tr>
<tr>
<td>Lnmiles</td>
<td>-0.00827</td>
<td>-0.0417</td>
<td>-0.0426</td>
<td>-0.000742</td>
<td>-0.00194</td>
<td>-0.0307</td>
</tr>
<tr>
<td></td>
<td>(0.0315)</td>
<td>(0.0306)</td>
<td>(0.0605)</td>
<td>(0.0180)</td>
<td>(0.0147)</td>
<td>(0.0620)</td>
</tr>
<tr>
<td>close</td>
<td>-0.000742</td>
<td>-0.00194</td>
<td>-0.0307</td>
<td>-0.000742</td>
<td>-0.00194</td>
<td>-0.0307</td>
</tr>
<tr>
<td></td>
<td>(0.0315)</td>
<td>(0.0306)</td>
<td>(0.0605)</td>
<td>(0.0180)</td>
<td>(0.0147)</td>
<td>(0.0620)</td>
</tr>
<tr>
<td>post</td>
<td>0.0226</td>
<td>-0.0263</td>
<td>-0.256***</td>
<td>0.0260</td>
<td>-0.00598</td>
<td>-0.222**</td>
</tr>
<tr>
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<td>(0.0510)</td>
<td>(0.0580)</td>
<td>(0.0678)</td>
<td>(0.0382)</td>
<td>(0.0452)</td>
<td>(0.0724)</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.000742</td>
<td>-0.00194</td>
<td>-0.0307</td>
<td>0.0260</td>
<td>-0.00598</td>
<td>-0.222**</td>
</tr>
<tr>
<td></td>
<td>(0.0315)</td>
<td>(0.0306)</td>
<td>(0.0605)</td>
<td>(0.0180)</td>
<td>(0.0147)</td>
<td>(0.0620)</td>
</tr>
<tr>
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<td>9,705</td>
<td>1,497</td>
<td>16,629</td>
<td>9,705</td>
<td>1,497</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.255</td>
<td>0.222</td>
<td>0.047</td>
<td>0.025</td>
<td>0.021</td>
<td>0.047</td>
</tr>
<tr>
<td>Number of zipbr</td>
<td>540</td>
<td>225</td>
<td>22</td>
<td>540</td>
<td>225</td>
<td>22</td>
</tr>
<tr>
<td>Min. Exposed Branches</td>
<td>3</td>
<td>5</td>
<td>10</td>
<td>3</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Zip Code FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Year FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Cluster</td>
<td>Merger year</td>
<td>Merger year</td>
<td>Merger year</td>
<td>Merger year</td>
<td>Merger year</td>
<td>Merger year</td>
</tr>
</tbody>
</table>

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Figure 1: Banking Industry Trends. Total number of banks (Figure 1A), Bank Branches (Figure 1B), and Real Deposits in 2010 dollars (Figure 1C), by bank size. Big banks are defined as those with greater than $50 billion in assets in 2010 dollars and are depicted in red. Small banks are defined as those with less than $1 billion in assets in 2010 dollars and are depicted in blue. Banks with between $1 billion and $50 billion in assets in 2010 dollars are depicted in green.
Figure 2: Banking Industry Deposits, by MSA and non-MSA. Figure 2A depicts total real deposits (2010 dollars) held in MSAs for small, mid-sized, and large banks. Figure 2B depicts total real deposits held in non-MSAs for small, mid-sized, and large banks. Figure 2C depicts total real deposits and small bank branch deposits for MSAs and non-MSAs relative to 1994 (i.e. each variable is indexed to 1 in 1994). Figure 2D depicts the difference in relative growth rates between total real deposits and small bank branch deposits, for MSAs and non-MSAs.
Figure 3: Banking Industry Branches, by MSA and non-MSA. Figure 3A depicts total branches held in MSAs for small, mid-sized, and large banks. Figure 3B depicts total branches in non-MSAs for small, mid-sized, and large banks. Figure 3C depicts total branches and small branches for MSAs and non-MSAs relative to 1994 (i.e. each variable is indexed to 1 in 1994). Figure 3D depicts the difference in relative growth rates between total branches and small bank branches, for MSAs and non-MSAs.

Figure 3A: Branches MSAs
Figure 3B: Branches Non-MSAs
Figure 3C: Branches MSAs
Figure 3D: Branches Non-MSAs
Figure 4: Population by MSA and non-MSA Relative to 1994

Figure 5: Nominal Output, by MSA and non-MSA Relative to 1994

Source: Call Reports, Moody's
Figure 6: Example of a merger used in the difference-in-differences analysis between Marquette Bank and Wells Fargo in 2002. The bottom map depicts Marquette Bank branches in the Summary of Deposits data prior to the merger. Moving counter-clockwise, the top left map zooms in on the box in the bottom map: Scott County, MN. The top right map zooms in on the box in the top left graph: Shakopee, MN. In the top left and right maps: large yellow circles represent merged out Marquette branches; medium red circles represent small bank (< $1 billion) branches; small blue circles represent all other bank branches.

Marquette Acquisition.pdf
Figure 7: Branch Count, by Zip Code. Total branch count and small branch count within a county experiencing a merger, separated by zip codes containing an acquired branch and zip codes without an acquired branch. Merger activity occurs between years 0 and 1.

Figure 8: Small Branch Count, by Zip Code. Total small branch count within a country experiencing a merger, separated by zip codes containing an acquired branch and zip codes without an acquired branch. Merger activity occurs between years 0 and 1.
Figure 9: Branch Growth, Overall and Small, by Zip Code. Total branch growth and small branch growth for affected and non-affected zip codes, normalized by the number of branches in the year of merger activity. Merger activity occurs between years 0 and 1.

![Branch Growth, Overall and Small](image)

Source: Summary of Deposits; Call Reports; Merger Records

Figure 10: Percent of Small Branches That Are New, by Zip Code. Percentage of existing small branches that did not exist in the previous year. Merger activity occurs between years 0 and 1.

![Percent of Small Branches That Are New](image)

Source: Summary of Deposits; Call Reports; Merger Records