Bank Acquisition: Robin Hood of Stagnant Capital

Leonid Pugachev
PhD Candidate, Price College of Business
University of Oklahoma
Lpugachev27@ou.edu

Current draft: May 15, 2018
First draft: May 15 2018

Prior research disagrees on whether bank merger and acquisition (M&A) helps or hurts depositors and borrowers. I propose a framework to reconcile conflicting findings: bank M&A benefits or harms consumers to the extent that it increases or decreases market competition. I examine price and volume effects for deposit and loan products in a comprehensive sample of all U.S. bank mergers between 1998 and 2016. I show that depositor welfare outcomes frequently move in the opposite direction of borrower outcomes. My results suggest that market and acquirer characteristics significantly explain consumer outcomes in the predicted way: acquirers raise more deposits in under-funded markets and issue more loans in under-lent ones. These findings are consistent with a view of bank M&A as a welfare-enhancing phenomenon that transfers capital toward its highest and best use.

Bank Acquisition: Robin Hood of Stagnant Capital

At the heart of a strong economy lies a healthy financial sector to allocate capital toward its highest and best use (King and Ross, 1993). When the fundamentals of this sector change, people pay attention. A topic of intense academic and regulatory interest has been the alarming rate of bank consolidation through merger and acquisition (M&A). M&A has transformed the United States banking landscape from over 15,000 institutions in 1980 to roughly 6,000 today. The trend has led scholars toward two broad questions: what drives bank[1] M&A and how does it impact bank customers. The present paper argues that these questions cannot and should not be separated.

One well-documented phenomenon is that bank M&A *benefits* depositors and borrowers (e.g. Focarelli and Panetta, 2003; Park and, Pennacchi and Sopranzetti, 2005). Another is that it *harms* these same stakeholders (e.g. Hannan and Prager, 1998; Garmaise and Moskowitz, 2006). To quote the latest published review on the subject, "*extant literature provides no consistent evidence whether the participating financial firms benefit from M&As [or] whether the customers of these firms benefit*" (DeYoung, Evanoff and Molyneux, 2009, pg. 88). Some authors explain the differential impact as the net effect of two opposing forces: market power increases, which harm consumers if exercised, and efficiency gains, which help consumers if passed down. Nonetheless, conclusions in this field appear inconclusive.

The present article aims to reconcile conflicting evidence by reexamining the price and volume impact of bank M&A on U.S. depositors and borrowers. Departing from prior empirical work, I investigate M&A's impact on both depositors and borrowers in a unified framework. I find that whether M&A helps or hurts target-bank customers depends largely on the customers in question with market and bank characteristics playing a prominent role. Acquisitions more likely motivated by deposit market access increase competition for target market deposits and, thus, benefit depositors. When, instead, banks acquire to access lending opportunities, borrowers win. I propose a simple method to discern these two deal types.

[1] Throughout, I use the term bank informally to denote any depository institution or its holding company.

Consider Flagstar Bancorp's 2017 acquisition of East West Bancorp about which Flagstar's CEO explains, "*The acquisition provides low-cost, stable funding to continue growing our balance sheet.*"[2] Deposit-market access clearly motivates the transaction so it is no surprise that in the target's markets, the consolidated bank gathers more deposits, post-merger. Contrast this case with Cascade Bancorp's 2016 purchase of Prime Pacific Financial. Cascade's president notes "*This opportunity expands our commercial banking footprint in the strong Seattle market. Prime Pacific's solid commercial and [Small Business Association] lending expertise is consistent with our strategy to increase our market share of commercial loans in fast-growing Northwest metropolitan markets.*"[3] One may rationally expect Cascade's small business lending in these markets to increase and, indeed, the data agree.

Targets are more geographically constrained than their acquirers[4], which adds an important dimension to the analysis. A bank operating in areas with more deposits than can be profitably lent may overinvest rather than return shareholder funds or chase away deposits. Acquisition lifts this constraint as the acquirer can, with regulatory limitations, redeploy funds to markets with more profitable investment opportunities. This rationale predicts better depositor and worse borrower outcomes in target markets where deposit levels exceeds loan demand. The reverse logic applies if loan demand exceeds deposit levels. Relatedly, when an acquirer is well-funded but lacks investment opportunities, target borrowers may benefit while depositors face less competition for their funds. I reason that bank- or market-level deposit-loan imbalances can provide useful, previously untapped, information about expected competitive changes in deposit and loan markets.

I create two variables to predict *ex-ante* how an acquisition will affect deposit and loan market competition. Each year, I regress a market's deposit volumes on its loan volumes. Signed residuals measure the degree of 'deposit-heaviness' in an area; more positive (negative) residuals signify markets with higher (lower) deposit levels than loan demand. The counterfactual, other areas in the same year, mitigates time-

[2] http://www.crainsdetroit.com/article/20171114/news/645031/flagstar-agrees-to-buy-8-bank-branches-in-california

[3] https://www.prnewswire.com/news-releases/cascade-bancorp-announces-agreement-to-acquire-prime-pacific-financial-services-in-the-greater-seattle-metro-market-300258029.html

[4] In my sample, the mean target (acquirer) operates in 2.6 (8.3) markets in the year preceding acquisition.

series differences in deposit and loan flows. I replicate this exercise at the bank-year level for a time-varying measure of bank deposit-heaviness.

Bank and market deposit-loan imbalances correlate with M&A likelihood. I further show that these variables significantly affect M&A consumer outcomes. When acquirers' need to *source* funds drives M&A, target market depositors benefit while borrowers in these same markets are harmed. When acquirers' need to *invest* funds drives M&A, target market borrowers benefit and depositors are harmed. These results manifest clearest in tests of deposit and loan volumes. Product price regressions yield more ambiguous conclusions which are still useful in relation to prior work. My evidence suggests that bank M&A improves the efficient allocation of capital by transferring it from overfunded markets to underfunded ones. Like the legendary Robin Hood who took money from the rich and gave to the needy, bank acquirers redistribute from deposit-rich markets to areas in need of loanable funds. In this sense, my results are consistent with a social welfare-enhancing view of bank M&A.

To my knowledge, my paper is the first to test M&As' impact on both quantities and prices in both deposit and loan markets. Research focused on one dimension yields conflicting evidence and inconsistent welfare implications. For instance, Karceski, Ongena, and Smith (2005) show that 48 Norwegian bank M&As between 1983 and 2000 damage firm value for large commercial target borrowers. Focarelli and Panetta (2003) show that 43 Italian transactions between 1990 and 1998 benefited depositors in the long run. In isolation, these findings feed opposing views of bank M&A. However, the discord may reflect different methodologies, countries, time-periods, and, especially, consumer classes. Kahn, Pennacchi, and Sopranzetti's (2005) write that "*it is simplistic to presume that bank consolidation affects different types of banking services in a uniform manner,*" (pg. 131). I answer their call by testing bank M&A's impact on several classes of depositors and borrowers for more robust, complete, and nuanced conclusions. Covering 2,668 mergers between 3,631 targets and 2,594 acquirers[5], in 1,884 acquired markets, and millions of loans and deposit accounts, my sample dwarfs that of most other studies. Ample bank, market, and time-series

[5] If target or acquirer is a multibank holding company, each subsidiary bank is considered to participate in the transaction. This induces a many-to-many relationship between target and acquirer bank.

variation allows me to isolate each specific dimension of heterogeneity and control for confounding factors using powerful fixed-effect combinations. My intuitive findings – M&A only helps depositors or borrowers when it increases deposit or loan competition – can reconcile the previously opposing views of M&A. I also contribute methodologically through the variables I create. Simple measures of bank- and area-level capital flow frictions exhibit intuitive relationships in the data. Characterizing the relative deposit-loan strengths of banks and markets has many useful applications for future work.

The remainder of the paper is organized as follows. Section 2 summarizes relevant literature. Section 3 outlines my data sources and variable construction. Section 4 presents my empirical analysis and Section 5 concludes.

2. Related Research

While empirical conclusions about bank M&A have spanned the gamut, they share a common theoretical foundation. Drawing on Williamson's (1968) seminal work, bank mergers are understood to benefit consumers if they create operating efficiencies for the surviving institution and those efficiencies are passed down through lower costs or better services. However, efficiency gains come at the possible price of higher market power. By buying out rivals, banks reduce competition, which may allow them to extract consumer rents. Whether the mean effect in an M&A sample is positive or negative is believed to reflect the net impact of these opposing forces.

Early empirical tests focused on changing supply of small business loans after bank M&A. These papers typically measure small business lending at the bank-year level using call report data. Examples include Strahan and Weston (1998) who find that mergers between small banks increase small business lending while other mergers have no effect. However, Avery and Samolyk (2004) and Craig and Hardee (2007) find that large bank acquirers negatively impact small business credit availability. Peek and Rosengren (1998) demonstrate that whether acquirers increase or decrease small business lending depends largely on the role this business line plays in their preexisting operations. Berger, Saunders, Scalise, and

Udell (1998) decompose the effect into several components and show that decreases in loan supply from the surviving institution are likely absorbed by competing banks.

Other papers assume the borrowers' perspectives. Using Norwegian data, Karceski, Ongena and Smith (2005) show that target bank borrowers lose value, on average, and are forced to terminate their banking relationships more frequently. Garmaise and Moskowitz (2006) study commercial real estate loan prices around U.S. bank M&A and find that competition-reducing mergers do not induce less favorable loan pricing but even higher crime rates. In a panel of Italian borrowers, Bonaccorsi di Patti and Gobbi (2007) find that credit supply temporarily decreases if their bank is acquired but then recovers. Degryse, Masschelein and Mitchell (2011) find small Belgian borrowers with fewer banking relationships are more likely to be 'dropped' by the acquirer bank. Kahn, Pennacchi and Sopranzetti (2005) are among the few to examine consumer loans, rather than commercial loans. They find that U.S. mortgage rates fall in merger markets *before the merger*, consistent with increased competition driving down prices. They find no effect for auto loan rates. Similarly, Nguyen (2014) finds that the impact differs by borrower class; M&A permanently decreases small business loan access but the negative effect on mortgage lending recovers.

Less work exists on depositor impact. Exceptions include Prager and Hannon (1998) who study deposit rate levels in U.S. markets that experienced substantial horizontal mergers, ones that increased the market's Hirschman-Herfindahl Index (HHI) at least 200 points to a pro forma level of 1800. In these markets, deposit rates fall while for less substantial mergers, rates increased relative to the control group. Studying Italian M&A, Focarelli and Panetta (2003) find that the negative short term impact on deposit rates reverses in the long term which the authors attribute to a lengthy gestation period to realize efficiency gains.

Two articles exceptionally illustrate the tradeoff between operating efficiencies and market power. Using Italian data, Sapienza (2002) shows that loan rates decrease modestly when the merger involves two banks with no market overlap, more substantially when the institutions overlap but have small market-shares, and rates increase with the banks' combined market share. Erel (2011) presents corroborating evidence using 350 large U.S. mergers. In-market-mergers, defined as those where the target and acquirer

overlap in at least one geographic market, generate significant loan spread declines whereas out-of-market mergers do not. However, when market overlap between target and acquirer is largest, consumer gains disappear. Both articles conclude that mergers reduce loan prices, presumably reflecting cost efficiencies at the consolidated bank, but these effects dissipate when the merger increases the acquirer's market power.

To summarize, M&A, on average, harms small business borrowers (Avery and Samolyk, 2004; Craig and Hardee, 2007; Garmaise and Moskowtiz, 2006; Degryse, Masschelein, and Mitchell, 2011), benefits small business borrowers (Strahan and Weston, 1998; Sapienza, 2002; Erel, 2011) and induces no lasting effect on small business borrowers (Berger et al. 1998; Bonaccorsi di Patti and Gobbi, 2007). Some consumers are harmed and others unaffected (Kahn, Pennacchi, and Sopranzetti, 2005; Nguyen, 2014). Depositors are harmed (Prager and Hannon, 1998) but only in the short-run (Focarelli and Panetta, 2003). All attribute negative effects on market power and positive ones on efficiency gains. The collective body of prior work provides only one, unambiguous conclusion: more, more consistent, and more comprehensive evidence is needed.

With Sapienza and Erel as a point of departure, I make several methodological adjustments to obtain sharper identification. Both paper focus on observed loan prices. While observed prices directly measure consumer surplus, they have two drawbacks. First, they are the outcome of a complex negotiation involving collateral, term, covenants, and, most importantly, the borrower's character. While certain factors can be controlled for, the latter cannot. Thus, observed loan prices may only approximate borrowing costs for the marginal borrower. The RateWatch data I use tracks advertised, not observed, loan rates for a menu of borrowers. It also provides very detailed information about non-rate costs of borrowing (e.g. loan-to-value limits, maximum term, etc.). Using this information, I restrict rates to be directly comparable across banks, which offers a cleaner view of the marginal rate. The second shortcoming of observed loan rates is ambiguous consumer welfare implications. Lower rates could reflect a price reduction or credit rationing. Without direct tests of loan volumes, one cannot discern the two stories. My study examines both volumes and rates to gauge the full impact of bank mergers on consumer welfare. In my sample, volumes offer a cleaner view.

However, the most substantial difference is that the present paper shifts analysis from the borrower level to the market level which provides three major benefits. First is sharper identification of the underlying theoretical mechanism. Nearly all prior work is framed in relation to the market power hypothesis. However, extant tests of this hypothesis assume *all* borrowers of banks with overlapping markets are affected. It is unclear why a borrower in Market M should face higher loan rates if acquirer and target overlap in Market Z. Market-level analysis can better identify consumers affected by market power changes. The second benefit is scope. Focusing on markets allows me to better gauge the broader impact of M&A. For example, borrower-level analysis can answer the question "are loans issued by M&A banks smaller" but market-level analysis can answer "are fewer loans issued by M&A banks?" A broader perspective may be more revealing since, given Bostic and Lee's (2017) finding that small business loan volume remained unchanged from 1996 to 2015 while the average size of each loan fell dramatically. My tests complement the more granular specifications from prior work. Finally, observing market-level outcomes allows me to directly model the impact of bank and market conditions on consumer outcomes. Such conditions are almost sure to impact the acquisition decision, and thereby affect consumer outcomes. Beyond the banking literature, scholars have long considered access to new markets as a key driver of M&A (e.g. Napier, 1989, and Anderson, Havila, and Holstrom, 2003). By explicitly modeling these conditions, I avoid omitted variable issues.

A final article that especially guides my analysis is Park and Pennacchi (2009). These authors theoretically demonstrate that mergers can disparately affect borrowers and depositors. In their model, large acquirers rely more heavily on non-deposit funding sources and have more efficient lending technology. Therefore, when a large acquirer gains or increases market share, competition for that market's deposits drops while competition for loans increases. Under their assumptions, bank M&A can simultaneously hurt depositors and help borrowers. I draw from and extend their theoretical conditions. Moving beyond the dimension of bank size, I hypothesize that *any* acquisition benefits customers to the extent that it increases competition in that market. My findings strongly suggest that some acquisitions help depositors and harm borrowers, even after controlling for acquirer size. The driving variable is competition for deposits or loans.

Park and Pennacchi rightly point out that competition correlates with acquirer size, but I argue that other bank- and market-level measures can more directly capture the effect.

3. Data and Variables

My sample period starts in 1998, the first year deposit rate information becomes available, and ends in 2016. The units of observation are bank-years, market-years or bank-market-years. Following prior work (e.g. Berger et al., 2004; Liebersohn, 2017), I define markets as metropolitan statistical areas (MSAs), when possible, or as counties when a county falls outside an MSA.[6] A bank is considered active in a market-year if the FDIC's Summary of Deposits (SOD) dataset reports at least one bank branch in that market-year. All variables measured in dollars are inflated up to 2016 values using the FRED consumer price index for urban consumers.

Deposit volumes: From SOD, I obtain June 30th branch-year deposit volumes for all branches of every FDIC insured depository institution. Deposit volumes are aggregated into bank-year, market-year, and bank-market-year levels (***VOL_D_B***, ***VOL_D_M***, and ***VOL_D_BM***, respectively). I then compute each bank's deposit market share (***SHR_D***) as ***VOL_D_BM/ VOL_D_M***. I compute each deposit market's Hirschman-Herfindahl Index (HHI; ***HHI_D***) as the sum of squared ***SHR_D*** of all banks operating in that market. Finally, I measure how significant a deposit market is to the bank's deposit operations (***SIG_D***) as ***VOL_D_BM/ VOL_D_B***. This variable reflects the *market's* share of a given *bank's* deposit operations in contrast to ***SHR_D*** which measures the *bank's* share of a given *market's* deposits.

Loan volumes: From Home Mortgage Disclosure Act (HMDA) Loan Application Registers, I obtain loan-level residential mortgage origination data. Each year-end, depository and non-depository institutions must report such data if they meet size and materiality thresholds. In 2016, the size threshold was $44 million for depository institutions[7]. From these data, I compute home mortgage volume in dollars

[6] Because MSAs definitions and delineations can change from year to year but one county can belong to at most one MSA, I use the 2016 relationships between counties and MSAs throughout my sample. That is, MSA *m* is defined to contain county *c* in year *y* if and only if it contains county *c* in 2016.[6] This modification avoids misattributing large year-over-year swings in MSA deposit and loan volumes when only the geographies, themselves, are redefined.

[7] For a full description of which institutions must report, refer to www.ffiec.gov/hmda/reporter.htm.

for bank-year, market-year, and bank-market-year (***VOL_HM_B***, ***VOL_HM_M***, and ***VOL_HM_BM***), market share (***SHR_HM***), HHI (***HHI_HM***), and market significance (***SIG_HM***) variables as for deposit volumes, above. I exclude bank-market-years in which a bank denies all applications or only purchases loans. HMDA respondents only began reporting RSSD IDs in 2004 so I populate RSSD ID values for earlier observations following Xie (2016) as described in Appendix I.

From the Community Reinvestment Act (CRA) website, I obtain small business and farm (SBF) loan origination volumes. Each year-end, federally regulated depository institutions report SBF data if they exceed a size threshold. The 2016 threshold was $1.216 billion in total assets. I compute SBF origination volumes for each bank-year, market-year, and bank-market-year (***VOL_SBF_B***, ***VOL_SBF_M***, and ***VOL_SBF_BM***, respectively). I compute each bank's SBF market share (***SHR_SBF***), and each SBF market's HHI (***HHI_SBF***) and its significance to the bank's total SBF operations (***SIG_SBF***) as above. Missing data for smaller lenders introduces measurement error. Concerns are partially allayed by findings in Berger et al. (1998) and Berger, Goulding and Rice (2014) that larger banks actually fund more small business loans. Further, Greenstone, Mas, and Nguyen (2014) estimate that this database includes 86 percent of all small business loans under $1 million in 2007 so I believe that the large threshold still captures a material portion of the U.S. small business loan market.

Deposit and loan rates: Deposit and loan rate data come from RateWatch, a company that surveys financial institutions. By disclosing rates, a financial institution learns about its competitors' rates. While survey response is voluntary, coverage is currently quite high. For my 2016 sample, 85 percent of bank by number and 95 percent by asset size report a rate for at least one of the 4 products I sample. Though the data include hundreds of variants on a few dozen deposit and loan products (for example, a $10,000 minimum, 12 month CD in the CD category), I select two loan and two deposit products based to maximize non-missing data and follow prior work. Deposit rates include the $10,000 minimum, 12 month CD rate following Cortez and Strahan (2017) and a $0 minimum interest checking account per Azar, Raina, and Schmalz (2016). Following Dlugosz et al. (2017) and Mora (2017), I select the 15-year fixed home mortgage rate and 5 year new auto loan rate, respectively. I measure each at bank-year, market-year level,

and bank-market-year levels as the median of all rates reported for that bank-year, market-year, and bank-market-year.

RateWatch collects data by surveying 'rate-setting' branches which establish rates for other branches of the same institution. A bank can have multiple rate-setting branches at a given point in time that direct prices for different regions or products. RateWatch provides files to link rate-setters with rate-following branches, their FDIC unique Branch Numbers (UNINUMBR), and the branches' latitude-longitude coordinates. I use the UNINUMBR to tie branch rates to RSSD IDs using SOD. Because RateWatch does not provide head office UNINUMBRs, I match head offices to RSSD IDs using their geographic coordinates. For most of my sample, institutions are surveyed at a monthly frequency. However, in 2011, RateWatch began to collect weekly deposit rate information. Since my study uses annual observations, I take rates from June surveys (to be consistent with the SOD timing) and after 2010, my deposit rates come from the first survey collected in June. Surveys cover more institutions for deposits than for loans and coverage increases monotonically for both categories over time.

Mergers and acquisitions: M&A data come from the National Information Center's Transformations file which includes detailed information on bank ownership changes. To retain true M&As, I exclude splits, asset sales, and mergers induced by bank failure (transformation codes 5, 7, and 50, respectively). I also exclude 'in-family' mergers, following Francis, Hasan, and Wang (2008) and Erel (2011) which involve multiple institutions within the same holding company structure. These transactions, common after the 1997 Riegle-Neal Act, should not affect consumer welfare because ultimate ownership does not change. If the target (acquirer) institution is a holding company, not a bank, I consider all subsidiary banks owned by that holding company as targets (acquirers). This allows me to maintain the bank-market-year level of analysis through my paper.

Area-year-level deposit-heaviness: Area-year-level deposit heaviness, ***DHA***, is computed as follows. Within each year, I regress log(***VOL_D_M***) on log(***VOL_HM_M***) and its square. Signed residuals proxy for deposit-market strength relative to the area's loan market. Positive residuals denote a market with more deposits than expected that year, given its loan volume. An equally valid interpretation is that the

market has too few loans, given its deposit volumes. The more positive the residual, the stronger the area's deposit market relative to its loan market. Conversely, negative residuals imply that the market has too few deposits or too many loans. Figure 1 plots the relationship between loans and deposits in each market in my sample[8]. The graph shows a mostly linear relationship which flattens slightly for small markets and steepens for large ones. Tail effects motivate the quadratic specification rather than a simple linear one. In regressions of SBF volumes, ***DHA*** is computed using ***VOL_SBF_M*** as the independent variable, instead.

Bank-year-level deposit-heaviness: Bank-year-level deposit heaviness, ***DHB***, is computed similarly to ***DHA***. Within each year, I regress a bank's logged residential real estate loan volume or its logged SBF loan volume on its logged deposit volume. These variables are obtained from June 30th Call Reports. While total loans are available at the bank level, I use residential real estate or SBF loans instead to maintain consistency with the market-level data which only provide SBF and home mortgage loans. Again, signed residuals proxy for deposit-heaviness, this time at the bank level.

Control variables: From June 30th Call Reports, I obtain bank-year level data on total assets; total equity; nonperforming assets; residential real estate (home mortgage) loans; small business and farm loans; and net income. Variables other than total assets are scaled by total assets. From the Bureau of Economic Analysis, I obtain market-level population and income-per-capita. From the Bureau of Labor Statistics, I obtain a market's unemployment rate.

My final sample includes 12,562 banks which operate in 2,349 markets between 1998 and 2016. It covers 2,668 mergers between 5,490 distinct banks. Over 40 percent of the U.S. bank universe participate in M&A activity over my sample period and over 75 percent of markets experience at least one merger over that time.

Panel A of Table 1 reports sample means and medians for key bank-year variables. Statistics are presented for the full sample, and subsamples of target and acquirer observations. Panel A confirms that acquirers are typically much larger than targets though both are larger than the non-M&A participants. Also

[8] While Figure 1 shows the relationship in the full panel of observations, my regression estimates this relationship within year to avoid time-series trends affecting my classification scheme.

note the severe right skew from several many mega-bank acquisitions. Consistent with Park and Pennacchi's (2009) model, acquirers rely less on deposit-based funding. In line with Berger et al. (1998) and many others, small business and farm loans comprise a lower fraction of acquirers' asset portfolios than targets'. The opposite appears to be true for home loans. The median acquirer firm-year is more deposit-heavy than the median target and overall firm-year for both home mortgage and SBF measures of deposit-heaviness. Acquirers exhibit lower nonperforming asset ratios and inefficiency ratios perhaps reflecting better scale economies. Capital ratios appear quite similar. Acquirers also offer consumers higher deposit rates but at the cost of pricier loans. This could also reflect the different markets that these institutions operate in.

Panel B reports the same at the market-year level. A target or acquirer market-year is any market-year in which a target or acquirer has a branch. Mean and median target market-years are larger and wealthier than acquirer market-years or the overall sample and have lower unemployment rates. They are larger and tend to be more deposit heavy by either metric. They are less concentrated according to the deposit market HHI. Both loan market HHIs (unreported) yield the same conclusions. Target markets also have higher median loan and deposit rates. This is consistent with a view of target markets as more urban centers while acquirers have branches in urban markets as well as more rural ones.

4. Empirical Analysis

4.1 Acquisition Likelihood

I begin the empirical analysis by testing whether ***DHB*** or the ***DHA*** of the markets in which a bank operates correlates with its likelihood of being either target or acquirer. If these measures significantly affect acquisition likelihood, then omitting them from consumer welfare regressions may introduce selection bias. Specifically, if these variables affect likelihood of being a target or acquirer, then tests of acquisition impact of consumer welfare, which omit these factors, will inadvertently attribute the these factors' impact on consumer welfare (if any) to the effect of the merger, itself. To test whether these factors relate to acquisition likelihood, I estimate the following model at the bank-year level with standard errors clustered by bank:

$$T|A_{b,t+1} = \boldsymbol{\beta DH}_{b,t} + \boldsymbol{\beta X}_{b,t} + \alpha_b + \delta_t + \epsilon_{b,t} \qquad (1)$$

where b and t index the bank and year, respectively. The dependent variable is an indicator measuring whether the bank partakes in an acquisition (alternately, as target or acquirer) over the following year. The variables of interest are vector of deposit-heaviness measures. The first two are ***DHB*** computed using home mortgage loans and SBF loans. The second two are each bank-year's ***Sig_D***-weighted average of ***DHA*** for the markets in which it operates, also computed using both home mortgage and SBF ***DHA***. Controls include the natural logarithm of total assets, total equity to total assets, and nonperforming assets to total assets. δ denotes year dummies which capture acquisition waves. Because the dependent variable is an indicator, I prefer to estimate Equation 1 as a logistic regression. However, doing so precludes control for time-constant bank-level heterogeneity (Greene, 2004) which inevitably affects a bank's likelihood to acquire or be acquired. For example, Bank of America is intrinsically more likely to acquire than rural community banks. Columns 1 and 2 of Table 2 report estimates from a linear probability model which includes the bank fixed effects, α. Columns 3 and 4 employ the logistic model, instead, excluding bank fixed effects. Note the fixed effect linear probability model eliminates cross-sectional heterogeneity so the variables of interest relate time-series changes in deposit-heaviness to M&A participation likelihood. Odd (even) numbered columns estimate the probability of being a target (acquirer) bank-year.

Columns 1 and 3 show that excess deposits relative to mortgage loan levels relates positively to target bank-year likelihood. Columns 2 and 4 document a strong negative link between the same variable and acquirer firm-year likelihood. Whether considering time-series variation (Columns 1 and 2) or both time-series and cross-sectional variation (Column 3 and 4), these patterns reiterate Table 1's univariate trend that acquirers issue more mortgage loans and targets issue less. β_2 documents a negative relationship between the SBF-measured deposit-heaviness and target likelihood. However, the sign flips from positive (Column 2) to negative (Column 4) when measuring acquirer likelihood though both are significant at the 5 percent level or better. This implies that when banks become more deposit-heavy relative to their SBF portfolio, i.e. begin to run out of SBF lending opportunities, they are more likely to acquire but overall, there exists a negative association between deposit heaviness relative to SBF lending and acquisition

likelihood. In all four columns, the weighted average deposit-heaviness of a bank's markets, whether computed using home mortgage or SBF loans, relates negatively or insignificantly to a bank-year's probability of being either a target or acquirer. This suggests that both targets and acquirers tend to operate in loan-heavy markets. Collectively, these results illustrate that bank- and market-level funding imbalances between loans and deposits significantly impact the likelihood to participate in M&A. Having shown evidence consistent with deposit- or loan-heaviness as a cause of bank M&A, I proceed to explore whether this variable affects consequences of bank M&A.

4.2 Bank-Market-Year Levels

For my main empirical analysis, I test how area- and bank-level deposit-heaviness moderates the impact of bank M&A on consumer welfare outcomes. I start by estimating the following regression at the bank-market-year level:

$$Log(Deposits|Loans)_{b,m,t} = \beta_1 M\&A_{b,m,(t-1:t-3)} + \beta_2 In\text{-}Market\ Merger_{b,m,(t-1:t-3)} + \beta_3 DHM_{m,(t-1:t-3)} + \beta_4 (M\&A\ x\ DHA)_{b,m,(t-1:t-3)} + \beta_5 DHB_{b,(t-1:t-3)} + \beta_6 (M\&A\ x\ DHA)_{b,m,(t-1:t-3)} + \boldsymbol{\beta X}_{b,m,t} + [\alpha_{b,t}|\alpha_{m,t}|(\alpha_{b,m} + \gamma_t)] + \epsilon_{b,m,t} \quad (2)$$

where b, m, and t respectively index the bank, market, and year. The dependent variable alternates between deposit and home mortgage or SBF loan volume. Independent variables includes an indicator, ***M&A***, equal to one if the bank merged into the market over the last three years; zero, otherwise; and another indicator, ***In-Market Merger***, equal to one if the bank previously operated in the market in which it merged over the past three years; zero, otherwise. I also include average ***DHA*** and ***DHB*** over the past three years to test how area- and bank-level deposit heaviness affect lending and deposit gathering. Finally, I interact these two variables with ***M&A***. The interaction terms β_4 and β_6 measure how area- and bank-level deposit heaviness changes the effect of M&A on the dependent variable.

Bank-year controls include logged total assets, the ratio of nonperforming assets to total assets, and the ratio of equity capital to total assets. Market-year controls include logged population, logged median income, the unemployment rate and the HHI (***Concentration)***. Bank-market-year controls include market share and market significance to the bank's operations. For each outcome variable, I use that variable-specific HHI, market share, and market-significance. Variables are defined in Section 3.

This regression is estimated in one of three fixed-effects specifications. The first version includes bank-year fixed effects; this tests how a recently acquired market's deposit-heaviness affects bank lending or deposit-gathering, *controlling for all time-varying, bank-specific factors that affect lending and deposit-gathering.* This specification eliminates endogeneity from time-varying bank-level omitted variables like corporate culture or risk-appetite. The second specification includes market-year fixed effects; this tests how a recent acquirer's deposit-heaviness affects its lending or deposit gathering *controlling for all time-varying, market-specific factors that affect lending and deposit-gathering*. This specification eliminates endogeneity from time-varying market-level omitted variables like investment opportunities or local business cycles. The third specification includes bank-market fixed effects plus year fixed effects; this tests how a recently acquired market's deposit-heaviness and a recent acquirer's deposit-heaviness affect its lending or deposit gathering in that market *controlling for all time-constant, market- and bank-specific factors that affect lending and deposit-gathering and controlling for national time-varying factors*. This specification eliminates endogeneity from time-constant bank-market-level omitted variables like whether the market is a core or peripheral market for the bank as well as national economic factors like the prime rate or quantitative easing. This specification is the most powerful as many factors that determine lending and deposit gathering activities are largely time-constant. For instance, Bank of America lends more to New York City than nearly any other bank for each year of my sample period. This type of heterogeneity is wiped away, focusing on time-series changes in bank- and area-level deposit-heaviness.

Table 3, Panel A, reports the results of these regressions. The first three columns test each of the above specifications on deposit volumes; the next (final) three columns estimate these regressions on home

mortgage (SBF) volumes. Variables that do not vary within a fixed effects specification are dropped. Standard errors are clustered by bank-year, market-year, and bank-market, according to the specification.

Column 1 presents several interesting findings. β_1 shows that a bank gathers fewer deposits from recently acquired markets than from other markets in which it operates that year. However, if the acquired market is one in which the bank previous operated, deposit levels are much higher than in other markets (β_2). This suggests that in-market mergers occur where the acquirer already has a large presence. B_3 reflects the intuitive result that banks gather more deposits from deposit-heavy markets than from other ones. This is consistent with bank herding toward markets where funds can be sourced at favorable terms. However, if the deposit-heavy market was recently acquired, the acquirer sources less of its funds there (β_4). This presents the first piece of evidence that acquirers can help offset deposit concentrations, potentially reducing disequilibrium.

Column 2 compares deposit gathering in the same market in the same year across different banks. Here, β_1, qualifies Column 1's result that banks source less of their funds from recently acquired markets; Column 2 suggests this amount still exceeds what non-acquirers source from the same market in the same year. Thus, acquirers may still increase deposit-market competition, potentially due to their larger network of investment opportunities. B_2 suggests that in-market acquirers source more deposits from the market they reinvested in than other banks in that market. Similar to the previous column, deposit-heavy banks source more deposits from a market than do other banks (β_5) but if the deposit heavy bank recently merged into this market, the difference diminishes (β_6). This suggests that when deposit-heavy banks expand through M&A, they focus less on deposit-gathering in the new market, however subsequent results suggest this more likely reflects some other difference in scope between deposit- and loan-heavy banks.

Column 3 is perhaps the most convincing since its results account for time-constant bank and market characteristics, leaving time as the only source of variation. The first two coefficients show that a bank gathers more deposits from a given market when it has recently merged into that market than at other times, and even more so if the bank already had a presence there. β_3 shows that the same bank gathers more deposits from a given market during periods when the market is deposit-heavy. Note this results cannot

reflect reverse causality because my ***DHA*** and ***DHB*** measures are computed in the cross-section and this captures pure time-series variation. This, again, highlights that market characteristics are important to control for when measuring M&A outcomes. β_4 reinforces the findings in Column 1. Not only does a bank collect less funds from recently acquired deposit-heavy markets than from other markets (Column 1), but a bank collects less from the same recently-acquired market during periods when that market is deposit-heavy. Again, this suggests that acquirers help dissolve market funding concentrations. The acquirer's funding imbalance is also an important determinant of its deposit gathering behavior (β_5). Banks collect more deposits from a given market during periods when they are deposit-heavy. However, a marginally insignificant β_6 (p-value of 0.114) suggests that the difference for recently acquired markets and other markets is not as strong.

While the preceding discussion focuses on bank and market deposit-heaviness the continuous nature of ***DHA*** and ***DHB*** means the opposite interpretation holds for loan-heavy banks and markets. That is, a given bank collects more deposits in a given year from recently acquired markets that are loan heavy than from other markets; loan-heavy acquirers collect more deposits than other banks in a same market in the same year; and a bank collects more deposits from a recently acquired loan-heavy market. Each dimension of variation points to the same conclusion: acquirers help offset their own and the acquired market's funding imbalances.

When testing lending rather than deposit-gathering many of the same relationships hold. B_4 in Columns 4 and 7, show that banks lend more to recently acquired deposit-heavy markets than to other markets in the same year. This suggests that acquirers not only alleviate market-level funding imbalance by adjusting deposit-gathering but also by adjusting lending. However, the effect dissipates when focusing exclusively on time-series variation suggesting that bank- or market-level heterogeneity is an important determinant. Indeed, when focusing exclusively on bank-level heterogeneity in Columns 5 and 8, the findings appear counterintuitive. Deposit-heavy banks naturally lend less (β_5) but the effect is actually exacerbated, not mitigated, for recent acquirers (β_6). Hence, a more plausible interpretation of these findings and β_6 from Column 2 is that deposit-heavy banks have intrinsically smaller scopes, even when controlling

for size. Finally, the results in Columns 6 and 9 offer mixed evidence on the effect of bank funding imbalances on their lending behavior. Deposit-heavy banks issue fewer home mortgages but more SBF loans in recently acquired markets. This result resonates with the findings in Kahn, Pennacchi and Sopranzetti (2005) that bank behavior after M&A varies by product type. One explanation is that deposit-heavy acquirers strategically refocus operations in their acquired markets from mortgage lending to SBF lending.

As the outcome variables are in logarithmic form, coefficients can be interpreted as percent changes. For example, if a given market becomes one standard deviation (0.616) more loan heavy, the same bank is expected to gather 2.2 (=0.616*-0.037) percent more deposits there (β_4, Column 3). If a bank's deposit heaviness increases from one year to the next by one standard deviation (0.737) it is expected to increase SBF lending to its recently acquired market by 3.5 (=0.737*-0.048) percent (β_6, Column 9). These estimates appear economically reasonable. That within bank-year and within market-year coefficients are much higher is also sensible as deposit and loan levels vary much more across banks and across markets than they do within the same bank-market over time.

Controls are highly significant in most specifications and consistently support economic theory. In most specifications, deposit and loan activity relates positively to a market's significance to overall bank operations, a bank's market share, and bank and market size. Deposit gathering and lending relates negatively to market concentration and unemployment rates while the relationship to market wealth and bank asset nonperformance and capitalization is ambiguous.

Panel B of Table 3 complements the above analysis with results on deposit and loan pricing using the same three fixed-effects specifications. Within bank-year specifications in Columns 1, 4, 7, and 10 suggest that rates vary little between pre-existing markets and markets recently expanded into through in- or out-of-market mergers. A slight exception appears to be mortgage rates which are 2.5 basis points lower for acquired markets in which the acquirer previously held a stake (β_2, Column 7). Interest checking account rates increase marginally with deposit-heaviness (β_3, Column 4) though the other products exhibit no

relationship. β_4 indicates that rate of change doubles for acquired markets. Additionally, banks appear to offer slightly lower auto rates in recently acquired deposit heavy markets.

Isolating within-market-year differences in Columns 2, 5, 8, and 11 identifies stronger relationships. Columns 2 and 8 respectively suggest that recent acquirers offer more competitive loan and deposit prices than their rivals, however, Columns 5 and 11 fail to corroborate this. For all four columns, in-market acquirers offer less competitive pricing, echoing market power concerns. β_5 provides inconsistent evidence on how bank-level deposit-heaviness affects pricing. Deposit-heavy banks seem to price CD and mortgages more competitively while interest checking and car loan rates are priced less favorably. β_6 suggests that for CDs and car loans, deposit-heavy banks chase away depositors and attract borrowers in acquired markets by lowering rates. However, the effect appears product-specific as interest checking and mortgage rates do not depend on the interaction between M&A and bank deposit-heaviness.

Finally, turning to within bank-market analysis, Columns 3 and 6 suggest that banks significantly lower deposit rates in markets they recently acquired, especially if there is market overlap. However, Columns 9 and 12 show that loan rates are unchanged following acquisitions. Market-level deposit-heaviness is associated with lower interest checking and car loan rates, consistent with banks chasing off depositors and attracting borrowers at times when they are deposit-heavy. However, CD and mortgage rates fail to corroborate this evidence. For both deposit types and for car loans, prices are higher in recently acquired markets when such markets are deposit-heavy. Though this benefits depositors, it harms borrowers which is consistent with banks entering such markets to capitalize on deposit-access, potentially shunning borrowers. Finally, β_6 again presents inconsistent evidence: insignificant for deposit rates, negative for mortgage rates, and positive for car loan rates.

Contradictory findings throughout this table present three important implications. First, understanding the source of the heterogeneity is paramount to interpreting results. To illustrate, consider Column 7 which most closely resembles the specifications in Sapienza (2002) and Erel (2011). Their results are not directly comparable to mine because their models use bank- and year-fixed effects whereas Column 7 uses bank-year fixed effects and they study commercial loan pricing whereas Column 7 examines

residential mortgage rates. Naturally, the three papers' samples also vary. Putting aside these differences, β_2 is broadly consistent with these papers main findings: banks reduce loan prices for overlapping markets which they recently acquired. However, the findings in Column 8, which retains only within market-year heterogeneity, suggest that acquirers' prices actually exceed market prices for that market-year. Whereas Column 7 suggested overlapping mergers benefit borrowers, now the implication is that these same transactions harm borrowers. To belabor the point, consider Column 9 which suggests that banks do not change their pricing in recently markets. Accordingly, consumers should be unaffected by the acquiring bank's direct strategy. The difference between these three specifications is the counterfactual. Clearly, the counterfactual is extremely important to understand policy implications.

Second, prior research, especially in the U.S. has largely focused on deposit and loan rates (e.g. Prager and Hannan, 1998; Craig and Dinger, 2009; Erel, 2011) however this table shows that rates vary substantially from product to product. Table 3 reports results for two different deposit and loan types but unreported analysis on money market deposit accounts, business money market deposit accounts, commercial real estate loan, and balloon mortgage loans further muddle conclusions. As Kahn, Pennacchi, and Sopranzetti (2005) point out "*It is simplistic to presume that bank consolidation affects different types of banking services in a uniform manner*" (pg. 131). My results also illustrate that conclusions vary drastically between product types. A robust analysis on many different loan and deposit account prices is needed for to understand the overall impact of bank M&A on banking product pricing. In contrast, analysis of volumes in the previous section can net out effects for different sub-products for a more complete perspective of consumer welfare. A separate issue is that rates, especially deposit rates, have been found not to vary much within bank (Hannan and Prager, 2004; Adams, Brevoort, and Kiser, 2007).

Finally, and most importantly, these results highlight the incompleteness of examining prices alone. Recall that β_2 in Column 8 suggests in-market acquirers issue pricier mortgages than other lenders in a given market in a given year. One might be tempted to conclude that market overlap, a common proxy for market power, harms borrowers. However, a deeper look into mortgage volumes paints a radically different picture. β_2 in Column 5 of Table 3, Panel A shows that in-market acquirers actually lend more than other banks.

Thus, higher prices are more consistent with expanding loan access to otherwise underbanked borrowers then they are with exercising market power. Clearly, these two stories have radically different policy implications. Thus, only after a comprehensive examination of both prices and volumes in both deposit and loan markets *over the same sample* can academics and regulators fully understand the net welfare implications of bank M&A.

4.3 Merger-Market Changes in Loan and Deposit Volumes and Rates

Table 4 estimates the impact of bank M&A on consumers using the entire panel of bank-market-years. Another approach is to focus directly on changes from target to acquirer levels. I estimate the following regression at the merger-market level to test how acquirers alter their targets' strategies and how these changes impact consumers:

$$\Delta_{t:t+3} Log(Deposits|Loans)_{z,m} = \beta_1 In\text{-}Market\ Merger_{b,m} + \beta_2 DHM_{z,m} + \boldsymbol{\beta X}_{z,m} + \alpha_z + \epsilon_{b,m} \quad (3)$$

where z and m t respectively index the merger and market. The dependent variable alternates between 3-year changes in deposit, home mortgage or SBF loan volumes. Independent variables includes an indicator, ***In-Market Merger***, equal to one if the bank previously operated in the market in which it merged over the past three years; zero, otherwise. Average ***DHA*** over the three years preceding the merger tests how area-level deposit heaviness affects lending and deposit gathering. Market-year controls include population, median income, the unemployment rate and the HHI (***Concentration)***. Bank-market-year controls include target and acquirer market share and market significance. For each outcome variable, I use that variable-specific HHI, market share, and market-significance. Variables are defined in Section 3. I estimate this regression within merger keeping constant target and acquirer characteristics that can drive outcomes. Thus, I compare outcome variable changes between markets affected by the same merger to test how area-level deposit-heaviness impacts these changes. Standard errors are clustered by merger.

Column 1 of Table 4, Panel A reports 3-year deposit volume changes from the target's previous levels. β_1 shows that deposits increase by less or decrease in markets with overlap than in other markets affected by the same merger. This evidence is consistent with market-power hypothesis. Interestingly, though, β_2 shows that market-level funding imbalances have a much more first order effect on deposit volume changes. In expectation, deposits fall by 6.6 percentage points more for a market that is one standard deviation more deposit heavy than for another market affected by the same merger.

Turning to loan volume changes in Columns 2 and 3, in-market mergers effect negative changes, as well. β_2 in Column 2 is insignificant but for SBF loans, it suggests that a market's deposit-heaviness is associated with a larger increase in lending to that market. Both this and the deposit results above provide further support that acquirers help alleviate capital flow frictions within markets. Acquisitions increase deposits in markets that had too few deposits and reduce them in markets with too many (β_2 ,Column 1). They raise SBF loans in markets with too few loans and reduce them in markets with too many (β_2 ,Column 3). These findings are consistent with a redistributive effect, benefitting social welfare.

Panel B applies the same methodology to the four product prices from Table 3. Again, results for deposit and loan rates are weaker than for volumes. In-market mergers significantly impact pricing only for mortgages. Relative to other markets affected by the same merger, mortgage prices fall by 17 more basis points for markets in which the acquirer already operated. One consistent results is β_2 which shows that for deposit rates decrease more in deposit-heavy markets than in other markets affected by the same merger. No such effect is observed for either loan product. The deposit rate results also support this paper's main intuition that acquisitions help disburse funding concentrations.

4.4 Rival Behavior

Another interesting question is how a target's rivals are impacted by the acquisition. Previous evidence is mixed. Prager and Hannan (1998), for example, find that market-power enhancing M&A induces lower deposit rates from acquirers and from their rivals but Berger et al. (1998) conclude that rivals absorb SBF loan volumes that acquirers no longer fund. I test for rival effects by modifying Equation 2. In

place of the ***M&A*** indicator, I include an indicator equal to one if a given bank's competitor in a given market was acquired over the last three years, zero otherwise. Likewise, I substitute the ***In-Market Merger*** indicator for a dummy which equals one if an in-market competitor acquired another in-market competitor over the last three years. In these results, the within market-year specification is omitted since target-rivals are the reference category in Table 3 within market-year regressions. Standard errors are clustered by bank-year or bank-market according to the specification.

Results are reported in Table 5. Naturally, β_3 and β_5 are quite similar between the Table 5 and Table 3 as they are estimated independent of acquirer or rival status. However, interesting differences emerge across the other variables. Whereas Table 3 found that acquirers are less active in newly acquired markets than in their other ones (β_1; Columns 1, 3, and 5), Table 5 shows that the average target-bank rival lends more to targeted markets, post-acquisition, than to other markets (β_1; Columns 3, and 5). Whereas the in-market merger coefficient was positive for acquirers, it is negative for rivals and statistically significant in Columns 1 and 3. These findings suggest that target rivals generally increase lending to acquired markets but less so if the acquisition enhanced their rivals' market power. More interesting is β_4. Whereas acquirer lending increases with target market deposit heaviness (β_4, Columns 4 and 7 in Table 3), rival lending decreases to these same markets (β_4). While deposit-gathering is lower for both acquirer and rival, the effect is much smaller for the rivals.

Within bank-market regressions also differ between tables. β_4 and β_6, when significant in Table 3, lose their significance for rivals. When it is more deposit-heavy is more deposit-heavy, it curtails home mortgage lending and increases SBF lending to acquired markets; rivals exhibit no such trends. While acquirers gather fewer deposits from an acquired market when it is deposit-heavy, rivals do not. However, rivals appear to curb local home mortgage lending when recently acquired markets are more deposit-heavy (β_4; Columns 4) while the acquirers, themselves, do not. Overall, these results are consistent with Berger et al.'s (1998) observation that rivals absorb credit demand which acquirers no longer fulfil, though the deposit results suggest both types of banks refocus deposit gathering away from deposit-heavy markets.

Panel B reports rate results. As in Table 3, results present an inconsistent view of the impact of bank M&A on rival behavior, varying by product type. The most consistent result is that rivals pay less for CDs and charge more on loans following in-market mergers, again echoing market-power results. Still, there is very little consistency between the two tables or between products within each table.

4.5 Market-Year Level

Because several effects observed for rivals offset acquirer effects, an interesting question is whether acquirer behavior, alone, is enough to change overall consumer welfare, or whether, as Berger et al. (1998) find, the net impact on consumers may be negligible. To test this, I estimate the following regression at the market-year level:

$$Log(Deposits|Loans)_{m,t} = \beta_1 M\&A_{m,(t-1:t-3)} + \beta_2 In\text{-}Market\ Merger_{m,(t-1:t-3)} +$$
$$\beta_3 DHM_{m,t} + \beta_4 (M\&A_{m,(t-1:t-3)}\ x\ DHA_{m,t}) + \boldsymbol{\beta X}_{z,m} + \alpha_m + \tau_t + \epsilon_{b,m} \qquad (4)$$

This specification resembles Equation 2 with three exceptions. First, since the regression is estimated at the market level, bank-level variables, including bank-level deposit-heaviness, are omitted. Second, instead of testing how a market's average deposit-heaviness over the past three years affects its deposit and loan levels, I test how deposit and loan levels respond to simultaneous deposit-heaviness and whether this relationship changes for recently acquired markets. The timing in Equation 2 better captures market factors that impact bank decision-making whereas Equation 4 allows me to directly test whether recent acquisitions alleviate the impact of market funding imbalance on lending and deposit gathering. Finally, this regression is estimated with market-fixed effects so the counterfactual is each market's long-term average. Standard errors are clustered by market.

Table 6 presents results. β_1 implies that recent mergers are associated with higher deposit and mortgage loan levels. Recent in-market mergers are associated with significantly higher mortgage and SBF lending, allaying concerns that market power increases negative affect consumers. Naturally, market-wide deposit-heaviness is associated with more deposits and less loans, though this result is largely mechanical,

based on the variable's construction. However, β_4, once again, exhibits an offsetting sign for Column 1 and 3. This indicates that recent M&A activity mitigates a market's exposure to wealth and credit-demand shocks. Formally, a shock to a recent M&A market's deposit-heaviness does not move deposit and SBF levels as far from their long-term mean as the same shock moves another market's deposit and SBF levels. For example, a one standard deviation decrease in ***DHM*** is associated with a 1.8 (=0.737*-0.025) percentage point smaller drop in deposit levels, if the market has had recent M&A activity. An equivalent increase in ***DHM*** is associated with a 3.5 (=0.737*-0.048) percentage points smaller decline in SBF lending if that market has had recent M&A activity.

The first two coefficients should be interpreted with caution. Market fixed effects regressions can still suffer from endogeneity if uncaptured market-wide changes correlate with deposit/lending activity as well as merger activity. While controlling for median income and the unemployment rate partially allay these concerns, factors such as plant openings or local grant receipt can impact the outcome variables immediately and the controls more gradually. However, the variable of interest is less exposed. Because the regression is estimated within market, the only potential source of omitted variable bias is time-varying differences within a market that simultaneously influence M&A activity and the sensitivity of market participants to the area's deposit-heaviness. Such a factor is difficult to conceive of.

Rate analysis, again, presents ambiguous results. Panel B shows that auto loan rates are slightly higher after mergers. Interest checking account rates are lower after in-market mergers while mortgage rates are higher, both of which are consistent with the market-power hypothesis. However rates do not appear to correlate much with market-level deposit-heaviness. The association between CD rates and deposit-heaviness is more negative for recent M&A markets while the link between checking account rates and deposit-heaviness is more positive in deposit-heavy markets.

Conclusion

This paper argues that previous tests of bank M&A impact on consumer welfare ignore perhaps the most fundamental determinant: *why* a bank decides to acquire. It is reasonable to hypothesize that

acquisitions motivated by increased deposit (loan) market access are more likely to benefit depositors (borrowers). Indeed, the data show precisely that. Because targets operate in fewer geographic markets, they face tighter constraints in where they source and invest funds. A possible consequence is having to source funds from weak deposit markets and/or invest them in weak loan markets. Acquisition lifts this constraint as acquirers can better redistribute funds toward their highest and best use. Accordingly, I find that acquirers reduce investment in areas with stronger deposit markets than loan markets and source more funds from those areas. Conversely, they loan more where funding is scarce but investment opportunities are high. Thus, my results support a social welfare enhancing view of bank M&A as a means of redistributing funds toward their highest and best use.

My methodology improves upon extant work in several ways. First, instead of looking at a single dimension of consumer welfare, price *or* volume for depositors *or* borrowers, I examine all. To my knowledge, my paper is the first to consider each through a unified lens. This provides a more comprehensive view of the impact of bank M&A and allows me to demonstrate that M&A frequently affects different consumer groups differently. Second, my sample of transactions far exceeds any previous work. I use the entire universe of U.S. bank M&A over a 19 year span and measure its effects on consumers in every U.S. market. Third, my results emphasize how important it is to understand the heterogeneity which drives empirical estimates. I highlight several examples where one fixed-effects specification yields certain conclusions qualified by another specification. I carefully discern between time-series, cross-bank, and cross-market heterogeneity that may drive my findings. In all cases, the counterfactual is key to understanding relationships in the data. I also contribute by introducing two measures that may aid future research. I devise a simple method to gauge a market's deposit and loan strength. This variable can help answer questions like "why do banks lend more to some markets than others" and "should banks that operate in deposit-heavy markets have more or less capital than banks that operate in others?" Similarly, the bank-level measure of deposit heaviness can reveal important information about a bank's business model and its needs.

Finally, I emphasize that the present paper is a work in progress. While my preliminary results hint at weighty welfare implications, much more work is needed to claim these effects of bank M&A. Fortunately, the data exist for much of this analysis. The next steps are to test whether certain borrower groups are disparately affected by bank M&A. I have race, gender, and income information at the census tract level for HMDA lending and census tract income information for SBF lending. Using this data, I can better measure M&A impact on various consumer classes. Another useful extension is to track market level outcomes like employment or wealth for markets in which M&A increases and decreases lending. These tasks will be attempted as the draft evolves.

References

Adams, R., Brevoort, K., Kiser, E. 2007. Who competes with whom? The case of depository institutions. Journal of industrial economics 55: 131-167.

Anderson, H., Havila, V., Holmstrom, J. 2003. Are customers and suppliers part(icipants) of a merger or acquisition? A literature review. Proceedings of the 19th IMP Conference, Lugano.

Avery, R., Samolyk, K. 2004. Bank consolidation and small business lending: The role of community banks. Journal of financial services research 25: 291-325.

Azar, J., Raina, S., Schmalz, M. 2016. Ultimate ownership and bank competition. Working paper.

Berger, A., Demirguc-Kunt, A., Levine, R., Haubrich, J., 2004. Bank concentration and competition: An evolution in the making. Journal of money, credit, and banking 36: 433-451.

Berger, A., Goulding, W., Rice, T. 2014. Do small businesses still prefer community banks? Journal of banking and finance 44: 264-278.

Berger, A., Saunders, A., Scalise, J., Udell, G. Udell. 1998. The effects of bank mergers and acquisitions on small business lending. Journal of financial economics 50: 187-229.

Bonoccorsi Di Patti, E., Gobbi, G.. 2007. Winners or losers? The effects of banking consolidation on corporate borrowers. The journal of finance 62: 669-695.

Bostic, R., Lee, H. 2017. Small business lending under the community reinvestment act. Department of Housing and Urban Development. Cityscape: 19 63-84.

Cortes, K., Strahan, P. 2017. Tracing out capital flows; How financially integrated banks respond to natural disasters. Journal of Financial Economics 125: 182-199.

Craig, B., Dinger, V. 2009. Bank mergers and the dynamics of deposit interest rates. Journal of financial services research 36: 111-133.

Craig, S., Hardee, P. 2007. The impact of bank consolidation on small business credit availability. Journal of banking and finance 31: 1237-1263.

Degryse, H., Masschelein, N., Mitchell, J. 2011. Staying, dropping, or switching: The impacts of bank mergers on small firms. Review of financial studies 24: 1102-1140.

DeYoung, R., Evanoff, D., Molyneux, P. 2009. Mergers and acquisitions of financial institutions: A review of the post-2000 literature. Journal of financial services research 36: 87-110.

Dlugosz, J., Kyu Gam, Y., Gopalan, R., Skrastins, J. 2018. Decision-making delegation in banks. Working paper.

Erel, I. 2011. The effect of bank mergers on loan prices: Evidence from the United States. Review of financial studies 24: 1068-1102.

Francis, B., Hasan, I., Wang, H. 2008. Bank consolidation and new business formation. Journal of banking and finance 32: 1598-1612.

Forcarelli, D., Panetta, F. 2003. Are mergers beneficial to consumers? Evidence from the market for bank deposits. American economic review 93: 1152-1172.

Garmaise, M., Moskowitz, R. 2006. Bank mergers and crime: The real and social effects of credit market competition. Journal of finance 61: 495-538.

Greene, W. 2004. The behavior of the maximum likelihood estimator of limited dependent variable models in the presence of fixed effects. The econometrics journal 7: 98-119.

Greenstone, M., Mas, A., Nguyen, H. 2014. Do credit market shocks affect the real economy? Quasi-experimental evidence from the Great Recession and 'normal' economic times. Working Paper.

Hannan, T., Prager, R. 2004. The competitive implications of multimarket bank branching. Journal of banking and finance 28: 1889-1914.

Kahn, C., Pennacchi, G., Sopranzetti, G. 2005. Bank consolidation and the dynamics of consumer loan interest rates. Journal of business 78: 99-134.

Karceski, J., Ongena, S., Smith, D. 2005. The impact of bank consolidation on commercial borrower welfare. Journal of finance 60: 2043-2081

King, R., Levine, R. 1993. Finance and growth: Schumpeter might be right. Quarterly journal of economics 108: 717-737.

Liebersohn, J. 2017. How does competition affect bank lending? Quasi-experimental evidence from bank mergers. Working paper.
Mora, N. 2014. The weakened transmission of monetary policy to consumer loan rates. Economic Review – Federal Reserve Bank of Kansas City. First quarter 2014: 5-29.
Napier, N. 1989. Mergers and acquisitions, human resource issues and outcomes: A review and suggested typology. Journal of management studies 26: 271-290.
Nguyen, 2014. Do bank branches still matter? The effect of closings on local economic outcomes. Working paper.
Park, K., Pennacchi, G. 2009. Harming depositors and helping borrowers: the disparate impact of bank consolidation. Review of financial studies 22: 1-40.
Peek, J., Rosengren, E. Bank consolidation and small business lending: It's not just bank size that matters. Journal of banking and finance 22: 799-819.
Prager, R., Hannan, T. 1998. Do substantial horizontal mergers generate significant price effects? Evidence from the banking industry. Journal of Industrial economics 4: 433-452.
Sapienza, P. 2002. The effects of banking mergers on loan contracts. Journal of finance 57: 329-368.
Strahan, P., Weston, J. Small business lending and the changing structure of the banking industry. Journal of banking and finance 22: 821-845.
Williamson, O. 1968. Economies as an antitrust defense: The welfare tradeoffs. American economic review 58: 18-36.
Xie, B. 2015. Does fair value accounting exacerbate the procyclicality of bank lending? Journal of accounting research 54: 235-274.

Data Appendix

Integrating HMDA data with other data sources requires manipulating its primary keys. The primary keys in HMDA and CRA datasets is the combination of an institution's Respondent ID, Agency Code (which regulator supervises the institution) and reporting year. While all CRA data include the institution's RSSD IDs, as well, HMDA data only does so after 2003. To populate HMDA RSSD IDs before 2003, I use four methods. When a Respondent ID–Agency Code–Year combination appears in both CRA and HMDA datasets, I use the RSSD ID from the CRA file. For remaining HMDA observations with missing RSSD IDs, I backfill pre-2004 RSSD IDs from their 2004 values as in However, because some respondents exit the HMDA sample before 2003 and many respondents do not report CRA data, many observations still lack RSSD IDs. For these, I employ exact matches on the institution's name between the HMDA file and the National Information Center's (NIC's) Active and Inactive Institutions files which contain RSSD IDs. Finally, for observations that still lack RSSD IDs, I match using a frequent pattern between Respondent IDs and RSSD IDs. RSSD ID is the Federal Reserve's institutional identifier and applies to all banks and affiliates. However, each institution's primary federal regulator also assigns it an identifier unique to that regulator. For example, FDIC-supervised institutions have Certificate Numbers. As a rule, for depository institution, HMDA Respondent IDs are also the institution's primary federal regulator's ID. Thus, I populate remaining unmatched RSSDs by treating Respondent IDs as each institution's supervisory identifier and matching these to the NIC Active and Inactive Institutions files. To ensure accurate matches using the latter two methods, I also require matching state FIPS codes between HMDA and NIC files.I match bank-year observations across data sources using the Federal Reserve's RSSD identifier. MSA-year (county-year) observations are matched using the CBSA (state and county FIPS) code.

These data allow for two substantial contributions to the literature. First, combining HMDA data with SOD lets me investigate bank product and supply markets over the same sample and time horizon. To my knowledge, this is the first study to simultaneously assess the impact in both markets. Measuring these

effects together is crucial given conflicting evidence from bank M&A literature. For example, DeYoung, Evanoff and Molyneux (2009) write "*While these mixed findings could reflect different methodologies used in previous studies, we believe it is more likely that the high incidence of contradictory findings results from the time period being studied.*" Sampling different countries may also add discord. By studying depositor and borrower welfare over the same sample period in the same country, I am able to offer a clearer perspective. Second, my paper contributes to the nascent literature exploring the RateWatch data. I could only find 7 published papers to use this data. Only one paper, Liebersohn (2017), uses this data to investigate bank mergers.

Table 1: Summary statistics

This table presents summary statistics for key variables. Panel A summarize bank-years in my sample while Panel B summarizes market-years. Means and medians are presented for the full sample and subsamples of target and acquirer observations. In Panel A, ***Total deposits***, ***home mortgage loans***, ***SBF loans***, ***total equity*** and ***nonperforming assets*** are scaled by ***total assets***. ***DHA*** represents the residual from within-year, quadratic regressions of logged market deposits on logged loan volumes. This regression is estimated twice: once using residential real estate (mortgage) loans and once using small business and farm (SBF) loans. ***DHB*** represents the residual from within-year, quadratic regressions of logged bank deposits on logged loan volumes. This regression is estimated twice: once using residential real estate (mortgage) loans and once using small business and farm (SBF) loans. The ***inefficiency ratio*** is the ratio of interest plus noninterest income to noninterest expense. ***In-market merger*** equals one if the bank acquired an in-market rival that year and zero otherwise. ***Concentration*** is the sum of an area's squared deposit-market shares. ***CD rate*** is the median offered rate on a 1-year, $10,000 minimum certificate of deposit; ***interest checking rate*** is the median offered rate on a $0 minimum interest checking account; ***Home mortgage rate*** is the median offered rate on a 15-year, $175,000 maximum fixed rate mortgage; ***Car loan rate*** is the median offered rate on a 5 year new car loan. Medians are taken within bank (market) in Panel A (B).

Panel A: bank-years

	Full Sample		Target		Acquirer	
	Mean	Median	Mean	Median	Mean	Median
Bank-years	147,161		3,400		4,258	
Total assets	1,241,841	141,487	1,847,011	158,395	8,581,684	496,869
Total deposits	0.824	0.848	0.819	0.851	0.774	0.808
Home mortgage loans	0.198	0.172	0.193	0.165	0.201	0.181
DHB (home mortgage)	0.005	-0.009	0.011	0.000	0.005	0.007
SBF loans	0.161	0.149	0.165	0.155	0.158	0.148
DHB (SBF)	-0.006	-0.072	-0.004	-0.055	0.235	0.139
Total equity	0.115	0.100	0.111	0.096	0.111	0.095
Nonperforming assets	0.013	0.006	0.012	0.006	0.008	0.005
Inefficiency ratio	0.737	0.671	0.751	0.693	0.629	0.605
In-market merger	0.026	0.000	0.568	1.000	0.459	0.000
CD rate (%)	2.084	1.600	2.360	1.850	2.467	2.230
Interest checking rate (%)	0.474	0.250	0.475	0.175	0.459	0.200
Home mortgage rate (%)	5.088	5.375	5.019	5.375	5.242	5.604
Car loan rate (%)	6.191	6.490	5.897	6.240	6.195	6.500

Panel B: market-years

	Full Sample		Target		Acquirer	
	Mean	Median	Mean	Median	Mean	Median
Market-years	44,410		6,959		20,433	
Population	129,456	21,347	519,131	67,202	248,053	40,966
Median income	35,544	33,984	37,218	35,471	36,145	34,636
Unemployment rate	6.310	5.700	5.921	5.400	6.095	5.600
Total deposits	3,344,650	358,782	14,933,006	1,015,939	6,584,745	677,370
Home mortgage loans	1,099,019	48,982	5,209,565	278,531	2,248,168	143,335
DHA (home mortgage)	0.000	0.053	0.118	0.131	0.042	0.075
SBF loans	129,164	15,666	540,176	66,521	255,188	38,490
DHA (SBF)	0.001	0.076	0.091	0.133	0.025	0.088
Concentration (deposit)	3326	2673	2162	1777	2456	2063
In-market merger	0.090	0.068	0.066	0.054	0.090	0.072
CD rate (%)	2.005	1.500	2.547	2.180	2.324	2.075
Interest checking rate (%)	0.395	0.150	0.470	0.200	0.403	0.150
Home mortgage rate (%)	4.765	4.625	5.215	5.500	5.050	5.438
Car loan rate (%)	5.466	5.625	5.740	6.000	5.637	5.990

Table 2: M&A participation likelihood

This table summarizes bank-year regressions of M&A participation likelihood on deposit-loan imbalance measures and bank controls. The dependent variables equals one when a firm-year is a target (Columns 1 and 3) or acquirer (Columns 2 and 4) and zero otherwise. The first (last) two columns estimate linear probability (logistic) regressions. ***DHB*** represents the residual from within-year, quadratic regressions of logged bank deposits on logged loan volumes. This regression is estimated twice: once using residential real estate (mortgage) loans and once using small business and farm (SBF) loans. Similar regressions are estimated at the market-level, also within year, and the weighted average residuals of areas in which a bank operates measure area deposit-heaviness. The fraction of a bank's total deposits obtained from a given market serve as weights. A bank is considered to operate in a market if it has at least one branch in that market. Standard errors are clustered at the bank-level. Controls include logged total assets (***Bank size***), the ratio of nonperforming assets to total assets (***Nonperforming assets***), and the ratio of equity capital to total assets (***Capitalization***). *, **, and *** denote statistical significance at the 10, 5 and 1 percent levels.

	Linear probability model		**Logistic regression**	
	Target	**Acquirer**	**Target**	**Acquirer**
	(1)	(2)	(1)	(2)
DHB (mortgage)	*0.017***	*-0.018****	*0.186***	*-0.226***
	(0.000)	*(0.001)*	*(0.034)*	*(0.021)*
DHB (SBF)	*-0.003****	*0.004***	*-0.189****	*-0.232****
	(0.004)	*(0.040)*	*(0.000)*	*(0.000)*
Weighted average DHA (mortgage)	-0.008***	0.004	-0.184***	-0.214***
	(0.003)	(0.251)	(0.000)	(0.000)
Weighted average DHA (SBF)	-0.005***	-0.003	-0.068	-0.202***
	(0.001)	(0.160)	(0.129)	(0.000)
Bank size	-0.005**	-0.006**	0.122***	0.709***
	(0.013)	(0.039)	(0.000)	(0.000)
Nonperforming assets	-0.106***	-0.039**	-2.913***	0.976**
	(0.000)	(0.019)	(0.000)	(0.025)
Capitalization	0.048**	-0.127***	2.298***	-18.481***
	(0.033)	(0.000)	(0.008)	(0.000)
Bank-years	113,880	113,880	113,880	113,880
Number of Banks	10,839	10,839	10,839	10,839
Bank-fixed effects	Yes	Yes	No	No
Year-fixed effects	Yes	Yes	Yes	Yes
R2/Pseudo R2	0.015	0.003	0.0273	0.1190

Table 3: Deposit-gathering and lending at the bank-market-year level

This table summarizes bank-market-year level regressions of deposit and loan outcomes. The dependent variables in Panel A are deposit and loan volumes. In Columns 1-3, the dependent variable is the log of a bank's total deposits (in dollars) in a given market in a given year. In Columns 4-6 (Columns 7-9) the dependent variable is a bank's logged home mortgage (SBF) loan originations in a given market in a given year. Columns 1, 4, and 7 are estimated using bank-year fixed effects. Columns 2, 5, and 8 are estimated using market-year fixed effects. Columns 3, 6, and 9 are estimated using bank-market fixed effects and year fixed effects. The dependent variables in Panel B are deposit and loan rates. In Columns 1-3 (Columns 4-6), the dependent variable is a bank's 1-year, $10,000 minimum CD rate ($0 minimum interest checking account rate) in a given market in a given year. In Columns 7-9 (Columns 10-12), the dependent variable is a bank's 15-year, $175,000 maximum fixed mortgage rate (5 year auto loan rate) in a given market in a given year. Columns 1, 4, 7, and 10 are estimated using bank-year fixed effects. Columns 2, 5, 8, and 11 are estimated using market-year fixed effects. Columns 3, 6, 9, and 12 are estimated using bank-market fixed effects and year fixed effects. Independent variables include ***M&A***, which equals one if that bank acquired another bank operating in that market over the past three years and zero otherwise, and ***in-market merger***, which equals one if the acquirer already operated in that market at the time of the acquisition. A bank is considered to operate in a market if it has at least one branch in that market. ***DHA*** represents the residual from within-year, quadratic regressions of logged market deposits on logged loan volumes. This regression is estimated twice: once using residential real estate (mortgage) loans and once using small business and farm (SBF) loans. ***DHB*** represents the residual from within-year, quadratic regressions of logged bank deposits on logged loan volumes. This regression is estimated twice: once using residential real estate (mortgage) loans and once using small business and farm (SBF) loans. All columns, save Columns 7-9 of Panel A, use residuals from the mortgage regressions. ***DHA*** and ***DHB*** are interacted with ***M&A***. For deposit, mortgage, and SBF loan volumes, ***market significance*** is separately measured as the fraction of a bank's total volumes in a given year that come from a given market. ***Market share*** is measured as the fraction of the market's total volumes in a given year supplied by a given bank. ***Concentration*** is measured as sum of squared market shares in a given market. ***Population***, ***income***, and ***unemployment*** respectively denote the logged population, logged median income, and unemployment rate in a given market in a given year. ***Bank size***, ***nonperforming assets***, and ***capitalization*** respectively denote a bank's logged total assets, ratio of nonperforming assets to total assets, and ratio of equity capital to total assets in a given year. In Columns 1, 4, 7, and 10 standard errors are clustered at the bank-year level. In Columns 2, 5, 8, and 11 (Columns 3, 6, 9, and 12) they are clustered by market-year (bank-market). *, **, and *** denote statistical significance at the 10, 5 and 1 percent levels.

Panel A: Deposit and loan volumes

Dependent Variable	Deposits			Mortgages			SBF Loans		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
M&A	-0.151***	0.108***	0.010***	-0.232***	0.220***	0.023	-0.185***	0.058	0.017
	(0.000)	(0.000)	(0.010)	(0.000)	(0.000)	(0.156)	(0.000)	(0.220)	(0.172)
In-market merger	0.910***	0.700***	0.203***	0.802***	0.173***	0.013	0.879***	-0.042	-0.022
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.753)	(0.000)	(0.334)	(0.514)
DHA	0.653***		0.061***	-0.213***		-0.167***	-0.238***		-0.232***
	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)
(M&A) x DHA)	-0.222***		-0.037***	0.037*		0.007	0.063***		-0.028
	(0.000)		(0.000)	(0.098)		(0.825)	(0.004)		(0.271)
DHB		0.323***	0.043***		-0.472***	-0.076		-0.635***	0.057***
		(0.000)	(0.000)		(0.000)	(0.176)		(0.000)	(0.000)
(M&A) x (DHB)		-0.221***	-0.023		-0.529***	-0.163***		-0.178***	0.048***
		(0.000)	(0.116)		(0.000)	(0.003)		(0.000)	(0.001)
Market significance		2.806***	1.926***		7.280***	7.858***		11.445***	11.243***
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)
Market share	6.540***		3.192***	10.228***		20.365***	4.865***		11.248***
	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)
Concentration	-0.281***		-0.058***	-0.496***		-0.444***	-0.068***		-0.159***
	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)
Population	0.455***		1.410***	0.675***		0.617***	0.538***		0.063
	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)		(0.614)
Income	0.588***		0.149***	0.664***		-0.054	0.468***		-0.161**
	(0.000)		(0.000)	(0.000)		(0.573)	(0.000)		(0.031)
Unemployment	0.000		-0.006***	-0.033***		-0.036***	-0.021***		-0.007**
	(0.905)		(0.000)	(0.000)		(0.000)	(0.000)		(0.048)
Bank size		0.588***	0.487***		1.293***	0.691***		1.553***	0.406***
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)
Nonperforming assets		1.760***	1.641***		-2.003***	-4.046***		0.060	0.378**
		(0.000)	(0.000)		(0.000)	(0.000)		(0.798)	(0.031)
Capitalization		-3.999***	-2.255***		-1.078***	1.151***		4.416***	1.614***
Observations	363,471	289,146	281,594	350,170	289,146	268,791	338,148	289,146	257,377
R2	0.460	0.501	0.478	0.370	0.523	0.562	0.330	0.690	0.648
Fixed Effects	BY	MY	BM, Y	BY	MY	BM, Y	BY	MY	BM, Y
Number of Groups	144,688	41,542	31,995	138,537	41,542	31,371	135,066	41,542	30,790

Panel B: Deposit and loan rates

Dependent Variable	CD Rate			Interest Checking Rate			Mortgage Rate			Auto Loan Rate		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
M&A	0.001	0.026***	-0.007*	0.010**	0.023**	0.001	-0.001	-0.037*	0.008	0.018	-0.020	0.012
	(0.694)	(0.000)	(0.060)	(0.022)	(0.034)	(0.776)	(0.812)	(0.086)	(0.389)	(0.361)	(0.554)	(0.414)
In-market merger	0.009	-0.030***	-0.027***	-0.010	-0.061***	-0.037***	-0.026***	0.049***	0.024	-0.004	0.053**	0.036
	(0.149)	(0.000)	(0.004)	(0.141)	(0.000)	(0.001)	(0.002)	(0.001)	(0.167)	(0.826)	(0.037)	(0.234)
DHA	0.002		-0.000	0.001		0.032***	-0.001		0.036	0.010		-0.177***
	(0.421)		(0.985)	(0.658)		(0.008)	(0.845)		(0.239)	(0.246)		(0.000)
(M&A) x DHA)	-0.002		0.018**	0.008*		0.011	0.011*		0.029	-0.033**		0.057*
	(0.464)		(0.020)	(0.052)		(0.242)	(0.051)		(0.107)	(0.026)		(0.051)
DHB		0.019***	-0.102***		-0.045***	-0.078***		-0.067***	0.040		0.234***	-0.515***
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.246)		(0.000)	(0.000)
(M&A) x (DHB)		-0.018**	0.012		-0.003	0.010		-0.005	-0.060**		-0.101**	0.128***
		(0.013)	(0.336)		(0.691)	(0.519)		(0.778)	(0.012)		(0.014)	(0.004)
Market significance		0.027***	0.025		0.046***	0.115***		-0.054***	-0.054*		-0.003	0.066
		(0.000)	(0.262)		(0.000)	(0.001)		(0.000)	(0.077)		(0.864)	(0.105)
Market share	-0.004		0.079*	-0.020***		-0.084	0.043**		-0.132	-0.074		-0.484***
	(0.284)		(0.082)	(0.000)		(0.183)	(0.036)		(0.166)	(0.114)		(0.000)
Concentration	-0.001**		-0.004	-0.001*		-0.003	-0.001		-0.022*	-0.005		0.015
	(0.012)		(0.254)	(0.080)		(0.482)	(0.718)		(0.062)	(0.202)		(0.264)
Population	-0.002*		-0.120***	-0.003***		0.040	-0.003**		0.741***	-0.006**		-0.249
	(0.064)		(0.000)	(0.000)		(0.427)	(0.028)		(0.000)	(0.026)		(0.227)
Income	0.009**		0.060***	0.006		-0.032	-0.001		0.270***	0.004		0.182*
	(0.032)		(0.005)	(0.350)		(0.287)	(0.925)		(0.001)	(0.725)		(0.084)
Unemployment	0.000		-0.004***	0.001		0.004**	0.000		0.008**	0.001		0.040***
	(0.861)		(0.001)	(0.505)		(0.012)	(0.658)		(0.021)	(0.637)		(0.000)
Bank size		-0.040***	0.026***		-0.027***	0.024***		-0.042***	-0.008		-0.137***	0.017
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.298)		(0.000)	(0.227)
Nonperforming assets		0.086**	-0.758***		0.223***	-0.271***		-1.044***	-1.223***		0.737***	2.185***
		(0.025)	(0.000)		(0.000)	(0.001)		(0.000)	(0.000)		(0.001)	(0.000)
Capitalization		0.076**	0.449***		0.304***	0.532***		-0.403***	-0.253*		0.592***	0.063
		(0.012)	(0.000)		(0.000)	(0.000)		(0.000)	(0.051)		(0.000)	(0.795)
Observations	193,833	158,482	154,383	182,718	148,915	145,027	98,316	68,519	65,446	117,696	92,814	88,968
R2	0.000	0.067	0.959	0.001	0.036	0.808	0.001	0.013	0.814	0.001	0.055	0.623
Fixed Effects	BY	MY	BM	BY	MY	BM	BY	MY	BM	BY	MY	BM
Number of Groups	78,616	34,630	20,955	73,528	34,097	20,200	24,211	20,817	14,573	37,874	22,988	17,835

Table 4: changes in deposit-gathering and lending at the bank-market level

This table summarizes bank-market level regressions of deposit and loan outcomes. The dependent variables in Panel A are 3-year changes in deposit and loan volumes measured as the logged ratio of the consolidated bank's volume in a given market in year t+3 to the pro-forma bank's level in year t, the last year-end before the merger. The pro-forma bank is defined as the sum of target and acquirer bank volumes in the given market as of year t. In Columns 1, 2, and 3, the dependent variables are changes in deposit volumes, mortgage volumes, and SBF volumes, respectively. The dependent variables in Panel B are deposit and loan rate changes measured as the difference between the consolidated bank's rate in a given market in year t+3 and the target bank's rate in year t. In Panel B, Columns 1 (2, 3, and 4), the dependent variable is the change in 1-year, $10,000 minimum CD rate ($0 minimum interest checking account rate; 15-year, $175,000 maximum fixed mortgage rate; 5 year auto loan rate) in a given market. All specifications include merger fixed effects. Independent variables include ***in-market merger*** , which equals one if the acquirer already operated in that market at the time of the acquisition. A bank is considered to operate in a market if it has at least one branch in that market. ***DHA*** represents the residual from within-year, quadratic regressions of logged market deposits on logged loan volumes. This regression is estimated twice: once using residential real estate (mortgage) loans and once using small business and farm (SBF) loans. All columns, save Column 3 of Panel A, use residuals from the mortgage regressions. For deposit, mortgage, and SBF loan volumes, ***market significance*** is separately measured as the fraction of a bank's total volumes in a given year that come from a given market. ***Market share*** is measured as the fraction of the market's total volumes in a given year supplied by a given bank. ***Concentration*** is measured as sum of squared market shares in a given market. ***Population*** , ***income,*** and ***unemployment*** respectively denote the logged population, logged median income, and unemployment rate in a given market in a given year. In Columns 1, 4, 7, and 10 standard errors are clustered at the bank-year level. In Columns 2, 5, 8, and 11 (Columns 3, 6, 9, and 12) they are clustered by market-year (bank-market). *, **, and *** denote statistical significance at the 10, 5 and 1 percent levels.

Panel A: Deposit and loan volume changes

Dependent Variable	Deposit (1)	Mortgage (2)	SBF (3)
In-market merger	-0.032*	-0.272***	-0.142**
	(0.087)	(0.001)	(0.017)
DHA	-0.106***	-0.067	0.191***
	(0.000)	(0.123)	(0.000)
Concentration	0.354***	1.067**	0.479*
	(0.000)	(0.038)	(0.099)
Acquirer market significance	0.052**	-0.143	0.004
	(0.012)	(0.178)	(0.966)
Target market significance	-0.154***	-0.362***	-0.261***
	(0.000)	(0.006)	(0.000)
Acquirer market share	-0.319***	-5.069***	-1.734***
	(0.005)	(0.000)	(0.000)
Target market share	-0.569***	-3.638***	-1.677***
	(0.000)	(0.000)	(0.000)
Population	0.056***	0.067***	0.030**
	(0.000)	(0.000)	(0.020)
Income	0.049	0.143	0.066
	(0.160)	(0.373)	(0.478)
Unemployment	-0.000	-0.005	0.017**
	(0.921)	(0.604)	(0.025)
Observations	6,994	4,942	4,211
R2	0.138	0.135	0.118
Number of Mergers	2,492	1,647	1,086

Panel B: Deposit and loan rate changes

Dependent Variable	CD	Checking	Mortgage	Auto
	(1)	(2)	(3)	(4)
In-market merger	-0.039	0.055	-0.169**	0.126
	(0.487)	(0.411)	(0.019)	(0.150)
DHA	-0.062**	-0.077**	-0.026	-0.153
	(0.031)	(0.029)	(0.705)	(0.268)
Concentration	-0.101	-0.145	-0.914*	-0.343
	(0.486)	(0.247)	(0.070)	(0.818)
Acquirer market significance	-0.295	-0.316**	-0.433***	0.033
	(0.175)	(0.014)	(0.001)	(0.653)
Target market significance	0.310**	0.065	0.526***	0.165**
	(0.020)	(0.484)	(0.001)	(0.014)
Acquirer market share	-0.208	-0.894*	2.681***	-4.278**
	(0.669)	(0.081)	(0.001)	(0.022)
Target market share	-0.175**	0.035	0.268	-0.754
	(0.045)	(0.766)	(0.432)	(0.386)
Population	-0.024**	-0.005	-0.003	0.026
	(0.037)	(0.477)	(0.758)	(0.297)
Income	-0.000	0.137	-0.060	-0.191
	(0.996)	(0.258)	(0.504)	(0.272)
Unemployment	-0.004	0.003	-0.003	0.047
	(0.436)	(0.548)	(0.790)	(0.198)
Observations	1,273	1,231	1,641	1,333
R2	0.070	0.053	0.085	0.039
Number of Mergers	460	439	345	402

Table 5: Deposit-gathering and lending at the bank-market-year level for rivals

This table summarizes bank-market-year level regressions of deposit and loan outcomes. The dependent variables in Panel A are deposit and loan volumes. In Columns 1 and 2, the dependent variable is the log of a bank's total deposits (in dollars) in a given market in a given year. In Columns 3 and 4 (Columns 5 and 6) the dependent variable is a bank's logged home mortgage (SBF) loan originations in a given market in a given year. Columns 1, 3, and 5 are estimated using bank-year fixed effects. Columns 2, 4, and 6 are estimated using bank-market and year fixed effects. The dependent variables in Panel B are deposit and loan rates. In Columns 1 and 2 (Columns 3 and 4), the dependent variable is a bank's 1-year, $10,000 minimum CD rate ($0 minimum interest checking account rate) in a given market in a given year. In Columns 5 and 6 (Columns 7 and 8), the dependent variable is a bank's 15-year, $175,000 maximum fixed mortgage rate (5 year auto loan rate) in a given market in a given year. Columns 1, 3, 5, and 7 are estimated using bank-year fixed effects. Columns 2, 4, 6, and 8 are estimated using bank-market fixed effects and year fixed effects. Independent variables include ***Rival***, which equals one if a merger that did not involve the given bank occurred in that market over the past three years and zero otherwise, and ***in-market competitor*** which equals one if the acquirer already operated in that market at the time of the acquisition. A bank is considered to operate in a market if it has at least one branch in that market. ***DHA*** represents the residual from within-year, quadratic regressions of logged market deposits on logged loan volumes. This regression is estimated twice: once using residential real estate (mortgage) loans and once using small business and farm (SBF) loans. ***DHB*** represents the residual from within-year, quadratic regressions of logged bank deposits on logged loan volumes. This regression is estimated twice: once using residential real estate (mortgage) loans and once using small business and farm (SBF) loans. All columns, save Columns 5 and 6 of Panel A, use residuals from the mortgage regressions. ***DHA*** and ***DHB*** are interacted with ***Rival.*** For deposit, mortgage, and SBF loan volumes, ***market significance*** is separately measured as the fraction of a bank's total volumes in a given year that come from a given market. ***Market share*** is measured as the fraction of the market's total volumes in a given year supplied by a given bank. ***Concentration*** is measured as sum of squared market shares in a given market. ***Population, income,*** and ***unemployment*** respectively denote the logged population, logged median income, and unemployment rate in a given market in a given year. ***Bank size***, ***nonperforming assets***, and ***capitalization*** respectively denote a bank's logged total assets, ratio of nonperforming assets to total assets, and ratio of equity capital to total assets in a given year. In Columns 1, 3, 5, and 7 standard errors are clustered at the bank-year level. In Columns 2, 4, 6, and 8 they are clustered by bank-market. *, **, and *** denote statistical significance at the 10, 5 and 1 percent levels.

Panel A: Deposit and loan volumes

Dependent Variable	Deposits		Mortgages		SBF Loans	
	(1)	(2)	(3)	(4)	(5)	(6)
Rival	-0.003	-0.001	0.110***	-0.045***	0.097***	-0.014
	(0.661)	(0.694)	(0.000)	(0.000)	(0.000)	(0.136)
In-market competitor	-0.099***	0.002	-0.070***	-0.011	-0.011	0.007
	(0.000)	(0.603)	(0.000)	(0.491)	(0.389)	(0.572)
DHA	0.609***	0.050***	-0.178***	-0.151***	-0.203***	-0.245***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
(Rival) x (DHA)	-0.091***	-0.008	-0.118***	-0.068***	-0.079***	-0.002
	(0.000)	(0.112)	(0.000)	(0.004)	(0.000)	(0.921)
DHB		0.033**		-0.144**		0.074***
		(0.011)		(0.011)		(0.000)
(Rival) x (DHB)		0.000		0.006		-0.004
		(0.996)		(0.879)		(0.741)
Market significance		1.938***		7.858***		11.243***
		(0.000)		(0.000)		(0.000)
Market share	6.606***	3.229***	10.315***	20.362***	4.908***	11.248***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Concentration	-0.291***	-0.058***	-0.492***	-0.444***	-0.066***	-0.160***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Population	0.453***	1.402***	0.667***	0.632***	0.528***	0.087
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.487)
Income	0.593***	0.149***	0.655***	-0.057	0.465***	-0.160**
	(0.000)	(0.000)	(0.000)	(0.554)	(0.000)	(0.031)
Unemployment	-0.000	-0.007***	-0.032***	-0.035***	-0.021***	-0.007*
	(0.882)	(0.000)	(0.000)	(0.000)	(0.000)	(0.053)
Bank size		0.493***		0.692***		0.407***
		(0.000)		(0.000)		(0.000)
Nonperforming assets		1.658***		-4.026***		0.403**
		(0.000)		(0.000)		(0.021)
Capitalization		-2.226***		1.144***		1.615***
Observations	363,471	281,594	350,170	268,791	338,148	257,377
R2	0.450	0.475	0.366	0.563	0.324	0.648
Fixed Effects	BY	BM, Y	BY	BM, Y	BY	BM, Y
Number of Groups	144,688	31,995	138,537	31,371	135,066	30,790

Panel B: Deposit and loan rates

Dependent Variable	CD Rate		Interest Checking Rate		Mortgage Rate		Auto Loan Rate	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Rival	-0.006***	-0.004	0.000	0.004	0.004	0.022***	-0.001	0.005
	(0.001)	(0.256)	(0.972)	(0.119)	(0.290)	(0.007)	(0.859)	(0.646)
In-market competitor	-0.002	-0.012***	-0.003***	-0.001	-0.002	0.036***	-0.013**	0.036**
	(0.332)	(0.003)	(0.008)	(0.815)	(0.545)	(0.000)	(0.049)	(0.015)
Market FI	0.000	0.012	0.006***	-0.004	0.002	0.035	0.002	-0.153***
	(0.989)	(0.189)	(0.000)	(0.694)	(0.568)	(0.220)	(0.797)	(0.000)
(Rival) x (Market FI)	0.004	-0.035***	0.002	0.005	-0.000	0.053***	-0.001	0.000
	(0.129)	(0.000)	(0.308)	(0.357)	(0.971)	(0.000)	(0.871)	(0.983)
Bank FI		-0.098***		-0.013		0.016		-0.470***
		(0.000)		(0.337)		(0.609)		(0.000)
(Rival) x (Bank FI)		0.001		-0.005		0.009		0.011
		(0.913)		(0.520)		(0.668)		(0.742)
Market significance		0.025		0.142***		-0.053*		0.068*
		(0.272)		(0.000)		(0.081)		(0.095)
Market share	-0.004	0.073	-0.019***	0.006	0.042**	-0.126	-0.068	-0.486***
	(0.270)	(0.109)	(0.000)	(0.901)	(0.040)	(0.183)	(0.140)	(0.000)
Concentration	-0.002***	-0.003	0.001***	0.005	-0.001	-0.022*	-0.004	0.015
	(0.002)	(0.339)	(0.004)	(0.171)	(0.672)	(0.059)	(0.281)	(0.260)
Population	-0.001*	-0.114***	-0.002***	0.454***	-0.003**	0.733***	-0.003	-0.240
	(0.081)	(0.001)	(0.000)	(0.000)	(0.020)	(0.000)	(0.154)	(0.244)
Income	0.009**	0.059***	-0.004**	-0.031	-0.000	0.276***	0.009	0.177*
	(0.024)	(0.005)	(0.036)	(0.179)	(0.965)	(0.001)	(0.479)	(0.093)
Unemployment	0.000	-0.004***	0.000	-0.002*	0.000	0.008**	0.001	0.039***
	(0.898)	(0.001)	(0.694)	(0.071)	(0.624)	(0.033)	(0.656)	(0.000)
Bank size		0.025***		0.045***		-0.008		0.017
		(0.000)		(0.000)		(0.301)		(0.211)
Nonperforming assets		-0.751***		0.035		-1.231***		2.196***
		(0.000)		(0.645)		(0.000)		(0.000)
Capitalization		0.442***		0.527***		-0.244*		0.072
		(0.000)		(0.000)		(0.060)		(0.764)
Observations	193,833	154,383	190,029	151,051	98,316	65,446	117,696	88,968
R2	0.001	0.960	0.002	0.774	0.001	0.815	0.000	0.623
Fixed Effects	BY	BM	BY	BM	BY	BM	BY	BM
Number of Groups	78,616	20,955	77,136	20,684	24,211	14,573	37,874	17,835

Table 6: Deposit-gathering and lending at the market-year level

This table summarizes market-year level regressions of deposit and loan outcomes. The dependent variables in Panel A are deposit and loan volumes. In Columns 1, the dependent variable is the log of a market's total deposits (in dollars) in a given year. In Column 2 (Column 3) the dependent variable is a bank's logged home mortgage (SBF) loan originations in a given market in a given year. The dependent variables in Panel B are deposit and loan rates. In Column 1 (Column 2), the dependent variable is a market's median 1-year, $10,000 minimum CD rate ($0 minimum interest checking account rate) in a given year. In Column 3 (Columns 4), the dependent variable is a market's median 15-year, $175,000 maximum fixed mortgage rate (5 year auto loan rate) in a given year. Each specification includes market and year fixed effects. Independent variables include ***M&A*** , which equals one if any bank acquired a bank operating in that market over the past three years and zero otherwise, and ***in-market merger*** , which equals one if the acquirer already operated in that market at the time of the acquisition. A bank is considered to operate in a market if it has at least one branch in that market. ***DHA*** represents the residual from within-year, quadratic regressions of logged market deposits on logged loan volumes. This regression is estimated twice: once using residential real estate (mortgage) loans and once using small business and farm (SBF) loans. ***DHB*** represents the residual from within-year, quadratic regressions of logged bank deposits on logged loan volumes. This regression is estimated twice: once using residential real estate (mortgage) loans and once using small business and farm (SBF) loans. ***DHB*** is included for both the target and acquirer. All columns, save Column 3 of Panel A, use residuals from the mortgage regressions. ***DHA*** is interacted with M&A. For deposit, mortgage, and SBF loan volumes, individually, ***concentration*** is measured as sum of squared market shares in a given market. ***Population, income,*** and ***unemployment*** respectively denote the logged population, logged median income, and unemployment rate in a given market in a given year. Standard errors are clustered at the market level. *, **, and *** denote statistical significance at the 10, 5 and 1 percent levels.

Panel A: Deposit and loan volume changes

Dependent Variable	Deposit (1)	Mortgage (2)	SBF (3)
M&A	0.006***	0.008**	-0.004
	(0.004)	(0.048)	(0.212)
In-market merger	-0.004	0.021***	0.028***
	(0.294)	(0.000)	(0.000)
DHA	0.432***	-0.938***	-1.104***
	(0.000)	(0.000)	(0.000)
(M&A) x (DHA)	-0.025***	0.002	0.048***
	(0.000)	(0.839)	(0.000)
Acquirer DHB	-0.001	0.026***	-0.007**
	(0.846)	(0.001)	(0.022)
Target DHB	0.017***	-0.019**	-0.005*
	(0.008)	(0.017)	(0.064)
Concentration	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)
Population	1.419***	1.327***	1.319***
	(0.000)	(0.000)	(0.000)
Income	0.532***	1.105***	0.669***
	(0.000)	(0.000)	(0.000)
Unemployment	-0.010***	-0.013***	-0.011***
	(0.000)	(0.000)	(0.000)
Observations	38,313	38,313	34,985
R2	0.507	0.720	0.845
Number of Markets	2,201	2,201	2,076

Panel B: Deposit and loan rates

Dependent Variable	CD	Checking	Mortgage	Auto
	(1)	(2)	(3)	(4)
M&A	-0.006	-0.008	0.005	0.040**
	(0.262)	(0.151)	(0.521)	(0.030)
In-market merger	0.012	-0.033***	0.026**	0.019
	(0.121)	(0.000)	(0.021)	(0.482)
Market FI	-0.005	0.030*	-0.023	-0.004
	(0.728)	(0.069)	(0.332)	(0.938)
(M&A) x (Market FI)	-0.035***	0.056***	0.012	-0.033
	(0.000)	(0.000)	(0.381)	(0.325)
Acquirer FI	0.026**	0.018	0.018	-0.273***
	(0.040)	(0.101)	(0.431)	(0.000)
Target FI	-0.033**	0.032***	0.002	-0.135***
	(0.011)	(0.001)	(0.918)	(0.000)
Concentration	-0.000	-0.000*	-0.000**	0.000
	(0.411)	(0.094)	(0.017)	(0.143)
Population	-0.197***	0.829***	0.344***	-1.128***
	(0.000)	(0.000)	(0.007)	(0.000)
Income	0.081**	-0.013	0.126	0.351***
	(0.022)	(0.729)	(0.112)	(0.007)
Unemployment	-0.007***	-0.002	-0.002	-0.011*
	(0.000)	(0.338)	(0.581)	(0.064)
Observations	33,725	32,774	24,757	23,631
R2	0.977	0.803	0.914	0.810
Number of Markets	2,166	2,164	1,985	2,090