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Market Concentration and Uniform Pricing: Evidence from Bank Mergers

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Abstract

We show that U.S. banks price deposits almost uniformly across their branches and that this pricing practice is crucial to explain the deposit rate dynamics following bank mergers. We find a strong and sharp post-merger convergence between the deposit rates of the acquired branches and the median deposit rate of the acquirer. This pattern is almost fully explained by adjustments in the deposit rates of the acquired branches, irrespective of whether their rates were above or below those practiced by the acquirer. Acquired branches lose deposits and local market share, especially when they decrease their rates due to uniform pricing. Local competitors respond to changes in deposit rates at the acquired branches by adjusting their own deposit rates in the same direction. We find that pre-merger differences in deposit rates between merged entities explain more of the post-merger evolution of deposit rates than the predicted changes in local market concentration induced by the merger. This result indicates that competition authorities would be well advised to review the potential impact of pre-merger pricing differences in evaluating a merger within an industry with strong uniform pricing practices.

Topics: Financial institutions; Financial system regulation and policies; Market structure and pricing

JEL codes: D4, G20, G21, G28, G34, L11

1 Introduction

In recent years there has been considerable debate about the economic impact of rising levels of market concentration across many industries in the U.S. economy. Many economists believe that increasing concentration is associated with decreased product market competition, which, in turn, is to blame for a number of economic ailments, such as increases in markups (De Loecker and Eeckhout, 2017), lower levels of private investment (Gutierrez and Philippon, 2017) and, in the case of the financial sector, frictions in the pass-through of monetary policy to depositors (Drechsler, Savov and Schnabl, 2017).

Concerns about the harmful role that market concentration plays in lowering market competition and market efficiency are, of course, not new. At least since the passage of the Sherman and Clayton acts, U.S. antitrust authorities review prospective mergers and use their powers to either block mergers or require remedies whenever proposed mergers induce increases in market concentration that exceed certain thresholds (e.g., Wollmann, 2019). This merger review process is based on the presumption that significant increases in market concentration resulting from mergers inevitably lead to higher prices and markups (e.g., Carlton, 2007). The process, therefore, implicitly assumes that gains in market share accruing from mergers translate to greater market power and that firms necessarily use that additional market power to raise prices from current levels (e.g., Syverson, 2019).

In this paper, we argue that if large multi-market firms set prices at a central rather than local level and do not respond as flexibly or as optimally to differences in local demand conditions, then the nexus between higher market concentration and higher prices could break down. In a recent series of important papers, DellaVigna and Gentzkow (2019), Hitsch, Hortaçsu and Lin (2019), and Nakamura (2008) show that most large U.S. food, drugstore, and mass merchandise chains set very similar prices for the same products across their retail stores. The prevalence of uniform pricing practices in a specific industry could have broad implications for antitrust analysis of horizontal mergers in that industry. When uniform pricing practices are strong, firms may not be able or willing to set different prices across their geographies. Firms that acquire market share in a specific local market will nevertheless be reluctant to raise prices there but not elsewhere. In fact, uniform pricing practices could induce convergence in prices set by the merging entities.

The U.S. banking sector is a convenient laboratory to study how uniform pricing affects product markets following increases in concentration induced by mergers and acquisitions (M&As). The relevant markets are local because U.S. depositors consider a limited number of banks in their choice sets (e.g., Abrams, 2019). Moreover, these local deposit markets are usually served by a mix of very large banks with substantial presence across multiple local

markets and a competitive fringe of small local banks with operations in only a few markets. The U.S. banking industry has seen significant consolidation activity in the past 20 years with the number of depository institutions declining from approximately 10,000 to less than 5,000. Finally, this sector plays a significant role in the economy: U.S. banks hold more than $9 trillion dollars in deposits, thus comprising a large fraction of the total savings in the U.S. economy, and the deposit franchise of banks represents a sizable share of their total value creation (e.g., Egan, Lewellen and Sunderam, 2017). In this paper, we study whether uniform pricing is a prevalent practice in the banking sector and, if so, whether it plays an important role in explaining the evolution of local deposit rates following M&As in the banking sector.

We start our empirical analysis by showing that U.S. banks set largely similar deposit rates across their branch networks. Our results suggest that, on average, variation in average interest rates across banks explains 93% of the total variation in advertised deposit rates across bank branches in the U.S. Therefore, only less than 7% of the variation in deposit rates across branches is explained by *within*-bank differences in deposits rates. By comparison, variation in the average deposit rates across U.S. counties absorbs less than 25% of the total variation in deposit rates in the banking sector. This means that bank branches of different banks practice very different deposit rates even when they are located in the same narrowly defined geographic regions. Similarly, we also show that the average monthly deposit rate correlations between two branches of the same bank are much higher than the average monthly rate correlations between two branches that belong to different banks. This evidence indicates that uniform deposit pricing practices are very strong and that the variation in deposit rates within a bank's branch network is small in absolute terms.

We then examine how such uniform deposit pricing practices impact the evolution of deposit rates in the two-year window around a merger event. We find very strong evidence that the deposit rates of branches acquired in an M&A agreement converge very quickly to the median deposit rate practiced by the acquirer bank. This convergence occurs regardless of whether the acquirer bank sets deposit rates above or below those of the acquired branches prior to the completion of the M&A. We find that the absolute difference between the deposit rates practiced by the branch sold in a merger and those of the acquirer in the 12 months following the merger decreased, on average, between 9.5 and 10.2 basis points (bps) or approximately 18%. These results are robust to the inclusion of state-by-month fixed effects, which suggests that they are not driven by aggregate trends in the deposit rates at the regional level, and to the inclusion of branch fixed effects that ensure that the results are obtained using only within-branch variation in deposit rates around the merger event. The results do not depend on the relative sizes of the acquirer and target nor on the geographic overlap between their branch networks, but they are more pronounced when the acquirer has stronger

uniform pricing practices. The convergence is also relatively sharp around the merger event. Between one-third and one-half of the total convergence in deposit rates occurs immediately in the month after the merger. Overall, these findings suggest that the ex ante difference in the deposit rates practiced by the acquired branch and the median acquirer branch is a significant determinant of the evolution of deposit rates following the merger.

Having established convergence between the deposit rates of the acquired branch and the respective acquirer, we look deeper into how this adjustment in deposit rates takes place. We find that when, prior to the merger, an acquired branch practices deposit rates that are above the median deposit rate of the acquirer, the deposit rate convergence is fully explained by downward adjustments in the deposit rates of the acquired branch. When, prior to the merger, the acquired branch sets lower deposit rates than the median acquirer branch, the adjustment is mostly explained by an increase in the deposit rates at the acquired branch but also partly by lower median deposit rates at the acquirer branches. The gap between the branch rate and the median acquirer rate declines by 11.6 bps, explained, on average, by an increase in the deposit rate of the acquired branch by 9.7 bps and a statistically insignificant decrease in the median acquirer rate of 1.9 bps. This result is very intriguing as it suggests that depositors of a low-deposit-rate institution could see upward adjustments in their deposit rates following a merger. Therefore, these results suggest that the bulk of the adjustment in the difference between the merged branch and the acquirer deposit rates induced by uniform pricing practices is explained by movements in the deposit rate of the acquired branch toward the median deposit rate of the acquirer.

After showing that uniform pricing practices by the acquirer bank induce significant adjustments in the deposit rates of the acquired branches following an M&A, we investigate whether these changes alter the local equilibrium in areas affected by the merger. First, we find that the quantity of deposits at acquired branches reacts predictably to ex ante differences between the deposit rates of merged branches and those of its respective acquirer. We find that, on average, merged branches lose deposits and deposit market share in their zip code following a merger. But when the deposit rate of the merged branch is above the median deposit rate of its acquirer, the merged branch loses an even greater amount and share of deposits. This result is consistent with the idea that merged branches whose deposit rates are above those of their respective acquirers lower their deposit rates following the merger and see their depositors react to such downward price adjustment by moving their deposits to another bank or financial institution.

Second, we find that local competitors adjust their deposit rates in response to these M&A-induced changes in the deposit rates of the acquired branches. We start by showing that the deposit rates of local competitors see no significant change when there is no sizable

difference between the rates set by the acquired branch and those of the acquirer prior to the merger. But in the presence of pre-merger rate differences, we predictably observe post-merger changes in the deposit rates of the acquired branches, which could subsequently prompt a response from their local competitors. We investigate this possibility and find evidence that local competitors respond to changes in deposit rates at acquired branches by adjusting their own deposit rates in the same direction. Thus, deposit rates behave as strategic complements in local banking markets. Finally, we provide evidence that the uniform deposit pricing practices of the local competitors limit their own ability to respond to the changes in the deposit rates of acquired branches. When the branches of local competitors have rate-setting privileges, they tend to respond more strongly to the deposit rate changes of acquired branches. Overall, these results suggest that uniform deposit practices not only shape the evolution of deposit rates of the banks directly involved in the M&A but also affect the dynamics of deposit rates in their competitive environment.

Merger review guidelines require competition authorities to screen bank mergers that significantly increase concentration in local banking markets. When the increase in local deposit market concentration accruing from a potential bank merger exceeds a certain quantitative threshold, competition authorities are significantly more likely to block a bank merger or request acquirers to divest branches (Liebersohn, 2017; Williams, 2019). This focus on local deposit market concentration is predicated on the idea that acquirers can easily price discriminate across regions and increase markups in places where they acquire greater market concentration following the merger. But uniform deposit pricing practices induce acquirers to pull the deposit rates of their newly acquired branches toward their own, thus limiting their ability to exploit increases in local market power. Next, we consider how such predicted changes in local banking market concentration compare with the pre-merger differences in deposit rates between banks in a merger deal in explaining cross-sectional differences in the deposit rates of acquired branches after a merger.

On average, the deposit rates of acquired branches included in our sample fall by 4 bps following a merger. But the 20% of acquired branches that, prior to the merger, practiced larger deposit rates relative to their respective acquirer see, on average, a significant post-merger decline in deposit rates of approximately 28 bps. Conversely, the 20% of acquired branches with lower pre-merger deposit rates relative to their respective acquirer see their deposit rates increase, on average, by 20 bps. These results suggest that moving from the lower to the upper quintile of the distribution of pre-merger differences in deposit rates is associated with a staggering 50bps differential in the impact of mergers on deposit rates. We find that variation in exposure to changes in local banking market concentration induced by a merger deal is associated with smaller differences in the impact of bank mergers on

deposit rates. Acquired branches located in banking markets whose predicted increase in local market concentration exceeds 200 points, a regulatory cut-off that triggers a merger review, see a post-merger decline of a mere 9.6 bps.[1] Moreover, acquired branches located in banking markets whose market concentration index increased between 0 and 200 points see post-merger declines in deposit rates of 10.2 bps, which suggests that crossing the merger review threshold is not associated with sharp declines in the impact of a merger on local deposit rates.

Furthermore, our findings suggest that the current merger review criteria preclude regulators from screening proposed merger deals that predictably result in considerable declines in deposit rates to local bank consumers. At the same time, the criteria could prompt regulators to screen and potentially block proposed merger deals that, in fact, would increase local deposit rates and thus potentially benefit bank consumers. To be concrete, we find that acquired branches that are in banking markets whose concentration indices increase by more than 200 points *and* that belong to the 20% of acquired branches with lower pre-merger deposit rates experience an average increase of 12.5 bps in their deposit rates following the merger. Thus, these acquired branches are at risk of a merger review even though deposit rates predictably increase as a result of the merger. By contrast, branches acquired by out-of-market acquirers do not experience increases in their predicted local market concentration indices and, as a result, are not subject to merger reviews. But if these branches are simultaneously in the top quintile of the pre-merger deposit rate differences between acquired and acquirer, their deposit rates decline by more than 20 bps, on average, which leads to lower overall deposit rates for local banking customers. In spite of the predictable negative effects on deposit rates, competition authorities do not review these merger deals.

One possible concern is that our previous analysis understates the effects of increases in local banking market concentration because competition authorities intervened and required acquirers to divest branches, precisely in those areas that would have seen much lower deposit rates due to increases in local market power. To address this concern, we follow Liebersohn (2017) and repeat the empirical analysis in a subsample of acquired branches whose post-merger local banking market concentration indices ranged between 1,300 and 1,800 points. According to Liebersohn (2017), these are mergers that fell slightly below the critical 1,800-point regulatory cut-off for merger screening and, therefore, were very unlikely to be subject to a merger review. Consistent with the finding in Liebersohn (2017), we show that variation in predicted increases in local banking market concentration induced by a proposed merger deal is associated with larger differences in the impact of bank mergers on deposit rates. A predicted increase in local banking market concentration exceeding 200

[1]The other cut-off is a post-merger banking market concentration level that exceeds 1,800 points.

points is associated with a post-merger decline of approximately 17 bps, thus suggesting that the effects of increasing concentration levels are stronger in this subsample. Having said that, we still find that moving from the lower to the upper quintile of the distribution of pre-merger differences in deposit rates is associated with a very significant 40 bps differential in the impact of mergers on deposit rates and that, even in this subsample, antitrust authorities would do well to use pre-merger differences in deposit rates as one of their criteria for merger review.

Our paper is related to several strands of the literature. First, the paper speaks to an important literature examining the relationship between deposit pricing and bank market concentration and consolidation. Hannan and Berger (1991), Neumark and Sharpe (1992), and Driscoll and Judson (2013) document that deposit rates adjust slowly to changes in interest rates when interest rates are increasing and more so when banks are located in concentrated banking markets. Drechsler, Savov and Schnabl (2017, 2019) find that market concentration is an important determinant of the pass-through of monetary policy to deposit rates. They find that banks exposed to higher concentration areas use their local market power to keep their deposit rates low in times of rising interest rates. Azar, Raina and Schmalz (2019) do not find a significant association between local concentration and the level of deposit rates, but Prager and Hannan (1998) and Liebersohn (2017) find that increases in concentration induced by bank consolidation are associated with lower deposit rates. Focarelli and Panetta (2003) argue that, in the long run, the efficiency gains from mergers trump the negative effect of increases in local market power, thus resulting in higher deposit rates. Our paper contributes to this debate by showing that uniform deposit pricing practices are a major force behind the evolution of deposit rates following bank consolidation. Our paper, therefore, suggests that efforts to understand how consolidation and local market concentration impact markups should pay attention to the role that uniform deposit pricing practices play in limiting the ability of banks to adapt their deposit rates to local economic and market conditions.

Our paper also contributes to an extensive literature analyzing the effects of bank mergers on lending outcomes and welfare in general (e.g., Sapienza, 2002; Garmaise and Moskowitz, 2006; Erel, 2011; Granja, Matvos and Seru, 2017; Liebersohn, 2017; Nguyen, 2019). Most of this literature is focused on understanding how efficiency gains, changes in organizational structure, and increases in market power following bank mergers impact prices and loan amounts to commercial and industrial borrowers. Our contribution is to suggest that something as simple as the pre-merger differences in the deposit rates between the merged entities can be a strong predictor of the evolution of deposit rates and of changes in the local competitive landscape in the years following the merger.

Finally, the paper is related to a growing literature on uniform pricing practices (e.g.,

Chintagunta, Dubé and Singh, 2003). Nakamura (2008) examines variation in product prices and shows that 65% of the price variation in retail chains is common to stores within a retail chain. DellaVigna and Gentzkow (2019) and Hitsch, Hortaçsu and Lin (2019) further document that retail stores set the same or very similar prices for the same products across their retail stores. Using a limited sample of mergers, DellaVigna and Gentzkow (2019) also document price convergence following mergers. In the banking industry, Hurst et al. (2016) show no significant regional variation in mortgage rates for loans securitized by government-sponsored enterprises, Deltas and Li (2019) find that multi-state mortgage lenders are less responsive to the average local mortgage rate level than local lenders, and Dlugosz et al. (2019) find that the deposit rates of local lenders are more responsive to local shocks from natural disasters than those of multi-state lenders. Our paper adds to this literature by further documenting how uniform pricing interacts with bank M&As and by better understanding the role of bank M&As in the local competitive landscape.

The rest of the paper proceeds as follows. We describe the data in section 2, and in section 3 we document the extent of uniform deposit pricing practices in our sample. In section 4 we provide descriptive statistics on our merger sample, and in section 5 we document the deposit rate convergence following bank M&As. Section 6 examines the interaction between local market concentration and rate convergence induced by uniform deposit pricing in determining the evolution of deposit rates. Section 7 concludes.

2 Data Description

Our main dataset consists of branch-level deposit rates from RateWatch. RateWatch surveys over 100,000 bank branches and collects weekly advertised deposit rates and annual percentage yield (APY) on new accounts.[2] Our sample comprises all branches of commercial banks and Savings & Loans institutions with a valid Federal Deposit Insurance Corporation (FDIC) identifier that report to RateWatch. RateWatch collects deposit rates for a large portfolio of standardized deposit products such as checking accounts, savings products, and certificates of deposits (CDs) of different sizes and maturities. We focus our analysis on one of the most common products: the 12-month CD with a minimum account size of $10,000 ("12MCD10K"). We ensure that our main results are robust to using other common deposit products such as 6-, 18-, 24-, and 36-month certificates of deposits with minimum account sizes of $10,000 or a money market money account with a minimum account size of $25,000. The dataset covers a high percentage of all branches and depository institutions in the U.S. Table 1 shows that the

[2]Throughout the analysis, we use the average monthly APY at the branch level as our definition of "deposit rate."

raw dataset covers 97,643 branches across 7,756 different banks.

RateWatch also contains information on geographic characteristics of branches, the FDIC branch identifier, and the FDIC identifier of the institution that owns the branch. Importantly, the dataset also identifies whether a branch has the ability to define its own deposit rates (rate setter) or whether it uses the deposit rates set by another branch of the same bank. The dataset covers 11,872 rate-setter branches that can set their own deposit rates. For the period between 2006 and 2016, RateWatch provides a list with the changes in the FDIC bank identifier of all reporting branches whose ownership was transferred between two different depository institutions. We use this list to identify bank mergers or branch acquisitions and the respective month in which such events became effective in the RateWatch dataset. We confirm that the branch ownership changes reported in this list correspond to effective bank mergers or branch acquisitions using the bank merger dataset available from the National Information Center (NIC). In some cases, the ownership change date reported on RateWatch is different from the respective effective merger date reported in the NIC bank merger file. In our main analysis, we use the effective merger dates provided by RateWatch, and we show in the online appendix that the results are not sensitive to using the merger dates reported in the NIC file.

We identify a bank M&A or a branch acquisition in the RateWatch dataset when a fraction or the totality of the branch network of a bank is acquired by another bank. Between 2006 and 2016, we observe 4,228 M&As. Because the main purpose of the paper is to understand the price dynamics of the acquired branches around the merger event, we only consider bank M&As for which we observe the deposit rate of the acquired branch and the acquirer median deposit rate in the 12 months around the merger event. These restrictions result in a final sample of 1,614 M&As of 1,511 different banks acquired by 863 distinct banks. These mergers comprise 7,050 branches located in 4,877 distinct zip codes across 49 states of the continental U.S.

We use the Summary of Deposits (SOD) dataset collected by FDIC to obtain information on the quantity of deposits at the branch level. All commercial banks and Savings & Loans institutions must report the level of deposits held in each branch as of June 30 of each year. We combine the SOD and RateWatch datasets using the branch and bank FDIC identifiers.[3] We measure the level of deposits of each acquired branch during the merger year as the level of deposits as of June 30 of the merger year if the bank merger occurred after June 30. If the merger occurred prior to June 30 of a given year, we measure the level of deposits of the

[3]Some large banks concentrate a significant fraction of their deposits in a few specific branches. These include online deposit accounts and potentially the transference of deposits obtained in local branches. Since these branches do not have a tight link with the local deposit demand, we exclude them from our analysis. In specific, we exclude branches with deposit amounts 10 standard deviations above the mean.

acquired branch during the merger year as the level of deposits on June 30 of the previous year. We also obtain information about the Bank Holding Company of each branch from the SOD dataset, which we use to identify bank consolidations of depository institutions held by the same bank holding company. In robustness analysis, we check the sensitivity of our results to eliminating those observations. Finally, we complement the dataset with bank balance sheets and income statement data from the quarterly Reports of Condition and Income (Call Reports) available from the Federal Financial Institutions Examination Council website.

3 Uniform Deposit Pricing in the Banking Sector

We begin our main analysis by asking how important are uniform deposit pricing policies in explaining the cross-section of deposit rates offered by U.S. bank branches. One could imagine that depository institutions operating a large network of branches would maximize profits by pricing deposits of local branches to their respective local demand conditions. But it is possible that banks practice uniform or near-uniform deposit rates across their branch network because of managerial inertia, brand image concerns, or a combination of other explanations (e.g., DellaVigna and Gentzkow, 2019). If banks practice uniform or near-uniform deposit rates across their branch networks, one would expect greater price similarity across branches belonging to the same bank than across branches belonging to different banks even when these branches are located within the same narrowly defined geographic region.

Our empirical findings strongly support the conjecture that uniform deposit pricing policies are an important and pervasive feature of the U.S. banking sector. To establish this result, we employ three alternative methods to compare the importance of within-bank variation relative to variation across banks in explaining the cross-section of deposit rates across all U.S. branches. First, we draw largely from Nakamura (2008) and Hitsch, Hortaçsu and Lin (2019) and we compute the proportion of the variance in the deposit rates of the U.S. branches that is explained independently by bank fixed effects, county fixed effects and zip code fixed effects. For each period, we run separate regressions of the branch deposit rates on bank, county and zip code fixed effects. If pricing is near-uniform within the branch networks of banks, bank fixed effects will explain a large share of the variance in deposit rates. Alternatively, if banks adjust their local branch deposit rates to changes in local economic conditions (e.g., Dlugosz et al., 2019), the county or zip code fixed effects will explain a large share of the variance in the deposit rates in the U.S. economy.

In Figure 1, we plot the adjusted R^2 of these regressions over time. The red line represents the adjusted R^2 of the regressions of deposit rates on bank fixed effects, and the blue and green lines represent adjusted R^2 of the regressions of deposit rates on county and zip code

fixed effects, respectively. Between 2005 and 2016, the average adjusted R^2 of the regressions with bank fixed effects is 93%, whereas the adjusted R^2 with county and zip code fixed effects are 26% and 17%, respectively. These results suggest that 93% of the variation in the deposit rates is explained by differences in average deposit rates across bank branches and less than 7% of this variation is explained by *within*-bank differences in deposit rates. By contrast, variation in average deposit rates across U.S. counties accounts for less than 26% of the total variation in deposit rates in the banking sector. Overall, these results suggest that prices are almost uniform within banks. The lower adjusted R^2 coefficients of the regressions with county and zip code fixed effects suggest that there is significant variation in deposit rates practiced by branches of different banks located in the same region. Figure 1 also shows that uniform pricing has become more predominant over time. While between 2005 and 2008 89% of variation across different banks explained variation in the average interest rates, this number increased to 98% after 2008. Conversely, the adjusted R^2 of the regressions with county and zip code fixed effects decreased from approximately 30% in 2009 to 22% in 2016. In Appendix Figure OA.1, we show that uniform pricing is also a pervasive feature across different deposit products, including savings accounts and money market accounts.

Next, we follow the approach in DellaVigna and Gentzkow (2019) and we randomly draw branch pairs from the population of branches in the sample and compute the absolute difference between the average quarterly advertised deposit rates of the two branches in each pair. We then average these quarterly absolute rate differences across quarters to obtain a single average absolute difference for each branch pair. We randomly draw 10,000 branch pairs whose elements belong to the same bank and another 10,000 branch pairs whose elements belong to different banks. We consider only pairs where both branches report deposit rates for 24 consecutive months. We show the distribution of the quarterly absolute rate differences for the *within*-bank pairs and *between*-bank pairs in Panel A of Figure 2. The solid blue bars correspond to the distribution of the quarterly absolute deposit rate difference for *within*-bank branch pairs, and the red hollow bars correspond to the *between*-bank branch pairs. The histogram clearly shows that a large portion of the mass in the distribution of the quarterly absolute deposit rate differences of the *within*-bank branch pairs is close to zero. By contrast, the distribution of the quarterly absolute deposit rate differences of the *between*-bank branch pairs is more uniform over its support. Approximately 70% of branch pairs of the same bank have an average absolute rate difference very close to zero. In Panel A of Table 2 we show that the average quarterly absolute rate difference for *between*-bank branch pairs is 25.9 bps, contrasting with an average 2.2 bps rate difference for *within*-bank branch pairs.

Finally, we repeat the DellaVigna and Gentzkow (2019) approach but compute the monthly deposit rate correlation between the elements of each pair of branches rather than the quarterly

absolute rate differences. Using the same branch pairs as in the previous analysis, we compute the correlation between the residuals obtained from a regression of the deposit rate of each branch on branch-year fixed effects. Panel B of Figure 2 shows that the distribution of monthly rate correlations of *within*-bank branch pairs is concentrated around one, whereas the distribution of monthly rate correlations of branch pairs whose elements belong to different banks has a large mass of correlations close to zero. While 45% of the branch pairs of the same bank report a monthly correlation of one, around 30% of branches of different banks report a negative or zero correlation.

One potential concern with the results presented above is that the price similarity between branches of the same bank is driven by their geographic proximity rather than by their uniform pricing practices. To address this concern, we repeat the DellaVigna and Gentzkow (2019) approach after imposing additional geographic restrictions on the pairs of randomly drawn branches used to compute the measures of deposit rate similarity. Specifically, in Table 2, we require the 10,000 randomly drawn pairs of branches to come from the same state (Panel B) and from the same county (Panel C). If the greater price similarity of *within*-bank branch pairs was purely an artifact of greater geographic proximity, we would expect that the similarity of deposit rates of *between*-bank pairs would increase substantially once we restrict the analysis to branch pairs from the same state or county. Instead, in Panels B and C of Table 2, we see greater deposit rate similarity of *within*-bank pairs once we impose these geographic restrictions but no greater deposit rate similarity for pairs of different banks even when they are drawn from the same county. Alternatively, in Panels D and E of Table 2 we impose the additional restriction that all branch pairs come from geographically distant regions. The deposit rate similarity of *within*-bank pairs is still greater than that of *between*-bank pairs, even when we force the branches forming these pairs to be located in different states (Panel D) or different counties (Panel E).

Overall these results strongly support the conjecture that banks practice uniform or almost-uniform deposit rates across their entire branch network. We show that variation in deposit rates within a bank's branch network accounts for a small portion of the cross-sectional variation in deposit rates. These findings suggest that it may not take long after a merger for acquirer banks to impose deposit rates on acquired branches that are similar to the rates offered in the rest of their branch network. If this holds, we must observe a convergence of deposit rates across their branches following a merger, and such convergence may be an important determinant of the evolution of deposit rates of branches involved in an M&A. In what follows, we formally measure the role of deposit rate convergence in the evolution of branch rates following a merger.

4 Summary Statistics

In this section we present descriptive statistics about the key variables used in the sample. Over the 2006 to 2016 sample period, a considerable number of banks and bank branches were acquired in bank M&As or taken into receivership by the FDIC and later sold in Purchase and Assumption transactions (e.g., Granja, Matvos and Seru, 2017). The bank M&A sample provided by the National Information Center (NIC) covers around 7,000 bank and branch transactions over the sample period. In our analysis, we use the sample of M&As provided by RateWatch. As we mentioned before, the RateWatch sample does not cover the universe of depository institutions in the U.S. and it also does not cover all the mergers reported in the NIC sample. Nevertheless, we are able to examine a substantial fraction of all bank mergers and branch acquisitions, as can be clearly seen in Figure 3. Overall, RateWatch reports approximately 4,000 bank and branch M&As, which are evenly distributed over the entire sample period. After requiring that both the acquired branch and the acquirer bank report deposit rates over the 24-month window around the merger event, we are left with 1,614 bank mergers and branch acquisitions in our sample.[4]

Our main variable of interest is the difference between the deposit rate of the branches acquired in an M&A and the median deposit rate of the acquirer bank. We compute the median deposit rate of the acquirer bank using the network of branches that the acquirer operated 12 months prior to the merger date. By holding constant the pre-merger branch network of the acquirer, we avoid having the median deposit rate of the acquirer contaminated by the acquisition of new branches following the merger.

Table 3 presents descriptive statistics for the difference in deposit rates and for the absolute difference in deposit rates between the acquired and acquirer branches (Panel A) and between a matched control sample of branches and the respective matched treatment acquirer (Panel B). Acquired branches practice deposit rates that are, on average, very similar to those of their acquirers. However, there is substantial dispersion in this difference because many acquired branches set deposit rates well above or well below the median deposit rate of the acquirer. The standard deviation in the pre-merger-period deposit rate difference is approximately 40 bps, and the interquartile range approximately 30 bps. Following the bank M&A, the standard deviation of the deposit rate difference decreases to 14.4 bps in the post-merger period, suggesting significant convergence in the deposit rate difference. These empirical patterns become even clearer when we examine the absolute deposit rate difference between

[4]The RateWatch dataset reports deposit rates from depository institutions from January 1997 to December 2016. However, RateWatch started recording changes in branches' ownership only in December 2006. This limits the number of mergers in 2006 in our sample to 18. Moreover, we exclude from our sample all mergers in 2016 because we are not able to observe a complete 24-month window for such cases.

the acquired and acquirer branches. The mean absolute deposit rate difference decreases from 22.4 bps to 6.7 bps, further suggesting significant deposit rate convergence in the aftermath of bank mergers.

To further illustrate these empirical patterns, Panel A of Figure 4 plots several points of the distribution of the relative percent difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer over the 24-month window around a merger event. The results suggest that 12 months prior to the merger event there is significant dispersion in the difference between the deposit rates of the acquired and acquirer branches. At the 5th percentile of the distribution, the deposit rate of the acquired branch is approximately half that of the median deposit rate of the acquirer, whereas at the 95th percentile the deposit rate of the acquired branch is twice the median deposit rate of the acquirer. The distribution remains mostly stable throughout the entire pre-merger period. However, in the two months around the time of the merger there is a sharp convergence of the difference in deposit rates toward zero. For instance, the 95th percentile of the difference in deposit rates decreases from approximately 100% to 50%. The deposit rates of the acquired and acquirer branches continue to converge, albeit more slowly, over the subsequent months. and 12 months following the merger the distribution of the rate difference is significantly tighter around the mean.[5]

A possible explanation for the empirical patterns described above is that they are a manifestation of mean reversion wherein acquired branches practicing very high (low) deposit rates naturally see their rates decrease (increase) over time as they reverse toward the mean. This alternative does not explain why we see such sharp convergence around the merger event, but to better examine this possibility, we create a matched control group of branches that are located in the same state as the acquired branch and practice the closest deposit rates to those of the acquired branches 12 months prior to the merger. We exclude from the pool of potential control branches, branches belonging to the treated bank and branches that at some point in time were acquired. When many potential control branches have the same deposit rate distance to the acquired branch, we randomly select 5 branches to serve as matched control. The control group has 6,907 branches from 1,902 different banks.

If the results were a pure artifact of mean reversion, we would also expect to see significant convergence in the deposit rates of the sample of matched control branches. The results reported in Panel B of Table 3 and Panel B of Figure 4 suggest that the distribution of the difference between the deposit rates of the matched control branches and the median deposit rate of the respective acquirer remains stable and, if anything, diverges slightly around the merger of the respective matched acquired branch. Overall, we interpret this pattern as

[5]In Appendix Figure OA.2 we plot the relative percent difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer for 24 months after the merger event. We find that the convergence pattern is not reverted after one year.

suggesting that the convergence in deposit rates of Panel A of Table 3 and Panel A of Figure 4 is driven not by mean reversion but rather by uniform deposit pricing practices of acquirer banks that prompt deposit rates at acquired branches to converge to the median deposit rates that they set in the rest of their network.

5 Bank Mergers and Acquisitions and Deposit Pricing

In this section, we more formally explore the role of uniform deposit pricing practices in shaping the dynamic evolution of deposit rates around a merger event. We begin by presenting a pre-post event study design of merger events, then we use our matched control sample to employ a differences-in-differences design, and finally we investigate the effects of deposit rate convergence in the local competitive landscape.

5.1 Pre-Post Event Study Analysis

We start by formally examining the impact of bank M&As on the evolution of deposit pricing using a regression framework. Here, we estimate the following empirical specification using ordinary least squares (OLS):

$$Y_{i,t,s} = \gamma_t + \theta_i + \beta \textit{Post-Acquisition}_{i,s} + \epsilon_{i,t,s} \tag{1}$$

where $Y_{i,t,s}$ represents measures of the absolute difference between the deposit rates of the acquired branch i and the median rate of the respective acquirer in month t and s months prior to or after the merger. $\textit{Post-Acquisition}_{i,s}$ is a dummy variable that takes the value of one in the 12 months following the merger, $s \in \{0, 1, ..., 12\}$, and zero in the 12 months preceding the merger, $s \in \{-12, -11, ..., -1\}$. Our main coefficient of interest, β, measures the average impact of the acquisition on the absolute difference between the deposit rate of the acquired branch and the median deposit rate of its respective acquirer.

Our main specification also includes month fixed effects and branch fixed effects. The month fixed effects, γ_t, absorb overall trends in the evolution of deposit rates that impact the differences in deposit rates over time. The branch fixed effects, θ_i, ensure that all results are estimated using *within*-branch variation in the absolute deposit rate differences. Using *within*-branch variation guarantees that our findings are explained by changes in the deposit rates at the acquired branches relative to the deposit rates of the same branch during the pre-merger period. We also employ alternative empirical specification where we include state-by-month fixed effects to absorb potential heterogeneity in the trends of the deposit

rates across U.S. states. We cluster our standard errors at the banking market level.[6] Overall, our research design equates to a canonical event study design in which all units in a panel receive treatment at different times. We estimate the impact of the merger by comparing the same units before and after the merger event, while purging the effects of common shocks affecting all branches at each point in time.

In Table 4, we report the results of estimating the specification of equation (1). We find very strong evidence of convergence between the deposit rate of the acquired branch and the median rate of the acquirer bank. Columns (1) and (2) present results using the absolute difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer as the main dependent variable. The main coefficient of interest, β, suggests a deposit rate convergence of approximately 10 bps, on average, following a merger event. The results are both economically and statistically significant. The 10 bps reduction in the absolute difference of deposit rates represents a 40% reduction relative to the pre-merger absolute difference of 27 bps. Columns (3) and (4) report results using the absolute deposit rate difference divided by the median deposit rate of the acquirer as the dependent variable. Similar to the previous analyses, the results suggest significant convergence between the deposit rates of the acquired and acquirer branches. The relative absolute percent difference decreases between 16Overall, the results of this pre-post event study analysis strongly suggest significant deposit rate convergence following a merger. In the Appendix Table OA.1, we show that these results also hold for CDs with different maturities, saving accounts and money market accounts.

Next, we investigate whether this empirical pattern of deposit rate convergence following a bank merger is limited to acquisitions in which the acquirer is larger than the target. There is a possibility that our results are entirely driven by acquisitions of small banks because it is not efficient for an acquirer to retain an independent pricing policy for a relatively small number of newly acquired branches. To assess this possibility, we examine whether bank mergers are more likely to induce convergence in deposit rates when the acquirer is larger than the target. In Panel A of Table 5, we repeat the specification of equation (1) after partitioning the sample based on the relative asset sizes of the acquirer and the target in the deal. The results reported in columns (1) and (2) suggest that when the asset size of the buyer is larger than that of the target, the absolute difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer decreases by 10.5 bps or, equivalently, 21.2% following a bank merger. The results of columns (3) and (4) suggest that,

[6]Regional Federal Reserve Banks define "banking markets" across the U.S. territory. In urban areas, these markets typically coincide with core-based statistical areas (CBSAs), while in rural areas they tend to coincide with single counties. Competition authorities use these banking market definitions when evaluating the competitive effects of M&As proposals.

if anything, the deposit rate convergence is even more pronounced when the target is larger than the acquirer. The absolute difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer in columns (3) and (4) decreases by 14.8 bps or 27.9% following a bank merger. These results show that the rate convergence following bank mergers does not hinge on the relative size of the buyer and target in the merger deal.

Another potential explanation for our results is that they are entirely driven by brand image concerns insofar as it would be untenable from a public relations standpoint to retain two different deposit rates in geographic areas where the branch networks of the acquirer bank and target banks overlap. To investigate this possibility, we partition the sample based on whether the acquirer operated a branch in the same banking market as the acquired branch. We report the results of this analysis in Panel B of Table 5. We find that the deposit rate convergence results do not depend on whether the branch networks of buyer and target overlap. The results presented in columns (1) and (2) suggest that the absolute difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer decreases by 11.9 bps or 18.2% following the merger in banking markets with branch overlap, whereas the results of columns (3) and (4) suggest that, in banking markets with no branch network overlap, the same absolute difference in rates significantly decreases by 7.2 bps or 18.7%.

Our primary explanation for the sharp convergence in the deposit rates of the acquired and acquirer following the merger is that most banks set uniform or near-uniform deposit rates across their branch network and thus reset the pricing policies of their newly acquired and existing branches following the merger to maintain this deposit rate uniformity. An interesting corollary of such conjecture is that the deposit rate convergence should therefore be more pronounced when acquirers have stronger uniform pricing practices prior to the merger. To test this hypothesis, we partition the sample based on the standard deviation of the deposit rates of the acquirer 12 months prior to the merger. The idea is that the deposit rate convergence will likely be stronger for the subset of acquired branches whose respective acquirer shows a lower dispersion of deposit rates across their branch network. The results presented in Panel C of Table 5 support this conjecture. Columns (1) and (2) suggest that an acquirer with a high degree of deposit rate uniformity sees a decline in the distance between its deposit rate and that of the acquired branch of 12.0 bps or 33.5%, whereas an acquirer with a low degree of deposit rate uniformity sees a lower decline of 8.8 bps or 10.4%.

In the Appendix, we perform several robustness tests and show that convergence between the deposit rates of the acquired and acquirer following the merger holds regardless of how we split the data. In Table OA.2, we exclude consolidations where the bank holding company (BHC) is the same. In other words, we only consider mergers whose acquirer and acquired

belong to different BHCs. In Table OA.3, we partition the sample between bank mergers and branch acquisitions, and we find similar convergence rates in both subsamples. Finally, in Table OA.4, we stratify the sample based on whether the acquired branch keeps the same rate-setter branch or not, and, unsurprisingly, we find a stronger convergence after a merger when the rate-setter branch of the acquired branch changes.

5.2 Differences-in-Differences Analysis

A potential concern is that the empirical findings of the previous section are driven not by the deposit rate convergence induced by uniform deposit pricing practices following bank mergers but rather by mean reversion in the deposit rates of the acquired branches. In particular, we might observe similar deposit rate patterns across branches regardless of whether they were acquired or not.

To address this potential concern, we create a matched control group of branches. For each acquired branch we select a set of non-acquired branches located in the same state as the acquired branch and that practiced the most similar deposit rates to those of the acquired branch 12 months prior to the merger. If the results are driven entirely by mean reversion, we would expect that the deposit rates of the matched control group would also converge to the deposit rates of the respective acquirer of the treated branch. Thus, there would be no significant differences in deposit rate convergence between the acquired branches and the matched control group of branches. We assess this possibility by estimating the following differences-in-differences specification using OLS:

$$Y_{i,s,t} = \gamma_t + \theta_i + \beta_0 \textit{Post-Acquisition}_s + \beta_1 \textit{Post-Acquisition}_s \times \textit{Acquired Branch}_i + \epsilon_{i,s,t} \quad (2)$$

where $\textit{Acquired Branch}_i$ takes the value of one if the branch was acquired in a merger and zero if the branch is in the matched control group. The dependent variables are defined similar to those in (1) except that in the case of a matched control branch, the dependent variable is the absolute difference between the deposit rate of the matched control branch and the median deposit rate of the acquirer of the respective treated acquired branch. That is, for each control branch we compute the rate difference using the acquirer of the respective matching treated branch. All other variables are defined as in equation (1). In this empirical specification, the main coefficient of interest is β_1, which measures the decrease in the absolute rate difference variable relative to a control group of matched branches that practiced similar pre-merger deposit rates but that was not acquired in a bank merger.

We present the results of this analysis in Table 6. The empirical findings largely support

the idea that the deposit rate convergence is induced by uniform deposit pricing practices following bank mergers. The results of columns (1) through (4) indicate stronger deposit rate convergence in the differences-in-differences analysis relative to the empirical specifications of the previous sections. In particular, the main coefficient, β_1, indicates a decrease in the absolute deposit rate difference of approximately 13 bps or 40% for the acquired branches relative to the control group. Despite having deposit rates similar to those of the treated acquired branches 12 months before the merger event, the matched control group of branches does not see any post-acquisition decrease in their absolute rate differences but rather a small increase, as suggested by the coefficient β_0.

If the deposit rate convergence is indeed induced by uniform deposit pricing practices following bank mergers, we would expect to see a significant fraction of the deposit rate convergence occurring around the time of the merger rather than well before or well after the merger. Toward this end, we investigate whether the bank merger or branch acquisition generates a sharp "on-impact" effect on the absolute difference between the deposit rates of the acquired and acquirer branches. To trace the evolution of the impact of bank mergers on deposit rate convergence over time, we extend the model of equation (2) to examine in greater depth the dynamics of rate convergence around the bank merger. To do so, we estimate the following specification using OLS:

$$Y_{i,t,s} = \gamma_t + \theta_i + \sum_{s=-12}^{s=12} \beta_s Acquired\ Branch_i \times \delta_s + \epsilon_{i,t,s} \tag{3}$$

where δ_s is an indicator variable that equals one s period relative to the merger event. All other variables are defined as in the previous equations.

Figure 5 plots the series of coefficients, β_s, and respective standard errors from estimating equation (3) using OLS. The plot suggests a sharp "on-impact" effect of the merger in the two months following the merger event insofar as approximately 40% of the first 12 months' convergence seems to occur in these initial two months. Following the large impact of the merger event in the initial months, the magnitude of the merger impact continues to gradually increase over time. This pattern suggests either that some acquired branches take more time than others to adjust their deposit rates or that the adjustment in deposit rates is gradual over time for a large fraction of the acquired branches. More importantly, we do not see a significant trend prior to the merger event, which suggests that the results are not an artifact of mean reversion or other statistical anomalies.

Overall, these results strongly support the idea of a strong statistic and economic convergence in the deposit rates set by the acquired and acquirer branches network following the merger.

5.3 Margins of Deposit Rate Adjustment Following Bank Mergers

We now further investigate the margins of adjustment of deposit rates following bank mergers or branch acquisitions. Specifically, we ask whether the acquirer adjusts the deposit rates across its entire branch network or whether the adjustment falls mostly on changes in the deposit rate of the acquired branches. We begin our analysis by partitioning the sample based on whether the acquired branch practiced higher or lower deposit rates, on average, than the median deposit rate of the respective acquirer in the pre-merger period. When an acquired branch practiced higher deposit rates than the median deposit rate of its respective acquirer prior to the merger, we expect either a subsequent reduction in the deposit rate of the acquired branch, an increase in the median deposit rate of the acquirer, or both. By contrast, when an acquired branch practiced lower deposit rates than the median deposit rate of its respective acquirer prior to the merger, we expect either a subsequent increase in the deposit rate of the acquired branch, a decrease in the deposit rate of the acquirer, or both.

To empirically examine this question, we implement the specification of equation (1) on each of these sample partitions that are based on the sign of the pre-merger difference in deposit rates. In columns (1) and (4) of Table 7, we examine the evolution of the raw difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer. In the remaining columns of the same table, we decompose the raw difference in deposit rates into the deposit rate of the acquired branch (columns 2 and 5) and the median deposit rate of the acquirer (columns 3 and 6).

In columns (1) to (3) of Table 7, we present empirical findings for our subsample of acquired branches that practiced higher deposit rates than their respective acquirer throughout the pre-merger period. An interesting element of this empirical analysis is that the sample size of this subsample is approximately half of the total sample size. This suggests that acquirers do not focus solely on potential targets that run deposit franchises that pay relatively low deposit rates to their depositors. The results of column (1) suggest, as expected, that the positive pre-merger difference in deposit rates decreases, on average, approximately 11.9 bps following the merger event. In columns (2) and (3), we see that this reduction in the deposit rate difference is fully explained by a reduction of the deposit rate practiced by the acquired branch. The deposit rate of the acquired branch decreases by 12.3 bps, whereas the median deposit rate of the acquirer sees a non-statistically significant reduction of 0.5 bps following the merger.

In columns (4) to (6) of the same table, we turn to the subsample of acquired branches that practiced lower deposit rates than their respective acquirer throughout the pre-merger period. This subsample is an interesting case insofar as one might expect that acquirer banks might hesitate to adjust the deposit rates in acquired branches upward and, in turn, might

prefer to reduce their median deposit rates to achieve deposit rate convergence. The results of column (4) of Table 7 confirm the idea that when the acquired branch practices lower deposit rates than the acquirer prior to the merger, the difference between the deposit rates becomes less negative subsequent to the merger. Perhaps somewhat surprisingly, we find in columns (5) and (6) that most of the adjustment is again explained by changes in the deposit rates of the acquired branches. The deposit rate of the acquired branch increases 9.7 bps following the merger while the median deposit rate experiences a non-statistically significant decrease of 1.9 bps. This result is intriguing because it suggests that local depositors might see a boost in their deposit rates when their relatively low-deposit-rate branch is acquired by a bank practicing relatively higher deposit rates. This empirical pattern seems to suggest another source of potential benefits accruing to depositors following bank mergers. Focarelli and Panetta (2003) suggest that bank customers stand to benefit from bank mergers as a result of efficiency gains that are passed through to them in the long run. We suggest that, even in the short run, depositors could see increases in their deposit rates if they bank with low-deposit-rate branches.

5.4 Deposit Rate Convergence and Local Competitive Effects

We have shown so far that uniform deposit pricing practices induce substantial changes in the deposit rates of acquired branches following bank mergers. Here, we turn to the question of better understanding whether these changes affect the amount of deposits held at the acquired branches or the deposit pricing strategies of local competitors. These merger events provide a very interesting setting to better understand price and cross-price demand elasticities in local markets (e.g., DellaVigna and Gentzkow, 2019). Estimating these elasticities is usually challenging as several endogeneity and simultaneity issues arise. However, as our previous results show, the adjustment in the deposit rates following a merger event is largely predetermined by the existing deposit rate differences. Moreover, around a merger event, demand and competitive conditions are essentially constant.

Due to uniform pricing practices, bank mergers induce increases (decreases) in deposit rates when the acquired branches practice relatively low (high) deposit rates. Thus, we would expect local demand for deposits of acquired branches to respond accordingly: a positive pre-merger rate difference predictably induces a decrease in the deposit rates of the acquired branch, which should prompt a more significant outflow of deposits from those branches. Therefore, if the price elasticities for deposits are different from zero, we would expect acquired branches to lose relatively more deposits and deposit share when the pre-merger differences in deposit rates are positive and vice-versa.

We evaluate this hypothesis using the SOD dataset, which contains deposit balances

of each branch of all U.S. depository institutions as of June 30 of each year. Unlike the analyses of the prior sections, we only observe deposits at an annual frequency, so we focus our attention on changes in deposits and zip code share of deposits at the acquired branches within a five-year window of the merger event. To empirically examine whether the evolution of deposits at the acquired branches is affected by the pre-merger differences between the deposit rate of the acquired branch and the median deposit rate of its acquirer, we implement the following specification:

$$Y_{i,t,s} = \gamma_t + \theta_i + \beta_0 \textit{Post-Acq}_s + \beta_1 \textit{Post-Acq}_s \times \left(\frac{\textit{Branch Rate - Acq. Med. Rate}}{\textit{Acq. Med. Rate}} \right)_i^{Pre} + \epsilon_{i,t,s} \quad (4)$$

where $Y_{i,t,s}$ is either the natural logarithm of total deposits at the acquired branch i in year t, s years around the merger event, or the market share of deposits at the zip code level of the acquired branch. *Post-Acq* is an indicator variable that takes the value of one after the branch is acquired by another bank. $\left(\frac{\textit{Branch Rate - Acq. Med. Rate}}{\textit{Acq. Med. Rate}} \right)_i^{Pre}$ measures the average difference over the 12 months prior to the merger between the deposit rate of the acquired branch and the median deposit rate of acquirer. The main coefficient of interest, β_1, measures the semi-elasticity of deposits to bank merger events when the pre-merger difference in deposit rates increases by one standard deviation.

We present the results of this analysis in Table 8. The results suggest that, on average, acquired branches lose approximately 12% of their deposits and 1.4 percentage points of deposit market share at the zip code level following the merger event. These results are consistent with the idea that current bank customers derive utility from the attributes or characteristics that are specific to the acquired bank or branch, such as familiarity with the bank personnel. Some of these attributes may be lost following a merger, prompting some outflow of deposits. More importantly, however, we find in columns (1) and (2) that an increase of one standard deviation in the pre-merger differences between the branch rate and the median deposit rate increases the outflow of deposits following a bank merger by 2% (Panel A) and prompts a loss in deposit market share of 0.3 percentage points (Panel B). In columns (3) and (4), we interact the post-acquisition dummy with a variable that directly measures the change between the pre-merger and post-merger average relative difference in deposit rates between acquired branch and acquirer. A positive value of this measure indicates that the deposit rate difference at the acquired branch relative to the median deposit rate of the respective acquirer increased in percent terms relative to its pre-merger level. As expected, we find that such increases are associated with smaller outflows of deposits (columns (3) and (4) of Panel A) and smaller losses of deposit market share (columns (3) and (4) of Panel B).

In Figure 6, we further evaluate the role of the deposit rate convergence in shaping the level of deposits at acquired branches. We do so by tracing how the impact of bank mergers on deposits over time depends on the pre-merger differences in deposit rates. Specifically, we repeat the specification of equation (4) but now interact a series of indicator variables that take the value of one s period around the merger with our pre-merger deposit rate difference variable, $\left(\frac{Branch\ Rate\ -\ Acq.\ Med.\ Rate}{Acq.\ Med.\ Rate}\right)_i^{Pre}$. We then plot the estimated coefficients and respective standard errors for acquired branches with a value of $\left(\frac{Branch\ Rate\ -\ Acq.\ Med.\ Rate}{Acq.\ Med.\ Rate}\right)_i^{Pre}$ two standard deviations above the mean (red line) and two standard deviations below the mean (blue line). The results plotted in Figure 6 further support the idea that a branch acquisition has a sharp negative impact on the deposits and local deposit market share of acquired banks after the merger. However, the results also suggest that deposits and deposit market share of acquired branches start recovering approximately one year after the merger event and that this recovery is faster for the acquired branches with a negative pre-merger difference in deposit rates. This empirical pattern is consistent with the idea that such branches experience increases in deposit rates (see Table 7) following the merger and that such increases in deposit rates are associated with lower deposit outflows.

Next, we ask whether local competitors respond to the merger-related changes in deposit rates at acquired branches by increasing or decreasing their own deposit rates. We investigate whether the rates of local competitors behave as strategic complements or strategic substitutes, by estimating the following specification using OLS regressions:

$$Y_{j,i,t,s} = \gamma_t + \theta_j + \beta_0 Post\text{-}Acq_{s,i,j} + \beta_1 Post\text{-}Acq_{s,i,j} \times \left(\frac{Branch\ Rate\ -\ Acq.\ Med.\ Rate}{Acq.\ Med.\ Rate}\right)_{i,j}^{Pre} + \epsilon_{j,i,t,s} \quad (5)$$

where $Y_{j,i,t,s}$ is the deposit rate practiced by a competitor j in the same zip code of an acquired branch i, in month t, s months around the merger event. $Post\text{-}Acq_{s,i,j}$ is now defined as an indicator variable that takes the value of one following the acquisition of branch i that competes locally with a branch of bank j, and $\left(\frac{Branch\ Rate\ -\ Acq.\ Med.\ Rate}{Acq.\ Med.\ Rate}\right)_{i,j}^{Pre}$ is the pre-merger difference in deposit rates of the acquired branch i that competes locally with j.

We present the results of this analysis in Table 9. The coefficient on the *Post-Acquisition* dummy variable is economically similar to zero and statistically insignificant in all four columns of Table 9. This result suggests that competitors of merged branches do not significantly change their deposit rates when there are no pre-merger differences between the deposit rate of acquired and acquirer branches. More interestingly, we see that a one-standard-deviation increase (decrease) in $\left(\frac{Branch\ Rate\ -\ Acq.\ Med.\ Rate}{Acq.\ Med.\ Rate}\right)_i^{Pre}$ is associated with a statistically significant reduction (increase) in competitor deposit rates of 0.3 to 0.9 bps following the merger. This

result is consistent with the idea that competitors respond to predictable post-merger shifts in the deposit rates of acquired branches by adjusting their own deposit rates in the same direction. These results also show that prices are strategic complements in local deposit markets in that the cross-price elasticities in this market are positive.

Similar to the previous analysis, we also trace out the evolution over time of competitor prices in response to a post-merger shock in deposit rates that is largely predetermined by the existing differences in deposit rates. To do so, we repeat the specification of equation (5) but now interact a series of indicator variables that take the value of one s period around the merger with our pre-merger deposit rate difference variable, $\left(\frac{Branch\ Rate\ -\ Acq.\ Med.\ Rate}{Acq.\ Med.\ Rate}\right)_i^{Pre}$. In Figure 7, we plot, in event time, the estimated coefficients and respective standard errors for representative branches j that compete with acquired branches i whose pre-merger differences in deposit rates, $\left(\frac{Branch\ Rate\ -\ Acq.\ Med.\ Rate}{Acq.\ Med.\ Rate}\right)_i^{Pre}$, are two standard deviations above the mean (red line) and two standard deviations below the mean (blue line). The plot shows that the red and blue lines in Figure 7 have common pre-merger trends throughout the entire pre-merger period. Following the merger, the lines begin to drift apart, and after 12 months there are significant differences between the average deposit rate of competitors exposed to an acquired branch with a positive pre-merger difference in deposit rates (red line) and the average deposit rate of competitors exposed to an acquired branch with a negative pre-merger difference in deposit rates (blue line).

While the results of the previous analyses suggest that local competitors adjust their own deposit rates in response to post-merger shocks in deposit rates of acquired branches, the economic magnitude of the competitors' responses is relatively small. The results presented in Table 7 suggest an average change in deposit rates of acquired branches of approximately 10 bps, whereas local competitors respond by adjusting their own deposit rates by 0.3 to 0.9 bps in response to a standard deviation increase in the relative pre-merger difference in deposit rates of acquired branches. One possibility is that the uniform deposit pricing practices of the competitor banks also preclude them from flexibly or optimally responding to the changes in the deposit rates of acquired branches. To investigate this conjecture, we look into whether the local competitor's response to the post-merger shocks in deposit rates of acquired branches is more pronounced when the local competitor branch has the ability to set deposit rates, i.e., if the competitor branch is a rate-setter. We repeat the specification of (5) by including an additional interaction term, a dummy variable that takes the value of one if the competitor branch is a rate-setter.[7]

We report the results of this analysis in Table 10. The results support the conjecture that uniform deposit pricing practices limit the ability of local competitors to adjust their

[7]Naturally, we include all other respective interaction terms.

own deposit rates in response to the deposit rate shocks induced by bank mergers. The results in columns (1) and (2) suggest that competitor branches that are not rate-setters respond to a one-standard-deviation increase (decrease) in $\left(\frac{Branch\ Rate\ -\ Acq.\ Med.\ Rate}{Acq.\ Med.\ Rate}\right)_i^{Pre}$ by decreasing (increasing) deposit rates by approximately 0.2 to 0.8 bps. However, when the competitor branch is a rate-setter, we see an incremental post-merger competitor response of approximately 1.7 to 1.8 bps to a standard deviation increase in the pre-merger difference in deposit rates of the acquired branch. Thus, the results of Table 10 suggest that competitor branches that are rate-setters respond to a standard deviation increase in the relative pre-merger difference in deposit rates of acquired branches by decreasing their own deposit rates by 1.9 to 2.6 bps. The results of columns (3) and (4) further support the inferences from the specification in columns (1) and (2) by suggesting that the results are not sensitive to using another measure of the price shock at the acquired branch.

Overall, the results in this subsection suggest that the shocks to deposit rates induced by deposit rate convergence at the acquired branches send shock waves that percolate to the pricing strategies of local competitors and to the banking decisions of local customers, significantly affecting the deposit market equilibrium in regions exposed to an acquired branch.

6 Deposit Rate Convergence, Local Market Concentration, and the Evolution of Deposit Rates

Merger review guidelines indicate that antitrust and competition authorities must review proposed bank mergers when the impact of the merger on local concentration indices results in an increase in excess of 200 points *and* the post-merger local market concentration index exceeds 1,800 points. Competition authorities then decide, based on the results of such review, whether to block the merger or request acquirers to divest branches. Liebersohn (2017) and Williams (2019) show that the likelihood of merger intervention rises discontinuously around the cut-off. This focus on local market concentration is predicated on the belief that increases in local market shares lead to lower deposit rates in those markets. But if acquirers have strict uniform deposit pricing policies, their primary consideration may be to adjust the deposit pricing of their newly acquired branches to conform to their current deposit pricing rather than lowering deposit rates in places where they see greater increases in their local market share. In the last part of our paper, we evaluate how important are predicted increases in local banking market concentration vis-à-vis pre-merger differences in deposit rates between banks in a merger deal in explaining cross-sectional variation in the impact of bank mergers on the deposit rates of acquired branches.

We begin our analysis by computing the changes in market concentration induced by the bank mergers in the banking market definitions used by the regulators. As mentioned before, banking markets do not necessarily coincide with any standard geographic delineation. We searched for the current banking market definitions through the CASSIDI tool available from the website of the Federal Reserve Bank of St. Louis.[8] Similar to Liebersohn (2017), we find that these markets tend to coincide with core-based statistical areas (CBSAs) in urban areas and single counties in the rural areas. Therefore, for each acquired branch, we compute the predicted change in its local banking market concentration that would be induced by the merger, which we take as the increase in the Herfindahl-Hirschmann Index (HHI) after combining the pre-merger market shares of the acquirer and acquired banks in the respective local banking market. This procedure closely mimics the calculations of antitrust authorities in their assessment of the potential effects of the merger on local market concentration.

After computing our measure of exposure of the acquired branch to predicted changes in local HHI, we examine its empirical association with the respective pre-merger difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer. A positive or negative relation between these variables could be indicative of sorting by acquirers. For instance, a positive association between these variables could emerge if acquirers must obtain additional local market power to lower the deposit rates of the acquired branch toward their own. In Figure 8, we present a scatterplot of the predicted increase in the local banking market concentration indices induced by the bank merger and the respective pre-merger difference in the deposit rates. The figure suggests that, if anything, predicted changes in local concentration indices are lower when merged branches practice higher deposit rates than those of their acquirers in the pre-merger period. This finding, therefore, does not support the idea of positive sorting on these two dimensions.

Next, we examine how predicted increases in local HHI compare with pre-merger differences in deposit rates in explaining cross-sectional variation in the impact of mergers on deposit rates. We start our analysis by computing the average impact of a bank merger on the deposit rates of acquired branches across the entire sample. The empirical results in column (1) of Table 11, Panel A, suggest that deposit rates at acquired branches decline, on average, by 4 bps following a bank merger. We obtain this result after conditioning on state-by-month and branch fixed effects, thus ensuring that the results are driven by within-branch variation after purging the effect of common trends at the state level.

In column (2) of the same table, we investigate whether predicted changes in HHI in excess of the threshold set in the merger review guidelines are associated with stronger negative effects of bank mergers on deposit rates. We interact the post-merger indicator with three

[8] https://cassidi.stlouisfed.org/index

indicator variables: $\mathbb{1}.(\Delta HHI = 0)$, which represents acquired branches with no increase in local market concentration (out-of-market bank mergers); $\mathbb{1}.\Delta HHI \in (0, 200)$, representing acquired branches experiencing strictly positive increases in HHI below the 200 points threshold; and $\mathbb{1}.\Delta HHI \geq 200$, representing acquired branches in markets whose HHI increases is in excess of that threshold. Our results suggest that out-of-market mergers are associated with an insignificant negative effect of 1.4 bps on the deposit rates of acquired branches. When a merger induces positive changes in local banking market concentration, the deposit rates of acquired branches see, on average, a significant decline of approximately 10 bps following the merger. The difference between the coefficients associated with $\mathbb{1}.\Delta HHI \in (0, 200)$ and $\mathbb{1}.\Delta HHI \geq 200$ is, however, very small.

We repeat the analysis of column (2) but rather interact the post-merger indicator variable with a set of five indicator variables that represent each quintile of the distribution of the pre-merger deposit rate differences between the banks in the merger deal. The results reported in column (3) suggest that the 20% of acquired branches that, prior to the merger, practiced larger deposit rates relative to their respective acquirer see, on average, a significant post-merger decrease in deposit rates of approximately 28 bps. Conversely, the 20% of acquired branches with lower pre-merger deposit rates relative to their respective acquirer see their deposit rates increase, on average, by 20 bps. These results suggest that moving from the lower to the upper quintile of the distribution of pre-merger differences in deposit rates is associated with a very significant 50 bps differential in the impact of mergers on deposit rates. In columns (4) through (6) of the same table, we further examine and compare the effects of changes in local banking market concentration and pre-merger differences in deposit rates. The results that we report in these columns suggest that when mergers increase the local banking market concentration, deposit rates of acquired branches significantly decline by approximately 9 bps. The results of columns (4) and (6) show that a one-standard-deviation increase in the predicted HHI change of the local banking market does not statistically significantly affect the impact of bank mergers on deposit rates of acquired branches once we account for the overall differences between in-market and out-of-market mergers. By contrast, the results reported in columns (5) and (6) suggest that a one-standard-deviation increase in pre-merger deposit rate differences between the merged entities is associated with an economically and statistically significant decline of 8.2 bps.

The results above suggest that pre-existing variation in the pre-merger differences in deposit rates between banks in a merger deal is associated with substantial heterogeneity in the impact of the bank merger on deposit rates. Next, we ask whether we could use the information on pre-existing deposit rate differences between merging banks to define merger review guidelines that better screen for mergers where customers at acquired branches will

see a decline in their deposit rates following a bank merger. In Figure 9, we extend the empirical analysis in Table 11 by including a full set of interactions between $\mathbb{1}.(\Delta HHI = 0)$, $\mathbb{1}.\Delta HHI \in (0, 200)$, and $\mathbb{1}.\Delta HHI \geq 200$ and the indicator variables representing the quintile sorts based on pre-existing deposit rate differences. We then plot the estimated coefficients from estimating this regression using OLS in Figure 9. Our results suggest that merger review guidelines that rely both on an HHI threshold and on the pre-merger difference in deposit rates between merging banks could improve merger review screening in at least two dimensions: First, merger authorities could screen mergers included in the top quintile of the distribution of pre-merger differences and whose predicted changes do not exceed 200 points. As Panel A of Figure 9 shows, these mergers are associated with substantial declines in post-merger deposit rates. Second, antitrust authorities could spend fewer resources investigating and possibly requiring merger relief for bank mergers with HHI increases exceeding 200 points but very negative pre-merger differences between acquired and acquirer branches. The results presented in Figure 9 suggest that depositors at such acquired banks see their deposit rates significantly increase in the post-merger period.

A potential concern about the empirical inferences in the previous analyses is that we do not observe how bank mergers would impact deposit rates of acquired branches in cases where competition authorities sought merger remedies. The results in Panel A of Table 11 could, therefore, significantly understate the negative impact of above-threshold increases in local market concentration on local deposit rates because antitrust interventions preclude us from observing precisely the mergers whose increases in local market concentration would have the most negative consequences on deposit rates. To formally assess this possibility, we exploit the empirical findings in Liebersohn (2017) and repeat our above analysis in a subsample of bank mergers whose predicted post-merger HHI was between 1,300 and 1,800 and thus slightly below the cut-off of 1,800 set forth in the review guidelines. Liebersohn (2017) finds that merger authorities seldom intervene in this subsample even when the local banking market HHI increases more than 200 points. Furthermore, Liebersohn (2017) shows that in this subsample, HHI increases in excess of 200 points are associated with substantially lower local deposit rates relative to other mergers that were reviewed by competition authorities because their predicted post-merger HHI was above the 1,800 HHI threshold.

The results reported in Panel B of Table 11 support the conjecture that including all bank mergers in the analysis likely attenuates the estimated coefficients associated with the dummy variable that indicates whether the increase in HHI exceeded 200 points. Column (2) suggests that, in the subsample of bank mergers whose predicted post-merger HHI was between 1,300 and 1,800, a local market concentration increase in excess of 200 points is associated with a statistically significant decline in the deposit rates of acquired branches of 16 bps, which

compares with declines of 1.3 bps and 5.4 bps for bank mergers that carry no increase in local concentration and increases between 0 and 200 points, respectively. Thus, unlike the results of the full sample, there is a sizable difference in the deposit rate declines associated with increases in local market concentration above and below 200 points.

The results of column (3) of Panel B of Table 11 show, however, that even in this subsample, pre-merger differences in deposit rates continue to explain significant heterogeneity in the impact of bank mergers on deposit rates of acquired branches. Moving from the lower to the upper quintile of the distribution of pre-merger differences in deposit rates is associated with a very significant 41.4 bps differential in the impact of mergers on deposit rates. Furthermore, much like the results of the previous analysis, the plot in Panel B of Figure 9 suggests that the merger review cutoff of 200 points screens mergers in the lower quintile of the distribution of pre-merger deposit rate differences that do not result in systematic declines in deposit rates. However, it does not screen mergers below the merger review cutoff of 200 points that result in large, systematic declines in deposit rates because the pre-merger differences in deposit rates between acquired and acquirer banks are in the upper quintile of its distribution.

Overall, our findings suggest that pre-merger differences in deposit rates explain a significant fraction of the cross-sectional heterogeneity in the impact of bank mergers on local deposit rates. Furthermore, our findings suggest that in sectors with strong uniform pricing practices, competition authorities would do well to pay attention to the effect of pre-merger differences in pricing patterns both as a screen to determine which mergers warrant additional scrutiny and also on their prospective merger reviews of bank consolidations.

7 Conclusion

Our paper speaks to an important debate on the economic implications of rising levels of market concentration in the banking industry. Mergers and acquisitions were the primary factor behind a significant decline in the total number of commercial banks in the U.S. and a corresponding increase in the levels of market concentration over the last 20 years. Thus, it is important to better understand whether this wave of bank M&As contributed to the previously documented ability of banks to use their market power to widen deposit spreads in areas exposed to high levels of market concentration (Drechsler, Savov and Schnabl, 2017). In particular, we attempt to shed some light on these issues by studying how bank M&As shaped the evolution of deposit rates at acquired branches.

Our novel contribution is to look at the effect of bank M&As on deposit pricing through the lens of a recent literature documenting strong uniform pricing practices across a number of sectors. Our headline findings are that banks practice uniform or near-uniform deposit

rates across their branch network and that this practice induces substantial convergence in the deposit rates of acquired branches toward those of the respective acquirers after a bank M&A. Interestingly, we find that because a substantial fraction of acquired branches practiced deposit rates that were below those of their acquirers prior to the merger, depositors at those branches actually saw an average increase in their deposit rates following the merger. Furthermore, we find that pre-merger differences between the deposit rate of acquired branch and the median deposit rate of the respective acquirer are a far more powerful determinant of the post-merger evolution of deposit rates than the predicted changes in local market concentration levels induced by the merger.

We believe that our findings are very relevant for policymakers interested in evaluating the effects of mergers on local competitive conditions. We detect strong uniform pricing practices in the banking industry, which calls into question whether competition authorities should require merger remedies based on concentration indices of local markets in isolation. Instead, our findings suggest that policymakers should better understand how the merger deal might affect the deposit prices that the bank sets across its entire branch network. Our findings also indicate that policymakers should examine how deposit rate convergence forces will affect the evolution of the competitive landscape in the areas directly affected by the merger. Without taking these forces into consideration in their merger review analyses, merger authorities could risk challenging merger deals that increase local concentration indices but would ultimately benefit local deposits due to deposit rate convergence.

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Figure 1: Adjusted R^2 of Interest Rate on Fixed Effects

Figure 1 plots the adjusted R^2 from a monthly series of ordinary least squares (OLS) regressions of the 12-month certificate of deposit (CD) rate with a minimum account size of $10,000 on bank fixed effects (solid red line), county fixed effects (dashed blue line) and zip code fixed effects (short dashed green line). For each month, we run an OLS regression of the deposit rates practiced by each branch in the respective month on each set of fixed effects, and we plot the respective R^2 over time. Data is from RateWatch.

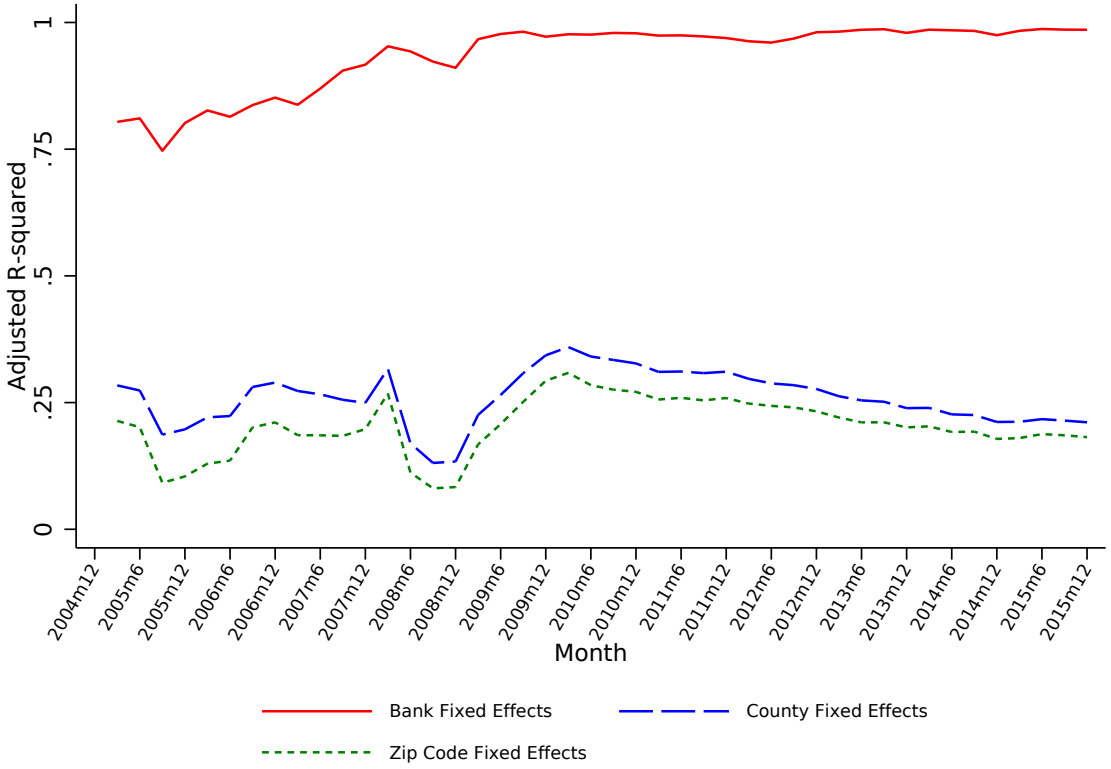
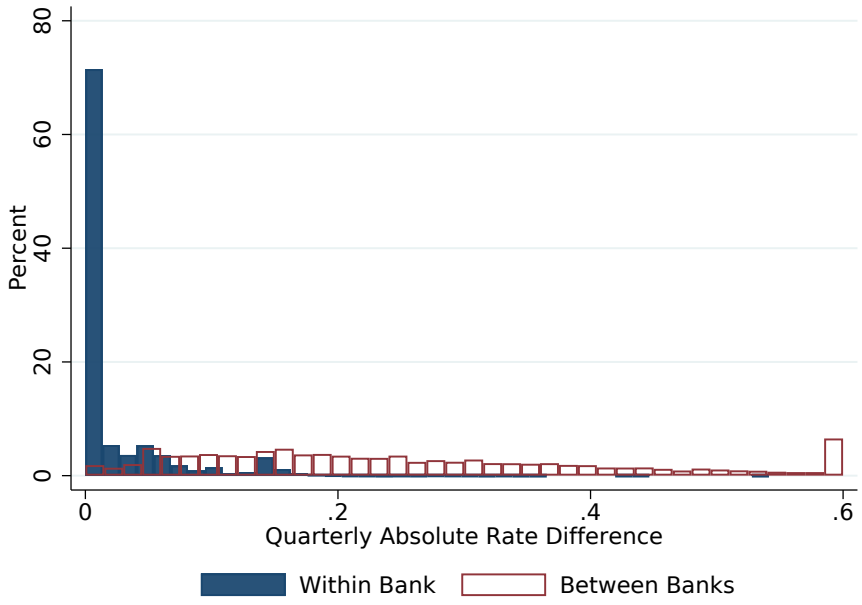


Figure 2: Similarity of Deposit Rates Across Branches: Same Bank vs. Different Bank Comparisons

Figure 2 presents histograms representing the quarterly absolute deposit rate differences and monthly rate correlations of randomly drawn pairs of branches of the same bank (solid blue bars) and randomly drawn pairs of different banks (hollow red bars). Panel A represents the average absolute rate difference in a quarter for each randomly drawn pair. Panel B represents the average rate correlation at a monthly level for each randomly drawn pair of branches. To construct these figures, we draw 10,000 random branch pairs for each panel, and the pairs are not the same across the panels. Data is from RateWatch.

Panel A: Quarterly Absolute Rate Difference



Panel B: Monthly Rate Correlation

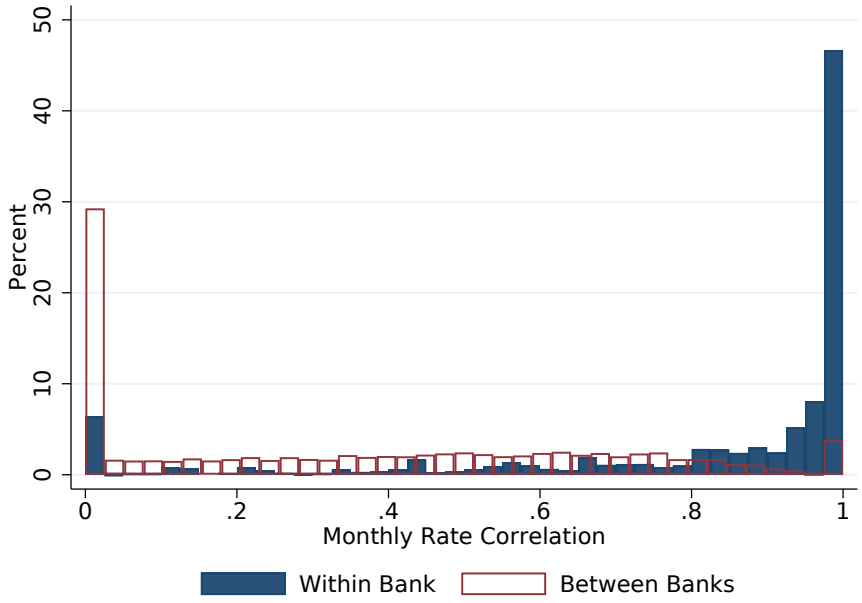


Figure 3: Number of Mergers

Figure 3 represents the annual number of bank mergers over the sample period. The blue bars represent the annual number of bank mergers obtained from the National Information Center (NIC) bank merger dataset. The red bars represent the number of bank mergers covered in the RateWatch sample. The green bars represent the annual number of bank mergers included in our final sample after imposing the selection criteria.

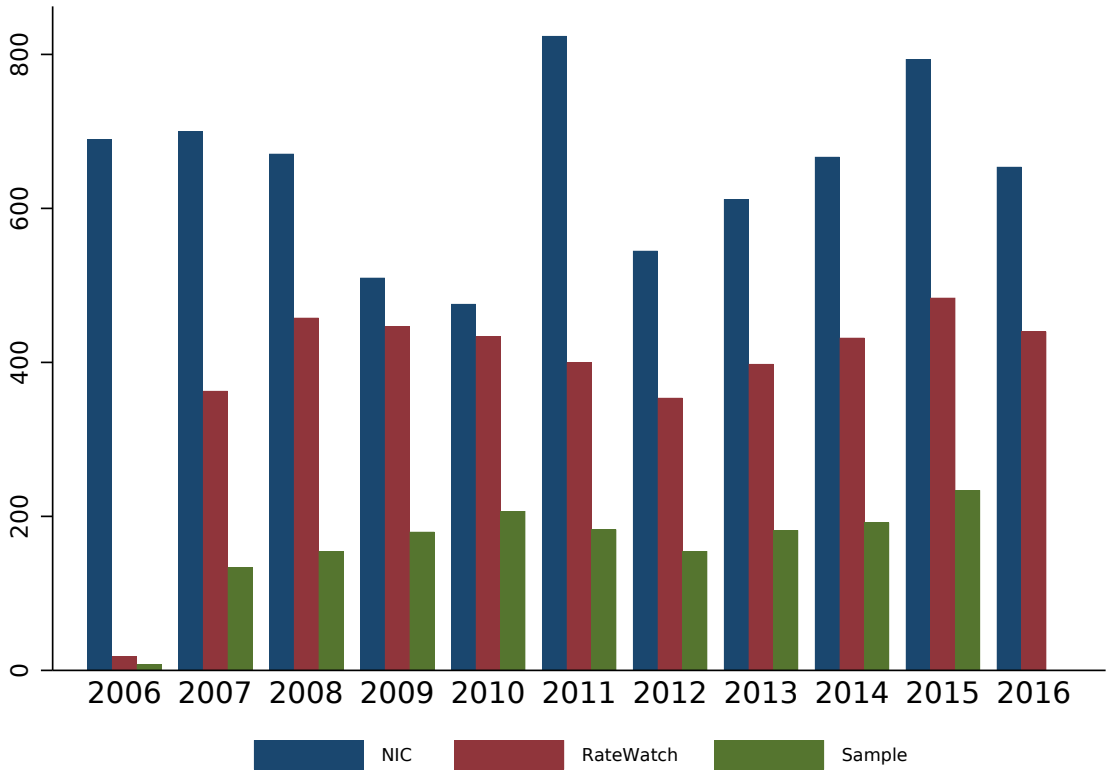
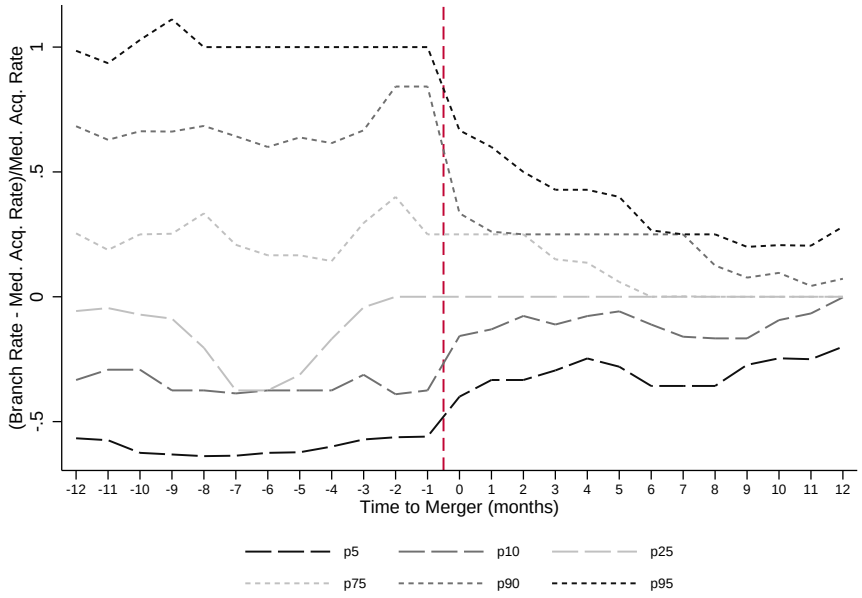


Figure 4: Relative Percent Difference between Branch Rate and Median Rate of Acquirer in Event Time

Figure 4 plots the distribution of the percent differences in the deposit rates practiced by an acquired branch (Panel A) or matched control branch (Panel B) and the respective median acquirer rate around the merger. The percent difference is defined as $\frac{\text{(Branch Rate - Med. Acq. Rate)}}{\text{Med. Acq. Rate}}$. The lines represent the 5th, 10th, 25th, 75th, 90th, and 95th percentile of the distribution of this difference over event time. The matched sample of control branches is obtained by selecting a set of branches in the same state with the closest rates to that of an acquired branch 12 months before the merger. Data for this analysis comes from RateWatch.

Panel A: Acquired Branches



Panel B: Matched Control Branches

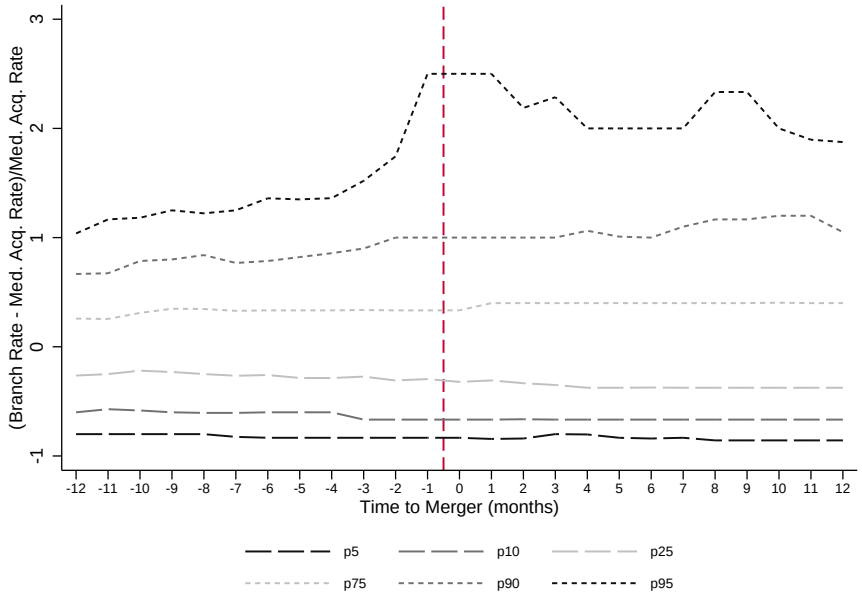


Figure 5: Treatment Effects over Event Time

Figure 5 plots the estimated impact of the merger event on the percent absolute difference between deposit rates of the merged branch and respective median rate of the acquirer. The shallow circles represent the series of coefficients β_s from estimating an OLS regression of this percent absolute deposit rate difference on a set of dummy variables representing 12 leads and lags of a dummy variable that takes the value of one 12 months after the merger and zero 12 months before. Specifically, we implement the specification of equation (3), where Y_{ist} represents the absolute percent difference between the deposit rate of the acquired branch i and the median deposit rate of the acquirer, $\frac{|BranchRate - Acq.Med.Rate|}{Acq.Med.Rate}$. The vertical bands represent 95% confidence intervals for the point estimates in each quarter. Data comes from RateWatch.

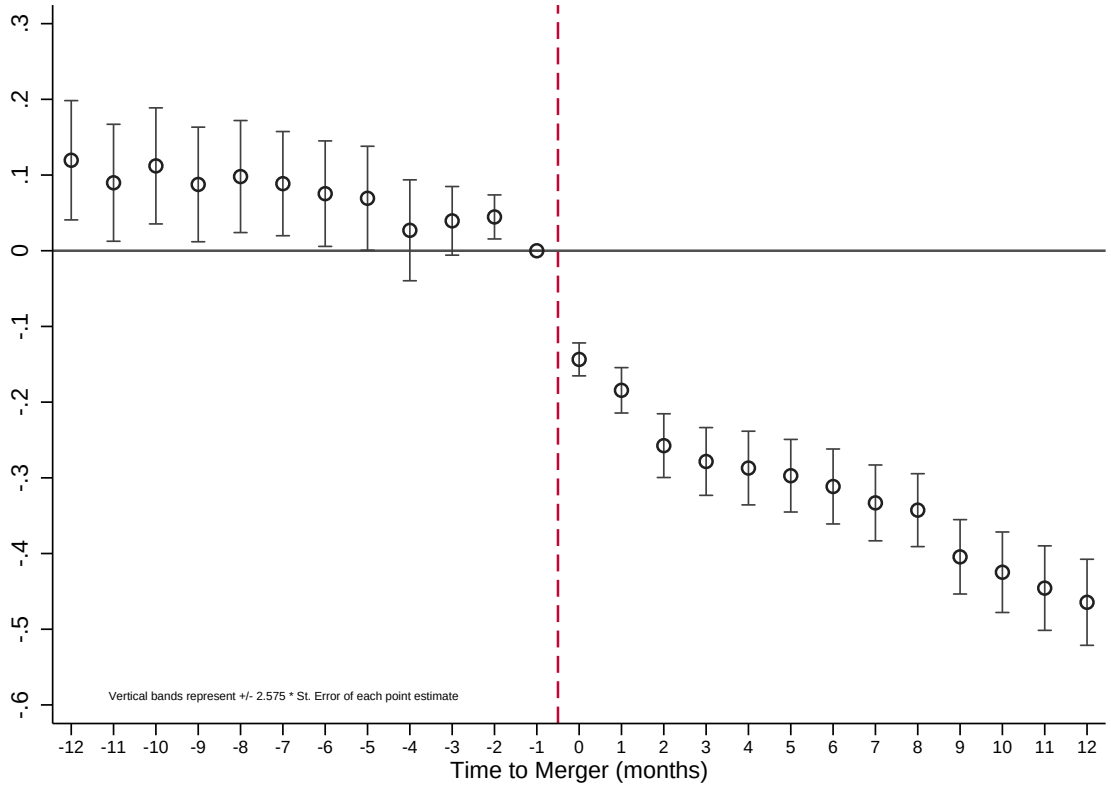
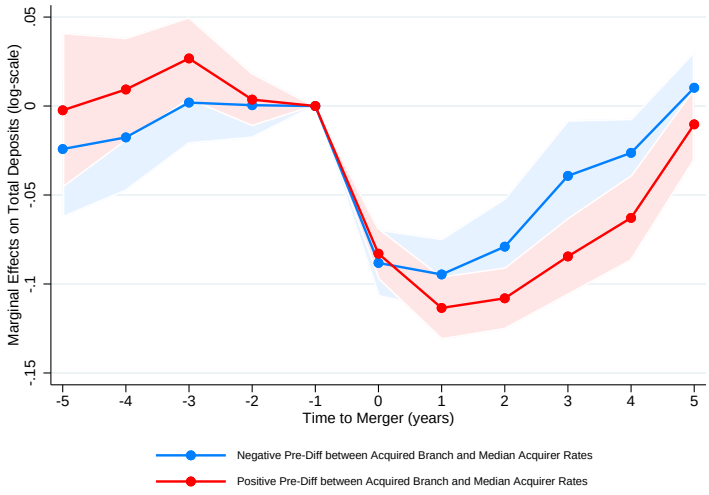


Figure 6: Evolution of Branch Deposits following M&A

Figure 6 represents the evolution of the deposits of acquired branches in the years around the merger event. The blue (red) line represents the marginal impact of the merger over time on the natural logarithm of branch deposits and on the share of deposits in the zip code of the acquired branch when there is a negative (positive) pre-merger difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer. Specifically, we estimate the following model specification using OLS: $Y_{i,t,s} = \gamma_t + \theta_i + \sum_{s=-5}^{s=5} \beta_s \delta_s + \sum_{s=-5}^{s=5} \lambda_s \delta_s \times \frac{(Branch\ Rate\ -\ Acq.\ Med.\ Rate)}{Acq.\ Med.\ Rate}_i^{Pre} + \epsilon_{i,t,s}$, where $Y_{i,t,s}$ represents either the natural logarithm of branch deposits (Panel A) or the branch share of deposits (Panel B), in year t, s years prior (after) the merger event, γ_t are state-by-year fixed effects, θ_i are branch fixed effects, and δ_s are merger event dummies. The marginal effects are computed using the event time coefficients of the dependent variable with respect to the merger event dummies β_s and the merger event time coefficients, λ_s, which represent the effect of the merger event interacted with the percent differences in pre-merger deposit rates between acquired branch and median acquirer rate, $\frac{(Branch\ Rate\ -\ Acq.\ Med.\ Rate)}{Acq.\ Med.\ Rate}^{Pre}$. Specifically, for each s={-5,-4,...,4,5}, we plot $\beta_s + \lambda_s \delta_s \times \frac{(Branch\ Rate\ -\ Acq.\ Med.\ Rate)}{Acq.\ Med.\ Rate}^{Pre}$ for an acquired branch with $\frac{(Branch\ Rate\ -\ Acq.\ Med.\ Rate)}{Acq.\ Med.\ Rate}^{Pre}$ two standard deviations below the mean (blue line) and for an acquired branch with $\frac{(Branch\ Rate\ -\ Acq.\ Med.\ Rate)}{Acq.\ Med.\ Rate}^{Pre}$ two standard deviations above the mean (red line). The blue and red shaded areas are 95% confidence intervals. Data for this figure comes from the Summary of Deposits (SOD) dataset and RateWatch.

Panel A: Total Deposits



Panel B: Branch Share of Deposits at the Zip Code Level

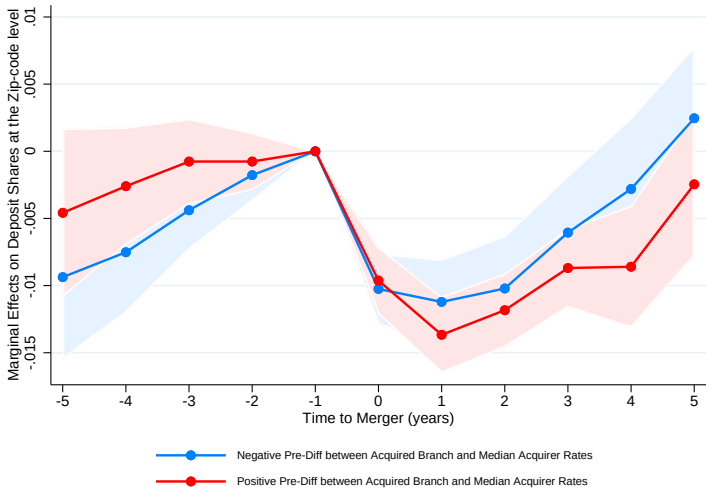


Figure 7: Competitors' Response to Local M&A

Figure 7 represents the evolution of the deposit rates of local competitors of acquired branches in the months around the merger event. The plot represents the marginal impact of the merger over time on the deposit rates set by competitor branches located in the same zip code of the acquired branch. The blue (red) line represents the evolution of the deposit rates of competitors when the average pre-merger difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer was negative (positive). Specifically, we estimate the following model specification using OLS: $Y_{j,i,t,s} = \gamma_t + \theta_j + \sum_{s=-12}^{s=12} \beta_s \delta_s + \sum_{s=-12}^{s=12} \lambda_s \delta_s \times \frac{(Branch\ Rate\ -\ Acq.\ Med.\ Rate)}{Acq.\ Med.\ Rate}_i^{Pre} + \epsilon_{j,i,t,s}$, where $Y_{j,i,t,s}$ represents the deposit rate practiced by a competitor j in the same zip code of the acquired branch i, in month t, s months prior (after) the merger event, γ_t are state-by-month fixed effects, θ_j are branch fixed effects, and δ_s are merger event dummies. The marginal effects are computed using the event time coefficients of the competitors' deposit rates with respect to the merger event dummies β_s and the merger event time coefficients, λ_s, which represent the effect in the competitors' deposit rates of the the merger event interacted with the percent differences in pre-merger deposit rates between acquired branch and median acquirer rate, $\frac{(Branch\ Rate\ -\ Acq.\ Med.\ Rate)}{Acq.\ Med.\ Rate}^{Pre}$. Specifically, for each s={-12,-11,...,11,12}, we plot $\beta_s + \lambda_s \delta_s \times \frac{(Branch\ Rate\ -\ Acq.\ Med.\ Rate)}{Acq.\ Med.\ Rate}^{Pre}$ for a competitors' branch j with a local acquired branch $\frac{(Branch\ Rate\ -\ Acq.\ Med.\ Rate)}{Acq.\ Med.\ Rate}^{Pre}$ of two standard deviations below the mean (blue line) and with a local acquired branch j with a $\frac{(Branch\ Rate\ -\ Acq.\ Med.\ Rate)}{Acq.\ Med.\ Rate}^{Pre}$ two standard deviations above the mean (red line). The blue and red shaded areas are 95% confidence intervals. Data for this figure comes from RateWatch.

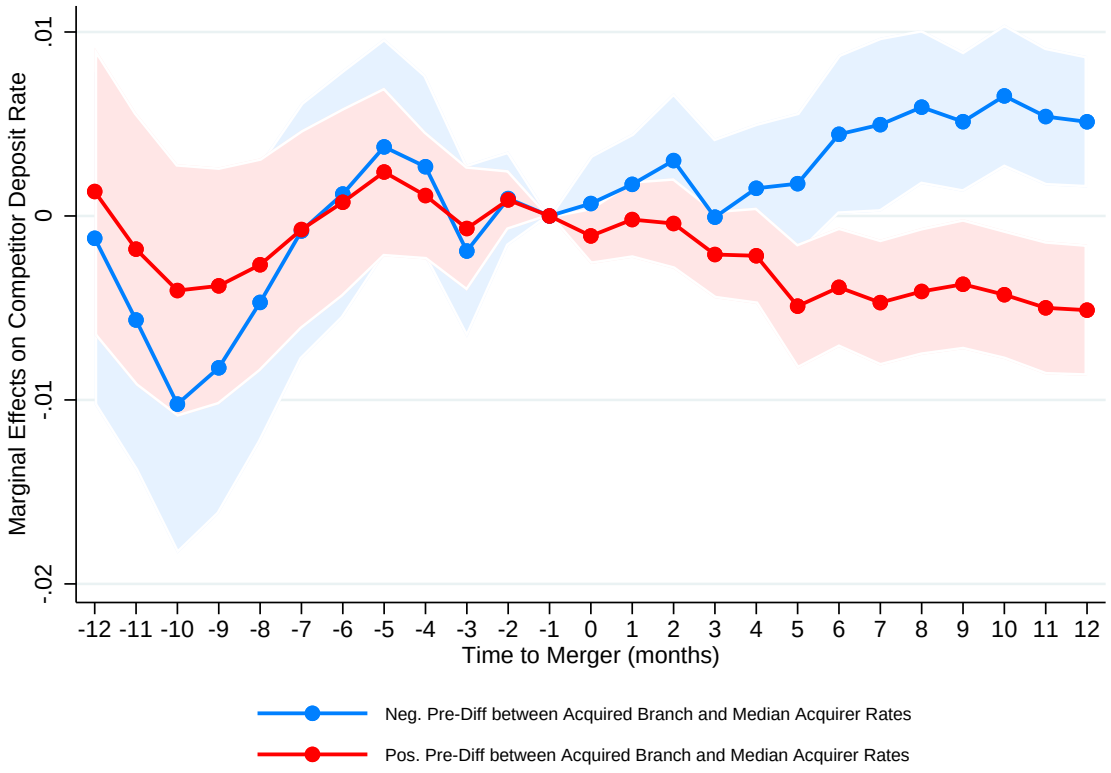


Figure 8: Sorting of Pre-merger Differences in Deposit Rates and Local Market Concentration

Figure 8 is a scatterplot (blue dots) and a linear fit (red line) representing the relation between the pre-merger difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer on the x-axis and the potential change in the local banking market Herfindahl-Hirschmann Index (in logs) on the y-axis. The potential change in the local banking market Herfindahl-Hirschmann Index is the change in the local banking market HHI that would be induced by the merger if the entities were combined and the banking market shares of deposits of both the acquirer and target banks remained at their pre-merger levels in the following year. Data for this figure comes from the Summary of Deposits (SOD) dataset and RateWatch.

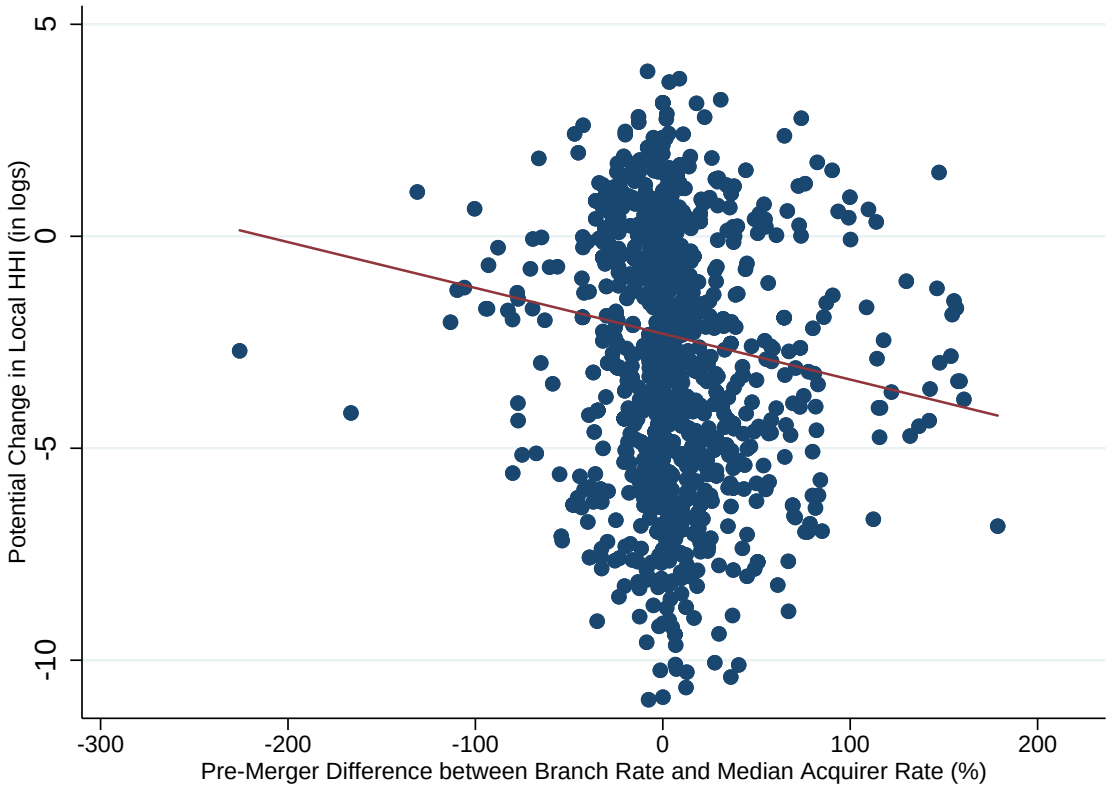


Figure 9: Impact of M&A on Branch Deposits by Pre-rate Differences Quintiles and Partitions of Predicted HHI change

Figure 9 plots the estimated impact of the merger event on the deposit rate of the acquired branch for each quintile of pre-merger deposit rate difference between the acquired branch and the median acquirer rate and for different levels of predicted changes in local HHI. Panel A considers all bank mergers, and Panel B considers only bank mergers whose predicted post-merger HHI was between 1,300 and 1,800. Specifically, we estimate the following model specification using OLS: $Y_{i,t,s} = \gamma_t + \theta_i + \sum_{s=1}^{s=5}\sum_{k=1}^{k=3}\beta_{s,k} Post - Acq_i \times \mathbb{1}.\text{Pre-rate Difference Qt}_{i,s} \times \mathbb{1}.\Delta HHI_{i,k} + \epsilon_{i,t,s}$, where $Y_{i,t,s}$ represents the deposit rate of the acquired branch i in year t, γ_t are state-by-year fixed effects, and θ_i are branch fixed effects. $Post - Acq_i$ is a dummy variable that takes the value one in the 12 months after the merger. $\mathbb{1}.\text{Pre-rate Difference Qt}_{i,s}$ are dummy variables for each quintile of the percent differences in pre-merger deposit rates between acquired branch and median acquirer rate, $\frac{(Branch\ Rate\ -\ Acq.\ Med.\ Rate)}{Acq.\ Med.\ Rate}^{Pre}$. $\mathbb{1}.\Delta HHI_{i,k}$ are dummy variables for different levels of the potential change in the local banking market HHI that would be induced by the merger if the entities were combined and the banking market shares of deposits of both acquirer and target banks remained at their pre-merger levels in the following year. $\mathbb{1}.\Delta HHI_{i,1}$ equals one if $\Delta HHI_i = 0$, $\mathbb{1}.\Delta HHI_{i,2}$ equals one if $\Delta HHI_i \in (0, 200)$ and $\mathbb{1}.\Delta HHI_{i,3}$ equals one if $\Delta HHI_i \geq 200$. Each bar corresponds to the marginal impact of the merger event on the deposit rate of the branch acquired, $\beta_{s,k}$, for each combination of pre-rate difference quantile and each partition of the predicted change in local HHI. The dark-green color bars identify marginal effects that are positive and statistically significant at the 10% level, and light-green color bars identify positive but not statistically significant marginal effects. Similarly, dark-red color bars identify marginal effects that are negative and statistically significant at the 10% level, and light-red color bars identify negative but not statistically significant marginal effects.

Panel A: All Level of Post-merger Predicted HHI

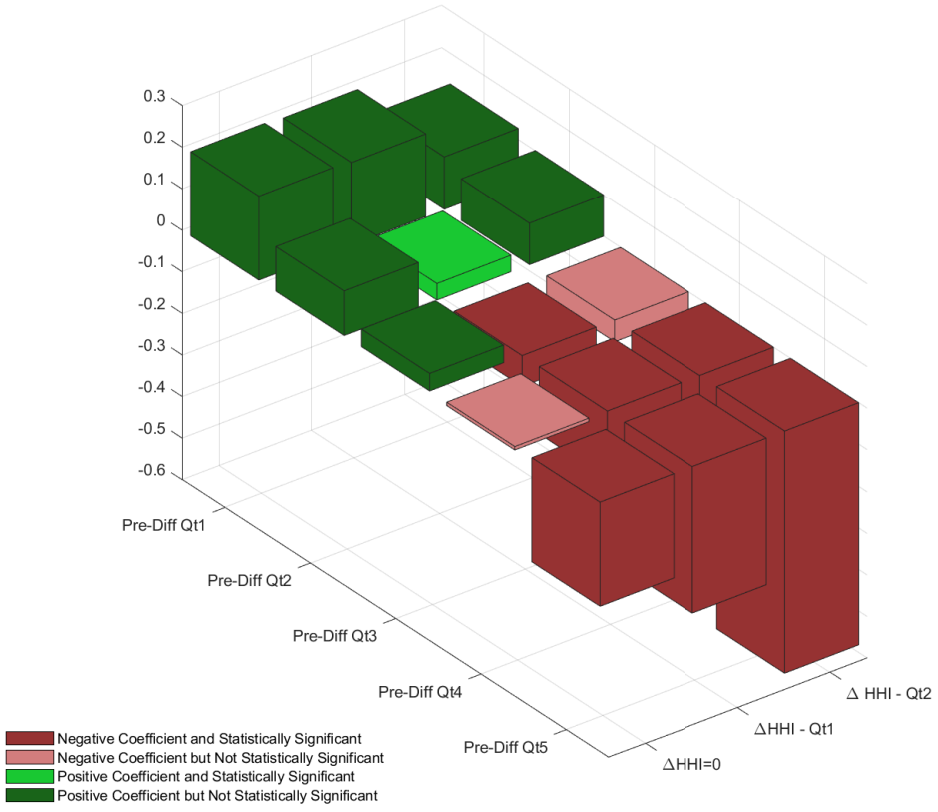


Figure 9: Impact of M&A on Branch Deposits by Pre-rate Differences Quintiles and Partitions of Predicted HHI change (Cont'd)

Panel B: Post-merger Predicted HHI between 1,300 and 1,800

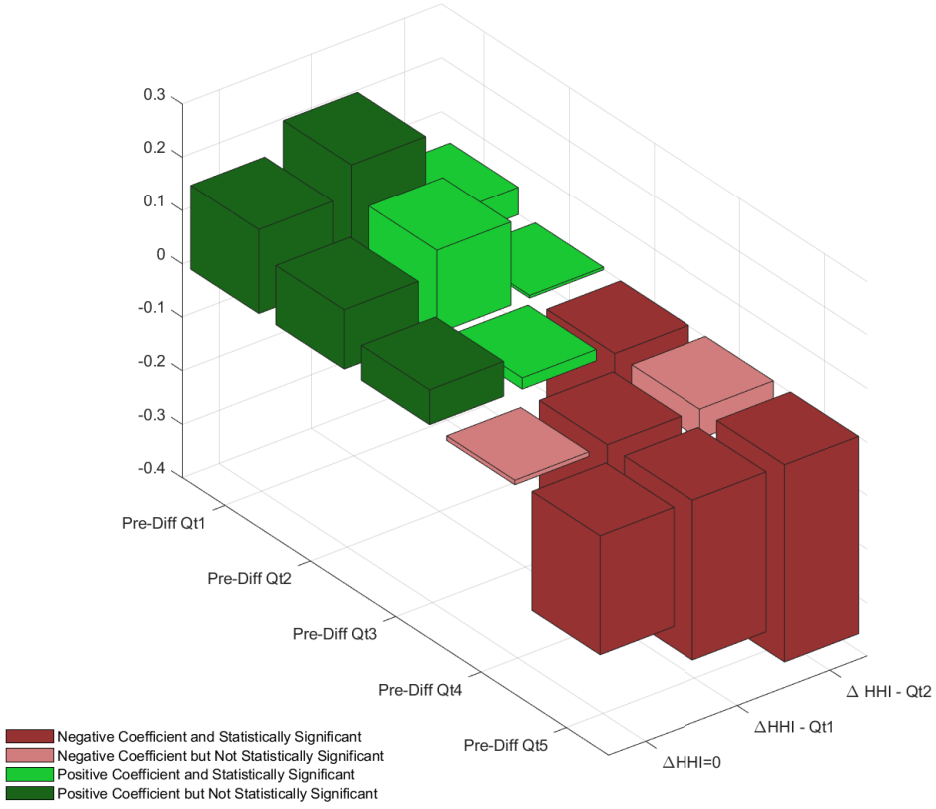


Table 1: Sample Formation and Summary Statistics

Table 1 describes the selection criteria and simple descriptive statistics for the banks and branches used in the sample. Panel A describes the selection criteria used in the sample, and Panel B describes the main characteristics of all banks and branches acquired in the sample. Data for this table comes from RateWatch.

Panel A: Sample Formation

	No. Branches	No. Rate Setters	No. Banks	No. States	No. Zips
All Branches	97643	11872	7756	49	19967
Branches presented for >=2 years	82934	8439	6124	49	18972
Acquired Branches	7050	1716	1511	49	4877

Panel B: Bank Characteristics

	Mean	St. Dev.	25th	Median	75th
All Banks					
Number of Branches	9.284	99.083	1	2.347	4.675
Number of Branch Rate Setters	1.205	2.217	1	1	1
Number of States	1.119	.891	1	1	1
Number of Zips	7.422	71.876	1	2	4
Banks Acquired					
Number of Branches	3.193	12.628	1	1	1
Number of Branch Rate Setters	1.094	.678	1	1	1
Number of States	1.05	.322	1	1	1
Number of Zips	2.905	10.68	1	1	1

Table 2: Similarity Rates

Table 2 provides simple descriptive statistics on the similarity between deposit rates practiced within branches of the same bank and between branches of different banks. For a large number of randomly drawn branch pairs, we compute the *Quarterly Absolute Rate Difference*, which we define as the average absolute difference in deposit rates during a quarter of the two branches in a branch-pair, and we compute the *Monthly Rate Correlation*, which we define as the coefficient of correlation between the average monthly deposit rates of the two branches in each branch-pair. In Panel A we draw 10,000 random pairs of branches within the same bank and 10,000 random pairs of branches of different banks from the entire sample. In Panel B we draw 10,000 random pairs of branches within the same bank and 10,000 random pairs of branches of different banks from the subsample of branches located in the same state. In Panel C we draw 10,000 random pairs of branches within the same bank and 10,000 random pairs of branches of different banks from the subsample of branches located in the same county. In Panel D we draw 10,000 random pairs of branches within the same bank and 10,000 random pairs of branches of different banks from the subsample of branches located in different states. In Panel E we draw 10,000 random pairs of branches within the same bank and 10,000 random pairs of branches of different banks from the subsample of branches located in different counties.

	Quarterly Absolute Rate Difference		**Monthly Rate Correlation**	
	Same Bank	Different Banks	Same Bank	Different Banks
		Panel A: All Branches		
Mean	.022	.259	.802	.335
Median	.002	.218	.968	.339
St. Dev.	.043	.181	.327	.365
		Panel B: Branch Pairs in the Same State		
Mean	.004	.24	.944	.321
Median	0	.199	1	.321
St. Dev.	.017	.177	.175	.373
		Panel C: Branch Pairs in the Same County		
Mean	0	.235	.96	.304
Median	0	.187	1	.278
St. Dev.	.004	.185	.153	.355
		Panel D: Branch Pairs in Different States		
Mean	.023	.258	.781	.338
Median	.003	.218	.955	.342
St. Dev.	.043	.181	.341	.367
		Panel E: Branch Pairs in Different Counties		
Mean	.022	.256	.796	.331
Median	.002	.215	.966	.335
St. Dev.	.043	.178	.333	.369

Table 3: Deposit Rates - Summary Statistics

Table 3 provides descriptive statistics on the deposit rates practiced by the branches and banks included in the main sample. Panel A provides descriptive statistics on the difference between the deposit rates practiced by acquired branches and the median deposit rate of the acquirer. Panel B provides descriptive statistics on the difference between the deposit rates practiced by the matched sample of control branches and the median deposit rate of the respective matched acquirer.

Panel A: Rate Difference of Acquired Branches

	Mean	St. Dev.	25th	Median	75th
Branch Rate - Acquirer Median Rate					
12 months before Merger	.073	.493	-.1	0	.2
Mean of 12 months before Merger	-.005	.386	-.231	0	.117
12 months after Merger	.002	.107	0	0	0
Mean of 12 months after Merger	-.005	.144	0	0	.033
|Branch Rate - Acquirer Median Rate|					
12 months before Merger	.27	.419	.025	.1	.32
Mean of 12 months before Merger	.224	.315	.057	.129	.256
12 months after Merger	.039	.1	0	0	.001
Mean of 12 months after Merger	.067	.128	0	.015	.057

Panel B: Rate Difference of Control Branches

	Mean	St. Dev.	25th	Median	75th
Branch Rate - Acquirer Median Rate					
12 months before Merger	.016	.375	-.1	0	.154
Mean of 12 months before Merger	.031	.36	-.109	.001	.16
12 months after Merger	-.007	.311	-.15	0	.15
Mean of 12 months after Merger	.009	.303	-.138	0	.15
|Branch Rate - Acquirer Median Rate|					
12 months before Merger	.225	.3	.05	.139	.3
Mean of 12 months before Merger	.225	.283	.052	.134	.287
12 months after Merger	.205	.234	.05	.15	.27
Mean of 12 months after Merger	.211	.217	.052	.148	.298

Table 4: Effects of M&A on Absolute Difference between Branch Deposit Rate and Median Acquirer Deposit Rate (Pre-Post Analysis)

Table 4 reports the coefficients of OLS regressions investigating the effect of a merger on the difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer. The dependent variable in columns (1) and (2), |Branch Rate - Acquirer Median Rate|, is the absolute difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer. The dependent variable in columns (3) and (4), $\frac{\text{|Branch Rate - Acq. Med. Rate|}}{\text{Acq. Med. Rate}}$, is the absolute difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer divided by median deposit rate of the acquirer. The main variable of interest, *Post-Acquisition*, is a dummy variable that takes the value of one in the 12 months following the merger event. The specifications of columns (1) and (3) include month and branch fixed effects, and the specifications of columns (2) and (4) include state-by-month and branch fixed effects. Standard errors are presented in parentheses and are clustered at the level of the branch banking market. ***, **, and * represent statistical significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
	|Branch Rate - Acquirer Median Rate|	$\frac{\text{|Branch Rate - Acq. Med. Rate|}}{\text{Acq. Med. Rate}}$	
Post-Acquisition	-0.095***	-0.102***	-0.159***	-0.196***
	(0.011)	(0.012)	(0.013)	(0.019)
Observations	176250	175703	176250	175703
Adjusted R^2	0.537	0.792	0.434	0.562
Month Fixed-Effects	Yes	No	Yes	Yes
State × Month Fixed Effects	No	Yes	No	Yes
Branch Fixed Effects	Yes	Yes	Yes	Yes

Table 5: Effects of M&A on Deposit Rate Convergence between Acquired Branch and Median Acquirer Deposit Rate: Heterogeneity across Size, Branch Network Overlap and Dispersion of Acquirer Deposit Rate

Table 5 reports the coefficients of OLS regressions investigating the effect of a merger on the difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer after stratifying the sample based on the size of the acquirer (Panel A), on whether the branch networks of the merged entities overlap in the banking market where the acquired branch is located (Panel B) and based on the standard deviation of deposit rates across acquirer's branch network 12 months before the merger (Panel C). The dependent variable in columns (1) and (3) of the three panels, |Branch Rate - Acquirer Median Rate|, is the absolute difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer. The dependent variable in columns (2) and (4) of three panels, $\frac{|BranchRate-Acq.Med.Rate|}{Acq.Med.Rate}$, is the absolute difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer divided by median deposit rate of the acquirer. The main variable of interest, *Post-Acquisition*, is a dummy variable that takes the value of one in the 12 months following the merger event. All specifications include state-by-month and branch fixed effects. Standard errors are presented in parentheses and are clustered at the level of the branch banking market. ***, **, and * represent statistical significance at 1%, 5%, and 10% levels, respectively.

Panel A: Partitioning Based on Acquirer Size

	(1)	(2)	(3)	(4)
	Acquirer has larger Assets		Acquirer has less Assets	
	|Branch Rate- Acq. Med. Rate|	$\frac{\text{\|Branch Rate - Acq. Med. Rate\|}}{\text{Acq. Med. Rate}}$	|Branch Rate- Acq. Med. Rate|	$\frac{\text{\|Branch Rate - Acq. Med. Rate\|}}{\text{Acq. Med. Rate}}$
Post-Acquisition	-0.105***	-0.212***	-0.148***	-0.279***
	(0.009)	(0.034)	(0.023)	(0.035)
Observations	92084	92084	29479	29479
Adjusted R^2	0.749	0.611	0.954	0.507
State × Month Fixed Effects	Yes	Yes	Yes	Yes
Branch Fixed Effects	Yes	Yes	Yes	Yes

Table 5: Effects of Merger on Deposit Rate Convergence between Acquired Branch and Median Acquirer Deposit Rate: Heterogeneity across Size, Branch Network Overlap and Dispersion of Acquirer Deposit Rate **(cont'd)**

Panel B: Partitioning Based on Banking Market Overlap

	(1)	(2)	(3)	(4)
	Overlap in the Banking Market		No Overlap in the Banking Market	
	|Branch Rate- Acq. Med. Rate|	$\frac{\text{\|Branch Rate - Acq. Med. Rate\|}}{\text{Acq. Med. Rate}}$	|Branch Rate- Acq. Med. Rate|	$\frac{\text{\|Branch Rate - Acq. Med. Rate\|}}{\text{Acq. Med. Rate}}$
Post-Acquisition	-0.119***	-0.182***	-0.072***	-0.187***
	(0.020)	(0.027)	(0.011)	(0.042)
Observations	112166	112166	62488	62488
Adjusted R^2	0.822	0.549	0.770	0.664
State × Month Fixed Effects	Yes	Yes	Yes	Yes
Branch Fixed Effects	Yes	Yes	Yes	Yes

Panel C: Partitioning Based on the Dispersion of Acquirer Deposit Rates

	(1)	(2)	(3)	(4)
	Dispersion below median		Dispersion above median	
	|Branch Rate- Acq. Med. Rate|	$\frac{\text{\|Branch Rate - Acq. Med. Rate\|}}{\text{Acq. Med. Rate}}$	|Branch Rate- Acq. Med. Rate|	$\frac{\text{\|Branch Rate - Acq. Med. Rate\|}}{\text{Acq. Med. Rate}}$
Post-Acquisition	-0.120***	-0.335***	-0.088***	-0.104***
	(0.008)	(0.033)	(0.032)	(0.030)
Observations	75895	75895	84735	84735
Adjusted R^2	0.802	0.469	0.886	0.915
State × Month Fixed Effects	Yes	Yes	Yes	Yes
Branch Fixed Effects	Yes	Yes	Yes	Yes

Table 6: Effects of Merger on Absolute Difference between Branch Deposit Rate and Median Acquirer Deposit Rate (Differences-in-Differences Analysis)

Table 6 reports the coefficients of differences-in-differences regressions investigating the effect of a merger on the difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer. The sample employed in this analysis includes acquired branches (treated observations) and a matched control sample of branches located in the same state as the respective treated acquired branches and with the closest rates to that of an acquired branch 12 months prior to the merger. The dependent variable in columns (1) and (2), |Branch Rate - Acquirer Median Rate|, is the absolute difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer. The dependent variable in columns (3) and (4), $\frac{|\text{Branch Rate - Acq. Med. Rate}|}{\text{Acq. Med. Rate}}$, is the absolute difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer divided by median deposit rate of the acquirer. The main variable of interest, *Acquired-Branch* × *Post-Acquisition*, is a dummy variable that takes the value of one in the 12 months following the merger event for the acquired branches. The specifications of columns (1) and (3) include month and branch fixed effects, and the specifications of columns (2) and (4) include state-by-month and branch fixed effects. Standard errors are presented in parentheses and are clustered at the level of the branch banking market. ***, **, and * represent statistical significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
	|Branch Rate- Acq. Med. Rate|		$\frac{\|\text{Branch Rate - Acq. Med. Rate}\|}{\text{Acq. Med. Rate}}$	
Post-Acquisition	0.009	0.010**	0.128***	0.107***
	(0.006)	(0.005)	(0.031)	(0.023)
Acquired-Branch × Post-Acquisition	-0.129***	-0.136***	-0.398***	-0.414***
	(0.009)	(0.009)	(0.036)	(0.027)
Observations	379275	379173	379275	379173
Adjusted R^2	0.600	0.734	0.561	0.632
Month Fixed-Effects	Yes	No	Yes	No
State × Month Fixed-Effects	No	Yes	No	Yes
Branch Fixed-Effects	Yes	Yes	Yes	Yes

Table 7: Decomposing the Convergence in Deposit Rates: Changes in Acquired Branch Rates vs. Changes in Median Deposit Rates of Acquirer

Table 7 reports the coefficients of differences-in-differences regressions investigating the effect of a merger on the acquired branch deposit rates and respective median deposit rates of the acquirer. We stratify the main sample based on pre-merger average difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer. Columns (1)–(3) report results for the subsample of acquired branches with a positive pre-merger average difference in deposit rates, and columns (4)–(6) present results for the subsample of acquired branches with a negative pre-merger difference in deposit rates. The dependent variable in columns (1) and (4), *Branch - Acq. Med. Rate*, is the difference between the deposit rate of the acquired branch and the respective median deposit rate of the acquirer; the dependent variable in columns (2) and (5), *Branch Rate* is the deposit rate of the acquired branch; and the dependent variable in columns (3) and (6), *Acq. Med. Rate*, is the median deposit rate of the acquirer. The main variable of interest, *Post-Acquisition*, is a dummy variable that takes the value of one in the 12 months following the merger event. The specifications of columns (1), (3), and (5) include month and branch fixed effects, and the specifications of columns (2), (4), and (6) include state-by-month and branch fixed effects. Standard errors are presented in parentheses and are clustered at the level of the branch banking market. ***, **, and * represent statistical significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	(Branch - Acq. Med. Rate)$^{Pre} > 0$			(Branch - Acq. Med. Rate)$^{Pre} < 0$		
	Branch - Acq. Med. Rate	Branch Rate	Acq. Med. Rate	Branch - Acq. Med. Rate	Branch Rate	Acq. Med. Rate
Post-Acquisition	-0.119***	-0.123***	-0.005	0.116***	0.097***	-0.019
	(0.010)	(0.011)	(0.006)	(0.013)	(0.021)	(0.016)
Observations	80821	80821	80821	81657	81657	81657
Adjusted R^2	0.714	0.984	0.992	0.901	0.987	0.992
State × Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Branch Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 8: Effects of Merger on the Evolution of Branch Deposits

Table 8 reports the coefficients of OLS regressions investigating the effect of a merger on the acquired branch's share of deposits. In Panel A, we investigate the merger effects on the evolution of the natural logarithm of deposits at the acquired branch. In Panel B, we investigate the merger effects on the share of deposits of the branch in the same zip code. The dependent variable in Panel A, *Ln(Total Branch Deposits)*, is the natural logarithm of the total deposits reported by the branch in the SOD dataset. The dependent variable in Panel B, *Branch Share of Deposits*, is the branch share of deposits in the zip code based on SOD data. For mergers occurring in the first six months of the year, the dependent variable in the merger year is measured on June 30th of the previous year. For mergers occurring in the last six months of the year, the dependent variable in the merger year is measured on June 30th of the same year. *Post-Acquisition* is a dummy variable that takes the value of one in the years following the merger event and zero otherwise. $\frac{\text{(Branch Rate - Acq. Med. Rate)}}{\text{Acq. Med. Rate}}^{Pre}$ is the average of the pre-merger percent difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer. $\Delta^{Pre-Post}\frac{\text{(Branch Rate - Acq. Med. Rate)}}{\text{Acq. Med. Rate}}$ is the difference between the post-merger and pre-merger average percent difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer. Standard errors are presented in parentheses and are clustered at the level of the branch banking market. ***, **, and * represent statistical significance at 1%, 5%, and 10% levels, respectively.

Panel A: Total Branch Deposits

	(1)	(2)	(3)	(4)
	Ln(Total Branch Deposits)			
Post-Acquisition	-0.120***	-0.125***	-0.119***	-0.125***
	(0.010)	(0.011)	(0.010)	(0.011)
Post-Acquisition × $\frac{\text{(Branch Rate - Med. Acq. Rate)}}{\text{Med. Acq. Rate}}^{Pre}$	-0.021**	-0.024***		
	(0.009)	(0.008)		
Post-Acquisition × $\Delta^{Pre-Post}\frac{\text{(Branch Rate - Med. Acq. Rate)}}{\text{Med. Acq. Rate}}$			0.040***	0.039***
			(0.013)	(0.012)
Observations	54142	54138	54142	54138
Adjusted R^2	0.891	0.894	0.891	0.894
Year Fixed Effects	Yes	No	Yes	No
State × Year Fixed Effects	No	Yes	No	Yes
Branch Fixed Effects	Yes	Yes	Yes	Yes

Panel B: Share of Deposits at the Zip Code Level

	(1)	(2)	(3)	(4)
	Branch Share of Deposits			
Post-Acquisition	-0.014***	-0.014***	-0.013***	-0.014***
	(0.002)	(0.002)	(0.002)	(0.002)
Post-Acquisition × $\frac{\text{(Branch Rate - Med. Acq. Rate)}}{\text{Med. Acq. Rate}}^{Pre}$	-0.003**	-0.003**		
	(0.001)	(0.002)		
Post-Acquisition × $\Delta^{Pre-Post}\frac{\text{(Branch Rate - Med. Acq. Rate)}}{\text{Med. Acq. Rate}}$			0.007**	0.008**
			(0.003)	(0.003)
Observations	54630	54626	54630	54626
Adjusted R^2	0.938	0.939	0.938	0.939
Year Fixed Effects	Yes	No	Yes	No
State × Year Fixed Effects	No	Yes	No	Yes
Branch Fixed Effects	Yes	Yes	Yes	Yes

Table 9: Effects of Merger on Rates of Local Competitors

Table 9 reports the coefficients of OLS regressions investigating the effect of a merger on the deposit rates practiced by local competitors. The dependent variable, *Deposit Rate of Competitor*, is the deposit rate of competitor branches located in the same zip code as the acquired branch. *Post-Acquisition* is a dummy variable that takes the value of one in the 12 months following the merger event and zero otherwise. $\frac{\text{(Branch Rate - Acq. Med. Rate)}}{\text{Acq. Med. Rate}}^{Pre}$ is the average of the pre-merger percent difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer. $\Delta^{Pre-Post}\frac{\text{(Branch Rate - Acq. Med. Rate)}}{\text{Acq. Med. Rate}}$ is the difference between the post-merger and pre-merger average percent difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer. Standard errors are presented in parentheses and are clustered at the level of the branch banking market. ***, **, and * represent statistical significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
	Deposit Rate of Competitor			
Post-Acquisition	0.005	-0.000	0.005	-0.001
	(0.004)	(0.002)	(0.004)	(0.002)
Post-Acquisition $\times$ $\frac{\text{(Branch Rate - Med. Acq. Rate)}}{\text{Med. Acq. Rate}}^{Pre}$	-0.009***	-0.003**		
	(0.004)	(0.002)		
Post-Acquisition $\times$ $\Delta^{Pre-Post}$ $\frac{\text{(Branch Rate - Med. Acq. Rate)}}{\text{Med. Acq. Rate}}$			0.009**	0.003*
			(0.004)	(0.002)
Observations	982150	981989	982150	981989
Adjusted R^2	0.950	0.954	0.950	0.954
Year Fixed Effects	Yes	No	Yes	No
State $\times$ Month Fixed Effects	No	Yes	No	Yes
Branch Fixed Effects	Yes	Yes	Yes	Yes

Table 10: Effects of Merger on Rates of Local Competitors: Incremental Effect of Rate-Setter Branches

Table 10 reports the coefficients of OLS regressions investigating whether the impact of a merger on the deposit rates practiced by local competitors varies with the rate-setting privileges of the competing branches. The dependent variable, *Deposit Rate of Competitor*, is the deposit rate of competitor branches located in the same zip code as the acquired branch. *Post-Acquisition* is a dummy variable that takes the value of one in the 12 months following the merger event and zero otherwise. *Rate Setter* is also a dummy variable that equals one if the competitor branch has rate-setting privileges and zero otherwise. $\frac{\text{(Branch Rate - Acq. Med. Rate)}}{\text{Acq. Med. Rate}}^{Pre}$ is the average of the pre-merger percent difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer. $\Delta^{Pre-Post}\frac{\text{(Branch Rate - Acq. Med. Rate)}}{\text{Acq. Med. Rate}}$ is the difference between the post-merger and pre-merger average percent difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer. Standard errors are presented in parentheses and are clustered at the level of the branch banking market. ***, **, and * represent statistical significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
	Deposit Rate of Competitor			
Post-Acquisition	0.010**	0.004*	0.009**	0.003*
	(0.005)	(0.002)	(0.004)	(0.002)
Post-Acquisition $\times$ $\frac{\text{(Branch Rate - Med. Acq. Rate)}}{\text{Med. Acq. Rate}}^{Pre}$	-0.008**	-0.002		
	(0.003)	(0.001)		
$\frac{\text{(Branch Rate - Med. Acq. Rate)}}{\text{Med. Acq. Rate}}^{Pre}$ $\times$ Rate Setter	-0.011	-0.014		
	(0.025)	(0.024)		
Post-Acquisition $\times$ $\frac{\text{(Branch Rate - Med. Acq. Rate)}}{\text{Med. Acq. Rate}}^{Pre}$ $\times$ Rate Setter	-0.018***	-0.017***		
	(0.007)	(0.006)		
Post-Acquisition $\times$ $\Delta^{Pre-Post}$ $\frac{\text{(Branch Rate - Med. Acq. Rate)}}{\text{Med. Acq. Rate}}$			0.007**	0.002
			(0.004)	(0.002)
$\Delta^{Pre-Post}$ $\frac{\text{(Branch Rate - Med. Acq. Rate)}}{\text{Med. Acq. Rate}}$ $\times$ Rate Setter			0.016	0.015
			(0.030)	(0.029)
Post-Acquisition $\times$ $\Delta^{Pre-Post}$ $\frac{\text{(Branch Rate - Med. Acq. Rate)}}{\text{Med. Acq. Rate}}$ $\times$ Rate Setter			0.028***	0.026***
			(0.007)	(0.007)
Observations	982150	981989	982150	981989
Adjusted R^2	0.950	0.954	0.950	0.954
Year Fixed Effects	Yes	No	Yes	No
State $\times$ Month Fixed Effects	No	Yes	No	Yes
Branch Fixed Effects	Yes	Yes	Yes	Yes

Table 11: Market Concentration and Rate Convergence in the Evolution of Deposit Rates

Table 11 reports coefficients of OLS regressions investigating the relative role of market concentration indices and rate convergence induced by uniform deposit pricing in the evolution of deposit rates of the acquired branch, *Branch Rate*, following a M&A. Panel A considers all bank mergers, and Panel B considers only bank mergers whose predicted post-merger HHI was between 1,300 and 1,800. *Post-Acquisition* is a dummy variable that takes the value of one in the 12 months following the merger event and zero otherwise. $\frac{\text{(Branch Rate - Acq. Med. Rate)}}{\text{Acq. Med. Rate}}^{Pre}$ is the average of the pre-merger percent difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer. ΔHHI is the potential change in the local banking market Herfindahl-Hirschmann Index that would be induced by the merger if the entities were combined and the banking market shares of deposits of both acquirer and target banks remained at their pre-merger levels in the following year. $\mathbb{1}.(\Delta HHI = 0)$ is a dummy variable that takes the value of one if $\Delta HHI = 0$; $\mathbb{1}.(\Delta HHI \in (0, 200))$ is a dummy variable that takes the value of one if $\Delta HHI \in (0, 200)$; and $\mathbb{1}.(\Delta HHI \geq 200)$ is a dummy variable that takes the value of one if $\Delta HHI \geq 200$. For each of the five quintiles of the pre-merger rate difference, $\frac{\text{(Branch Rate - Acq. Med. Rate)}}{\text{Acq. Med. Rate}}^{Pre}$, we define a dummy variable *Pre-Difference - Qt*. Standard errors are presented in parentheses and are clustered at the level of the branch banking market. ***, **, and * represent statistical significance at 1%, 5%, and 10% levels, respectively.

Panel A: Impact of Local HHI and Rate Convergence on Branch Rate - All bank mergers

	(1)	(2)	(3)	(4)	(5)	(6)
	Branch Rate					
Post-Acquisition	-0.044***			-0.105***	-0.094***	-0.097***
	(0.012)			(0.025)	(0.023)	(0.024)
Post-Acquisition × $\mathbb{1}.(\Delta HHI = 0)$		-0.014		0.092***	0.091***	0.095***
		(0.015)		(0.029)	(0.026)	(0.028)
Post-Acquisition × $\mathbb{1}.(\Delta HHI \in (0, 200))$		-0.102***				
		(0.026)				
Post-Acquisition × $\mathbb{1}.(\Delta HHI \geq 200)$		-0.096***				
		(0.032)				
Post-Acquisition × Pre-Difference Rate - Qt1			0.198***			
			(0.027)			
Post-Acquisition × Pre-Difference Rate - Qt2			0.080***			
			(0.021)			
Post-Acquisition × Pre-Difference Rate - Qt3			-0.007			
			(0.023)			
Post-Acquisition × Pre-Difference Rate - Qt4			-0.058***			
			(0.020)			
Post-Acquisition × Pre-Difference Rate - Qt5			-0.286***			
			(0.021)			
Post-Acquisition × Δ HHI				0.008		0.005
				(0.005)		(0.005)
Post-Acquisition × $\frac{\text{(Branch Rate - AMR)}}{\text{AMR}}^{Pre}$					-0.082**	-0.082**
					(0.033)	(0.033)
Observations	174153	174153	174153	174153	174153	174153
Adjusted R^2	0.977	0.978	0.980	0.978	0.979	0.979
State × Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Branch Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 11: Market Concentration and Rate Convergence in the Evolution of Deposit Rates (Cont'd)

Panel B: Impact of Local HHI and Rate Convergence on Branch Rate - 1,300<Post-Merger Predicted HHI<1,800

	(1)	(2)	(3)	(4)	(5)	(6)
			Branch Rate			
Post-Acquisition	-0.030*			-0.046	-0.057*	-0.027
	(0.017)			(0.039)	(0.032)	(0.036)
Post-Acquisition × $\mathbb{1}.(\Delta HHI = 0)$		-0.013		0.021	0.053	0.010
		(0.018)		(0.044)	(0.036)	(0.039)
Post-Acquisition × $\mathbb{1}.(\Delta HHI \in (0, 200))$		-0.054				
		(0.039)				
Post-Acquisition × $\mathbb{1}.(\Delta HHI \geq 200)$		-0.160**				
		(0.066)				
Post-Acquisition × Pre-Difference Rate - Qt1			0.169***			
			(0.029)			
Post-Acquisition × Pre-Difference Rate - Qt2			0.103			
			(0.063)			
Post-Acquisition × Pre-Difference Rate - Qt3			0.040			
			(0.028)			
Post-Acquisition × Pre-Difference Rate - Qt4			-0.054			
			(0.037)			
Post-Acquisition × Pre-Difference Rate - Qt5			-0.245***			
			(0.034)			
Post-Acquisition × Δ HHI				-0.067		-0.070
				(0.045)		(0.044)
Post-Acquisition × $\frac{\text{(Branch Rate - AMR)}}{\text{AMR}}^{Pre}$					-0.101***	-0.102***
					(0.022)	(0.022)
Observations	29277	29277	29277	29277	29277	29277
Adjusted R^2	0.986	0.986	0.987	0.986	0.987	0.987
State × Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Branch Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

A Appendix

Figure OA.1: Adjusted R^2 of Interest Rate on Fixed Effects

Figure OA.1 plots the adjusted R^2 from a monthly series of ordinary least squares (OLS) regressions of the 6-month certificate of deposit (CD) rate with a minimum account size of $10,000 (Panel A), 24-month CD rate with a minimum account size of $10,000 (Panel B), 12-month CD rate with a minimum account size of $100,000 (Panel C), and Money Market account (MM) rate with a minimum account size of $25,000 (Panel D) on bank fixed effects (solid red line), county fixed effects (dashed blue line) and zip code fixed effects (short dashed green line). For each month, we run an OLS regression of the deposit rates practiced by each branch in the respective month on each set of fixed effects and we plot the respective R^2 over time. Data is from RateWatch.

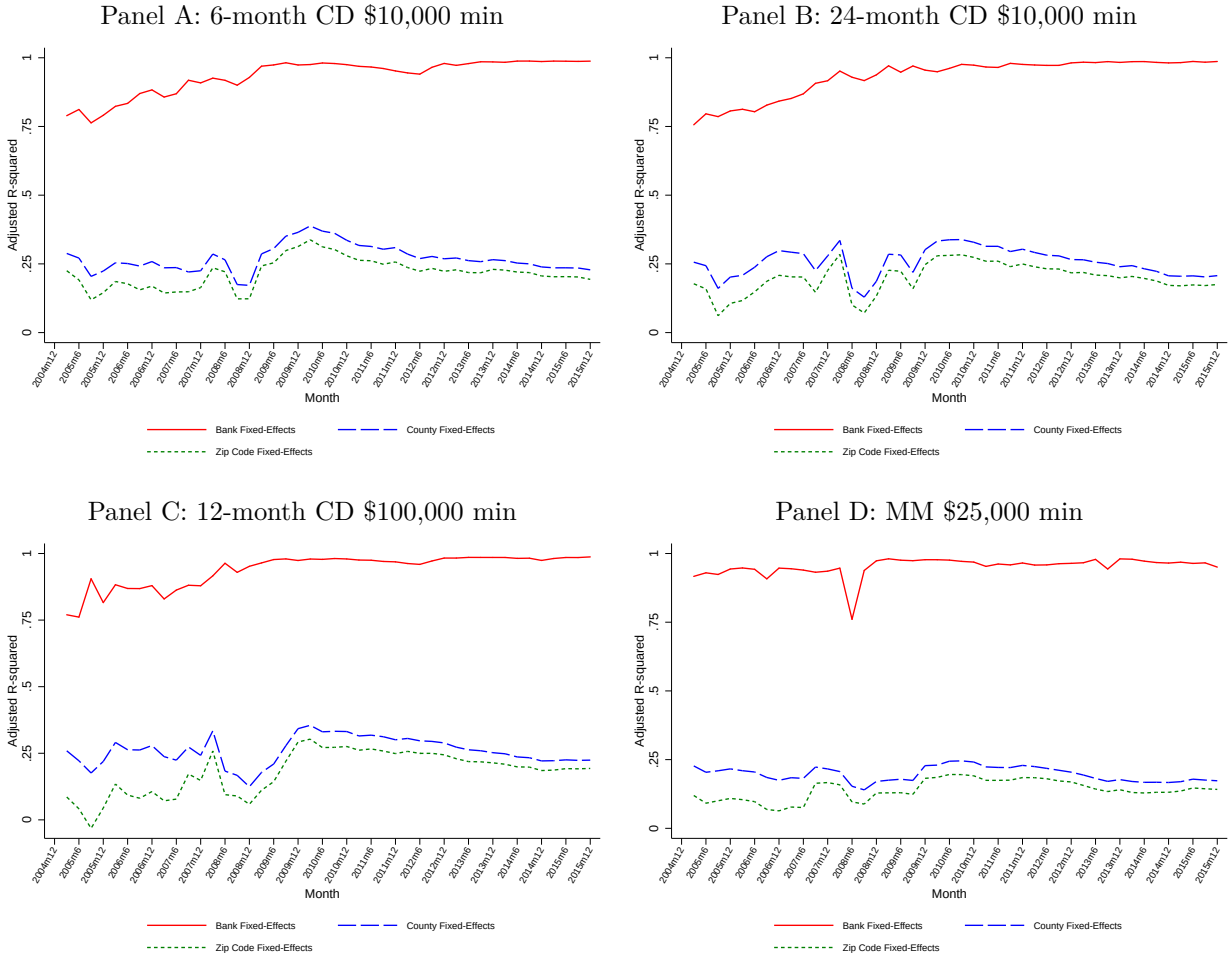


Figure OA.2: Relative Percent Difference between Branch Rate and Median Rate of Acquirer in Event Time

Figure OA.2 plots the distribution of the percent differences in the deposit rates practiced by an acquired branch and the respective median acquirer rate around the merger. The percent difference is defined as $\frac{\text{(Branch Rate - Med. Acq. Rate)}}{\text{Med. Acq. Rate}}$. The lines represent the 5th, 10th, 25th, 75th, 90th, and 95th percentile of the distribution of this difference over event time. Data for this analysis comes from RateWatch.

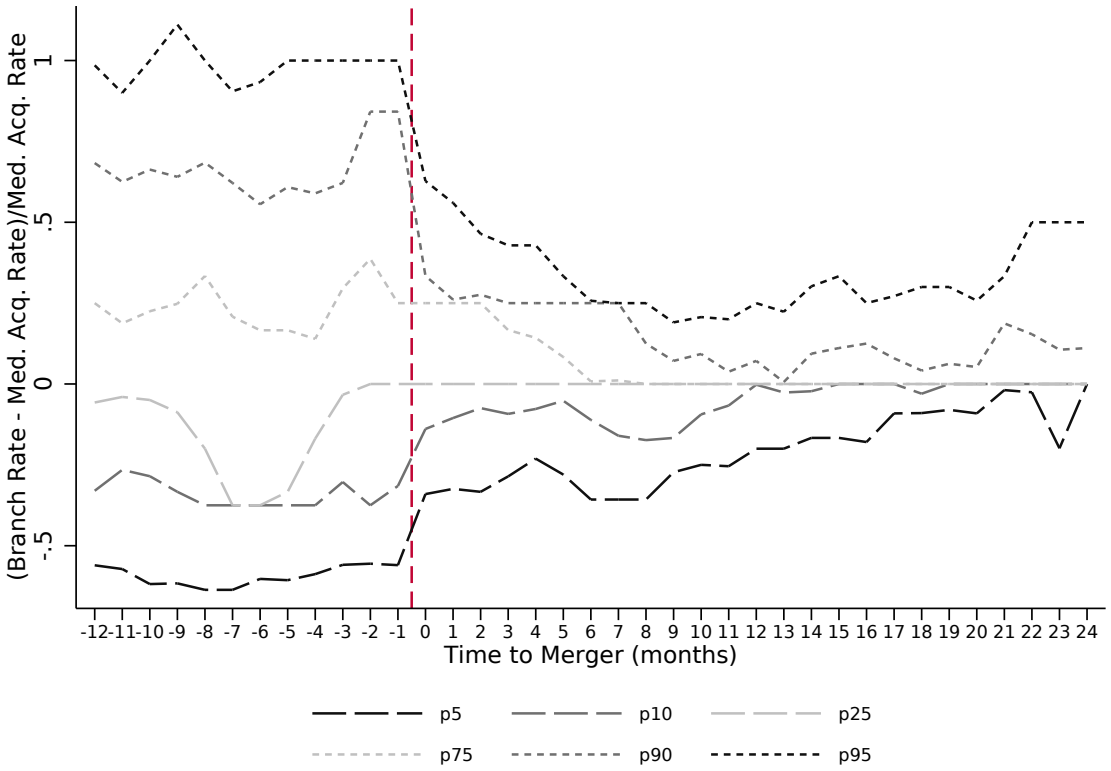


Table OA.1: Effects of M&A on Deposit Rate Convergence between Acquired Branch and Median Acquirer Deposit Rate: Heterogeneity across Deposit Products

Table OA.1 reports the coefficients of OLS regressions investigating the effect of a merger on the difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer for the following deposit products: 6-month certificate of deposit (CD) rate with a minimum account size of $10,000 (12MCD10K), 24-month CD rate with a minimum account size of $10,000 (24MCD10K), 12-month CD rate with a minimum account size of $100,000 (12MCD100K) and Money Market account rate with a minimum account size of $25,000 (MM25K). The dependent variable in columns (1)–(4) of the three panels, |Branch Rate - Acquirer Median Rate|, is the absolute difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer. The dependent variable in columns (5)–(8) of three panels, $\frac{|BranchRate-Acq.Med.Rate|}{Acq.Med.Rate}$, is the absolute difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer divided by median deposit rate of the acquirer. The main variable of interest, *Post-Acquisition*, is a dummy variable that takes the value of one in the 12 months following the merger event. All specifications include state-by-month and branch fixed effects. Standard errors are presented in parentheses and are clustered at the level of the branch banking market. ***, **, and * represent statistical significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Branch Rate- Acq. Med. Rate				$\frac{\text{\|Branch Rate - Acq. Med. Rate\|}}{\text{Acq. Med. Rate}}$		
	6MCD10K	24MCD10K	12MCD100K	MM25K	6MCD10K	24MCD10K	12MCD100K	MM25K
Post-Acquisition	-0.073***	-0.115***	-0.078***	-0.113***	-0.183***	-0.148***	-0.198***	-0.489***
	(0.009)	(0.012)	(0.007)	(0.009)	(0.021)	(0.014)	(0.019)	(0.038)
Observations	174302	169517	121028	157899	174302	169517	121028	157899
Adjusted R^2	0.800	0.806	0.796	0.849	0.679	0.731	0.726	0.793
State × Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Branch Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table OA.2: Effects of M&A on Absolute Difference between Branch Deposit Rate and Median Acquirer Deposit Rate (Excluding same Bank Holding Company Consolidations)

Table OA.2 reports the coefficients of OLS regressions investigating the effect of a merger on the difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer when both acquired and acquirer do not belong to the same Bank Holding Company. The dependent variable in columns (1) and (2), |Branch Rate - Acquirer Median Rate|, is the absolute difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer. The dependent variable in columns (3) and (4), $\frac{\text{|Branch Rate - Acq. Med. Rate|}}{\text{Acq. Med. Rate}}$, is the absolute difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer divided by the median deposit rate of the acquirer. The main variable of interest, *Post-Acquisition*, is a dummy variable that takes the value of one in the 12 months following the merger event. The specifications of columns (1) and (3) include month and branch fixed effects and the specifications of columns (2) and (4) include state-by-month and branch fixed effects. Standard errors are presented in parentheses and are clustered at the level of the branch banking market. ***, **, and * represent statistical significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
	|Branch Rate - Acquirer Median Rate|	$\frac{\text{|Branch Rate - Acq. Med. Rate|}}{\text{Acq. Med. Rate}}$	
Post-Acquisition	-0.117***	-0.142***	-0.204***	-0.249***
	(0.013)	(0.015)	(0.019)	(0.019)
Observations	114925	114214	114925	114214
Adjusted R^2	0.622	0.821	0.466	0.638
Month Fixed Effects	Yes	No	Yes	Yes
State × Month Fixed Effects	No	Yes	No	Yes
Branch Fixed Effects	Yes	Yes	Yes	Yes

Table OA.3: Effects of M&A on Deposit Rate Convergence between Acquired Branch and Median Acquirer Deposit Rate: Bank Mergers vs. Branch Acquisitions.

Table OA.3 reports the coefficients of OLS regressions investigating the effect of a merger on the difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer after stratifying the sample based on the merger being a bank merger or a branch acquisition. The dependent variable in columns (1) and (3) of the three panels, |Branch Rate - Acquirer Median Rate|, is the absolute difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer. The dependent variable in columns (2) and (4) of three panels, $\frac{|BranchRate-Acq.Med.Rate|}{Acq.Med.Rate}$, is the absolute difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer divided by the median deposit rate of the acquirer. The main variable of interest, *Post-Acquisition*, is a dummy variable that takes the value of one in the 12 months following the merger event. All specifications include state-by-month and branch fixed effects. Standard errors are presented in parentheses and are clustered at the level of the branch banking market. ***, **, and * represent statistical significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
	Bank Merger		Branch Acquisition	
	|Branch Rate- Acq. Med. Rate|	$\frac{\text{\|Branch Rate - Acq. Med. Rate\|}}{\text{Acq. Med. Rate}}$	|Branch Rate- Acq. Med. Rate|	$\frac{\text{\|Branch Rate - Acq. Med. Rate\|}}{\text{Acq. Med. Rate}}$
Post-Acquisition	-0.114***	-0.181***	-0.100***	-0.204***
	(0.015)	(0.018)	(0.019)	(0.067)
Observations	82914	82914	91876	91876
Adjusted R^2	0.786	0.533	0.895	0.712
State × Month Fixed Effects	Yes	Yes	Yes	Yes
Branch Fixed Effects	Yes	Yes	Yes	Yes

Table OA.4: Effects of M&A on Deposit Rate Convergence between Acquired Branch and Median Acquirer Deposit Rate: Keep Same Rate-Setter vs. Change Rate-Setter

Table OA.4 reports the coefficients of OLS regressions investigating the effect of a merger on the difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer after stratifying the sample based on the branch keeps the same rate-setter branch or not. The dependent variable in columns (1) and (3) of the three panels, |Branch Rate - Acquirer Median Rate|, is the absolute difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer. The dependent variable in columns (2) and (4) of three panels, $\frac{|BranchRate-Acq.Med.Rate|}{Acq.Med.Rate}$, is the absolute difference between the deposit rate of the acquired branch and the median deposit rate of the acquirer divided by the median deposit rate of the acquirer. The main variable of interest, *Post-Acquisition*, is a dummy variable that takes the value of one in the 12 months following the merger event. All specifications include state-by-month and branch fixed effects. Standard errors are presented in parentheses and are clustered at the level of the branch banking market. ***, **, and * represent statistical significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
	Keeps Rate-Setter		Changes Rate-Setter	
	|Branch Rate- Acq. Med. Rate|	$\frac{\text{\|Branch Rate - Acq. Med. Rate\|}}{\text{Acq. Med. Rate}}$	|Branch Rate- Acq. Med. Rate|	$\frac{\text{\|Branch Rate - Acq. Med. Rate\|}}{\text{Acq. Med. Rate}}$
Post-Acquisition	-0.060***	-0.079**	-0.172***	-0.426***
	(0.016)	(0.033)	(0.010)	(0.025)
Observations	134656	134656	40027	40027
Adjusted R^2	0.829	0.624	0.733	0.470
State × Month Fixed Effects	Yes	Yes	Yes	Yes
Branch Fixed Effects	Yes	Yes	Yes	Yes