Determinants of Community & Agricultural Bank Consolidations: A Rare Event Study

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Abstract

Community banks promote local economic growth, while the U.S. banking sector has experienced significant M&A activities for decades. This study examines different determinants of community bank acquisitions between 2010 and 2018. We examine comprehensive characteristics of acquiring bank, target bank, and also the relative differences between two parties, overcoming sample selection problem prevalent in previous studies by employing rare event logistic regression on all possible M&A scenarios based on the population of U.S. banks. The results suggest that while the individual bank characteristics matter, relative differences between the two banks matter in estimating the probability of bank M&A. Our results show that capability deployment work as a trigger for community bank acquisitions, and national banks are likely to acquire a community bank for asset and geographic diversification.

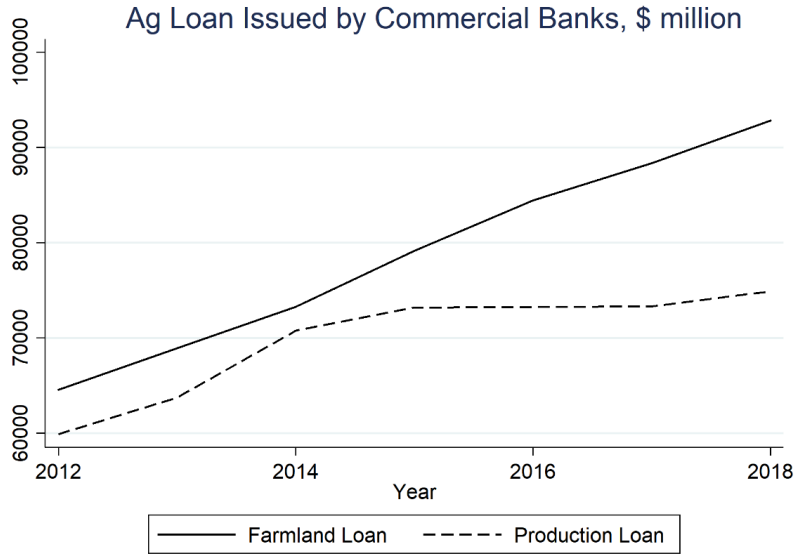
Keywords: mergers and acquisitions, agricultural bank, farm credit

JEL code: G21, G34, Q14

Introduction

U.S. farmers' reliance on debt as a source of capital for farm business has increased significantly between 2010 and 2018; the amount of agricultural real-estate and production loans reached $401.2 billion, resulting in a debt-to-asset ratio of 15.32%. Increasing reliance on debt capital highlights the importance of understanding the lender's competitive market change. Among different types of agricultural lending institutions that lend to the local community borrowers and farmers, community banks have been the major source of local credit. These institutions comprise more than 90% of total commercial banks in 2018, and despite small individual sizes, the amount of agricultural loans issued represents about 48% of the total agricultural loans outstanding. Recent trends in the amount of farm production loans and farmland real-estate loans issued from commercial banks are outlined in Figure 1.

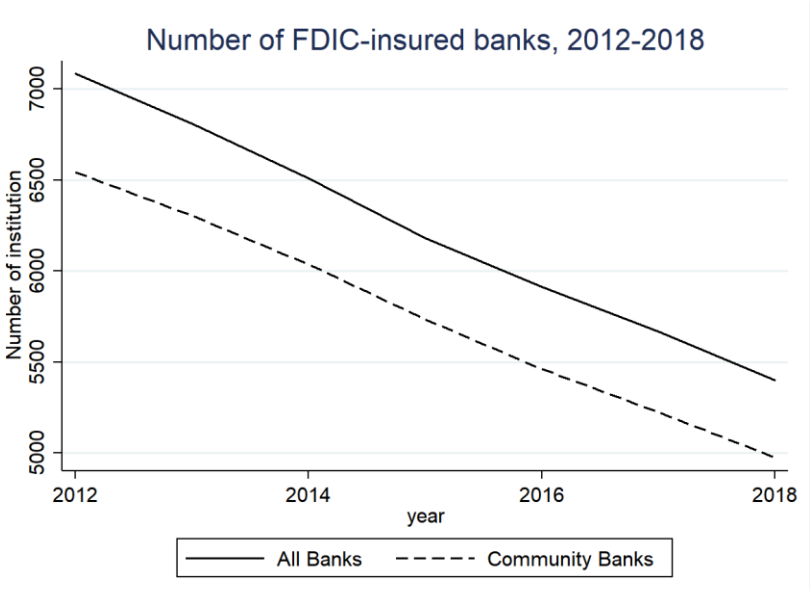
Figure 1: Trends in agricultural production loans and farmland real-estate loans, 2012-2018



Notes: The amount of agricultural loans issued from commercial banks is provided in nominal million dollars. The amount of farmland real-estate loans is shown through the solid line. The amount of agricultural production loans is shown through the dashed line. *Source: USDA ERS*

While the U.S. farmer's reliance on these commercial banks has remained strong, the commercial banking sector has experienced significant changes in recent years caused by both the regulatory changes and competitive market changes. First, a series of new regulations introduced in reaction to the Great Recession in recent years, such as the Dodd-Frank Act of 2011 and the Basel III capital regulation which became effective in 2014, had fundamental changes to the reporting rules and the governance of the commercial banks in the United States. Both from the academia and the industrial practitioners, it has been argued that such regulations could increase the cost of lending for lending institutions that were subject to these stringent new regulations, and some addressed the concerns that this could be another triggering event for another consolidation wave within the banking sector (Allen et al., 2012; Brester and Watts, 2018; Kim and Katchova, 2020).

Figure 2: Number of FDIC-insured banks, 2012-2018



Notes: Total number of all FDIC-insured banks is shown through the solid line. The total number of all FDIC-insured community banks is shown through the dashed line. A bank is categorized as a community bank following the FDIC definition, as provided in Appendix 1.

These commercial lending institutions have experienced significant competitive market changes over the decades. The number of commercial banks reported in the FDIC decreased from 7,083 to 5,551 between 2012 and 2018, a 21.6% decrease as shown in Figure 2. The number of community banks also decreased from 6,544 to 4,783, and the decline is caused by mergers and acquisitions (M&A) in the U.S. banking sector. The accelerated decline in the number of banking institutions due to M&As that target local community banks create two concerns. First, consolidation of the community bank and market concentration may not result in the benefit of local borrowers because of the enhanced bargaining power of the lender (Erel, 2011). Second, literature has highlighted the importance of non-national community banks in more effectively promoting local growth compared to large national banks (Scott, 2004; Chen et al., 2015; Hakenes et al., 2015).

Bank M&A is a strategic choice that an acquiring institution makes to maximize the firm value, and thus the selection process of M&A is a non-random but carefully calculated approach. Therefore, there are different drivers of this particular choice of M&A to expand a business which depends on the current market, acquirer and target business characteristics, and the relative strengths between the two institutions. Within the literature, careful analysis of the determinants of the community bank M&As has been limited (DeYoung et al., 2009). In this study, we examine the comprehensive set of determinants of community bank M&As in the post-Great Recession era. Our study deviates from most other studies that examine either (1) determinants of being acquired by other lending institutions or (2) determinants of acquiring other lending institutions. These past studies all tend to examine the isolated characteristics of one specific party within M&A activities, while the M&A process again involves analysis of two parties, including relative differences. We create all possible M&A scenarios from the population of national banks and community banks to

overcome the sample selection problem prevalent in previous studies. We then use rare event logistic regression to minimize possible bias in rare event studies.

Our results show that the several isolated characteristics of the acquirer and the target remain significant even when they are tested simultaneously, and the probability of community bank M&A decreases with different performance measures of the target community bank, while the potential acquiring bank would not engage in M&A especially when the bank has enough equity capital and funds availability. Our results further shed important insights on the significance of the differences in relative strengths between the acquiring bank and the target bank. First, the findings show that M&A is more likely to happen if the acquiring national bank has better profitability and cost efficiency, confirming the theory of capability deployment from the strategic management literature (Berchicci et al., 2012; Kaul and Wu, 2016). These findings provide important implications regarding the expected competitive market change in the banking sector; as large national banks have maintained higher profitability and cost efficiency utilizing their strengths stemming from the economies of scale, it is likely that we would observe further M&As triggered by these large national banks targeting small community banks in upcoming years as we predict that those large national banks will continue to maintain better performance. Second, the findings suggest that banks enter a less concentrated lending market through M&As, as M&As are more likely to occur when the target bank is located in a less concentrated market. Third, M&A is more likely to happen between two banks that have different specialties or asset concentrations. Despite the widely documented diversification discount in terms of products and geography, we still find evidence that diversification still has a strong effect on the M&A probability.

This study contributes to the literature in several ways. First, to our understanding, this is the first study in the field of agricultural economics to carefully examine the pre-M&A period

determinants of commercial banks M&As, as previous studies either (1) focus on the descriptive statics of the acquirer and the target in the pre-M&A period or (2) emphasize on the post-M&A performance of community bank acquisitions. Second, this is the first study to examine a comprehensive set of determinants that comprises characteristics of both the acquirer and the target as well as the relative strengths between them which have not been tested in the banking literature. Third, our study employs a recent new methodology to examine different determinants of bank acquisitions that have not been utilized in the literature, overcoming possible issues of deterministic sample selection and biased estimates from general rare event studies. The rest of the paper is organized as follows. First, we provide a literature review on the determinants of community bank M&As from various literature. We then discuss how our primary data is uniquely structured, followed by discussions on certain issues associated with the type of data that we use. Then, we introduce the empirical framework and the list of variables to be tested in the rare event logistic framework. Results on national banks-community bank pairs are shown in the next section, followed by results on community bank pairs. Lastly, we provide a discussion of our findings and conclusion.

Literature Review

M&A activities are also defined as the inorganic growth model, where acquiring other businesses is the means of growth. Thus, M&A is a non-random choice in which the event is initiated after a careful analysis of strengths, weaknesses, and relative differences between the acquirer and the target are conducted (DeYoung, 2009; Berchicci et al, 2012; Kaul and Wu, 2016). Existing studies on lending institution M&As focus mostly on publicly-traded banks, and isolated characteristics of one party (acquirer or target) are examined. The first set of studies examines the

probability of acquisition based on the target bank characteristics in the context of the U.S. and the European markets. These studies focus on either the probability of getting acquired or time-to-disappear from the set of banks that file bankruptcy or get acquired by another banking institution through M&As, and while the findings are mixed, these studies have highlighted that poorly managed banking institutions in terms of profitability, solvency, and efficiency are more likely to be acquired (Hernando, Nieto, Wall, and 2009, Wheelock and Wilson, 2000).

The second set of studies focuses on the probability of a banking institution voluntarily engaging in M&A activities, and this set of studies focuses on the probability of acquiring other banking institutions from the given set of acquiring bank's perspectives (Cyree, Wansley, and Boehm, 2000; Haleblian, Kim, and Rajagopalan, 2006; Cyree, 2010). Certain studies have also analyzed the determinants of M&As targeting non-bank financial institutions triggered by financial institutions, supporting that product diversification indeed results in M&As (Harjoto, Yi, and Chotigeat; 2012).

Yet, studies on community bank or rural bank M&As have been limited especially in recent years. Neff and Ellinger (1996) examine geographic characteristics in terms of urban and rural banks that engage in community bank acquisition and find that most M&As are triggered by urban banks and that rural banks with significant agricultural lending have not been the primary targets of M&As, especially in the interstate acquisitions. Featherstone (1996), in evaluating the performance of rural bank acquisitions, provides comparative differences between acquired rural banks and acquiring banks, in terms of size, profitability, and agricultural loan volume. While there have been other studies on examining community bank M&A, the main focus of those studies has been mostly on evaluating the effect of rural bank acquisitions rather than on rigorously testing for pre-M&A determinants of such consolidations (Featherstone, 1996; Cyree, 2010; Jagtiani, Kotliar,

and Maingi, 2016). Also, even though the importance of evaluating the relative differences between two merging banks has been recognized, most studies focus on only the target bank characteristics or the acquiring bank characteristics in predicting the probability of bank acquisitions.

It has been increasingly stressed that previous studies that focus on one-party characteristics fail to recognize the importance of relative differences or similarities between the acquirer and the target. Even the studies that examined both-side characteristics suffered from inherent sample selection problem because those studies rely on panel data which is only composed of banks that actually go through M&As. Such dataset is deterministic and creates concerns about the lack of counterfactuals. Recent development in the strategic management literature, however, tries to overcome such limitation (Capron and Mitchell, 2009; Kaul and Wu, 2016).

The difficulty of overcoming the sample selection problem has been solved by creating all possible counterfactuals or possible M&As that could have happened but never occurred. The methodological development in the strategic management literature has been caused by the theoretical development in recognizing the importance of the relative differences between an acquirer and a target, as the source of value creation can be different depending on the current status of the acquirer and the target (Capron and Mitchell, 2009; Kaul and Wu, 2016). In this study, we follow the new methodology to identify triggering characteristics of community bank M&As.

Data Construction and Methodology

To test for various bank characteristics and the probability of M&A occurring, we first collect bank panel data. Our primary sources of dataset include FDIC call reports for the month of

June and Federal Financial Institutions Examination Council (FFIEC) bank transformation data between 2012 and 2018. FFIEC database provides different sets of bank transformation activities, including M&As. From the FFIEC database, we only use M&A events in which no government support is provided, and the target bank ceases to exist after the transfer of assets. We use the FDIC definition of a community bank and a non-community bank to categorize a bank either as a potential acquirer or a potential target. We also use data from the Federal Reserve Bank and USDA ERS for obtaining macroeconomic variables as well as farm sector variables, including net farm income and government payments.

The FDIC defines the community banks as small banking institutions with a nominal asset value less than $1 billion and with limited geographic presence with less than 3 states and foreign loan exposure, among different criteria as outlined in Appendix 1. We define non-community banks as banks that do not fall under the required criteria for community banks following the FDIC definition and consider those banks to be national banks or multistate banks, terms that will be used interchangeably throughout the study. Our data includes 300 M&A activities that occurred among national bank acquirers and community bank targets, which are the primary set of national bank-community bank acquisition cases and the focus of this paper. 1,001 M&A events occurred among community banks, in which both the acquirer and the target are community banks. Table 1 provides the number of acquisitions between 2012 and 2018.

Table 1. Number of community bank M&As, 2012-2018

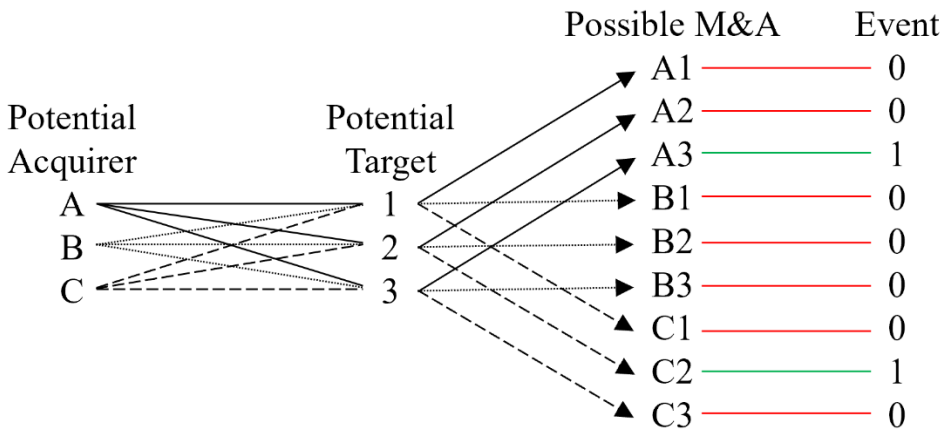
Year	Acquirer: National Bank	Acquirer: Community Bank
2012	39	106
2013	46	132
2014	55	161
2015	33	154

2016	47	130
2017	39	172
2018	41	146
Total	300	1,001

Pairwise Combination and Data Reconstruction

Because our study focuses on the comprehensive determinants of community bank acquisitions including the bank-specific characteristics as well as relative differences between the possible acquirer and the target, we reconstruct the FDIC data using the pairwise combinations. In doing so, we create all possible M&A scenarios from the population of commercial banks.

Figure 3. Creating pairwise M&A scenarios



This figure presents how the pairwise combination creates possible M&A scenarios for the dataset. Assume that there are three potential acquirers: A, B, and C. Assume that there are three potential targets that are not identical to the potential acquirers: 1, 2, and 3. Pairwise combinations then create all possible M&A scenarios, such as between A&1, A&2, A&3, B&1, and so on. Only the M&A scenarios that are realized are then flagged as an event, while the rest is flagged as a non-event.

Assume that there are three potential acquirers (A, B, and C) and three potential targets (A, B, and C) in year *t*, as shown in Figure 3. Assume that on year *t*, M&A between A&3 and C&2 actually occurred. Assuming that none of the individual banks are identical to each other, we create possible M&A scenarios using pairwise combinations from the given pool, and each scenario is

either categorized as an event (1) or non-event (0) based on the actual realization of the M&A activity. Out of 9 possible M&A scenarios, only two (A&3 and C&2) are flagged as events, while the other eight are flagged as non-events. This particular approach allows for accounting of the complete population of potential targets and acquirers, therefore eliminating sample selection bias or the deterministic sample data (Berchicci et al., 2012; Kaul and Wu, 2016) while examining a more comprehensive set of determinants of M&As that comprises both the isolated characteristics of acquirer and target and the relative differences between them.

We create two different pools of M&A scenarios between 2012 and 2018 in which the possible pools of potential acquiring banks and target banks differ. In the first set of tests, we utilize the population of national banks as potential acquirers and the population of community banks as potential targets. Pairwise combination results in 13,478,255 possible acquisition combinations with actual 300 acquisition events happening. Next, we consider the population of community banks both as potential acquirers and targets. While the main interest of the study is on the M&A determinants between national banks and community banks due to the possibility of greater local lending market disruption, as the majority of actual M&As occur between community banks, we test for these particular combinations to enhance our understanding of the nature of community bank acquisitions. Utilizing the same approach as discussed above, we create 227,333,208 possible M&A scenarios for community bank-community bank pairs, out of which 1,001 cases are flagged as actual events.

Rare Event Logistic Regression

Our main equation utilizes a logit regression to estimate the effect of different individual bank characteristics, relative differences between the pairs, and macroeconomic conditions on the

probability of an M&A event happening. Our reconstructed data is dominated by non-events or possible M&A scenarios that do not happen. This type of dataset can be considered as rare events data in which the number of events is dominated by non-events. With such sample observations, several researchers have noted that conventional Maximum Likelihood Estimates (MLE) in logistic regressions result in biased estimates. The estimates can be biased in rare events studies in which the number of non-events is extremely large while the number of events is very few (Firth, 1993; King and Zeng, 2001; Leitgob, 2013). Among various proposed methodologies, we use rare event logistic regression proposed by King and Zeng (2001). This can mitigate biases rising from the rare events as it reduces small-sample bias in maximum likelihood estimation and produces consistent estimates of parameters and also can be used for penal data (Firth, 1993; King and Zeng, 2001; Zhou, 2011; Kaul and Wu, 2016).

Model and Predictors

In this study, we examine the significance and magnitudes of different predictors on the probability of community bank M&As happening. The dependent variable is a binary variable that captures the acquisition decision for all possible acquiring bank and target bank combination scenarios. Again, our dependent variable takes a value of one if an acquisition occurs for possible M&A combinations. The logit model takes the following functional form:

$$ln\frac{P_{a,b,t}}{(1-P_{a,b,t})} = \beta_0 + \beta_1 X_{a,t-1} + \beta_2 Y_{b,t-1} + \beta_3 Z_{a,b,t-1} + K_{t-1} + \varepsilon_{a,b,t} \quad (1)$$

Concerning the equation, *a* denotes the acquiring bank and *b* denotes the target bank. Thus, we assume that the probability of acquisition is linearly affected by the vector of acquiring bank's characteristics ($X_{a,t-1}$), target bank's characteristics ($Y_{b,t-1}$), the relative differences between them ($Z_{a,b,t-1}$), as well as macroeconomic conditions of the previous period (K_{t-1}). All the predictors

on the right-hand side of the equation are lagged for one period to address the possible issue of reverse causality, and robust standard errors are used to address the issues related to heteroskedasticity and autocorrelations (White, 1980).

Individual Bank Specific Characteristics

In the first set of predictors, we examine whether the previously documented individual bank characteristics ($X_{a,t-1}$, $Y_{b,t-1}$) remain as the significant predictors of the M&As. This is also worthwhile to examine individual characteristics due to the mixed findings from the literature (Hernando, Nieto, and Wall, 2009; Kaul and Wu, 2016). For our study, we examine the size, profitability, equity structure, business efficiency, funds availability, and local competitive market environment. The first independent variable *Size* is measured as the natural logarithm of total assets. It has to be noted that banking institutions may prefer to acquire large banks as the acquisition of the target assets may grant "too-big-to-fail" status to the acquiring banks (DeYoung et al., 2009). Next, *ROE* or return-on-equity is included. It has been widely documented that such performance measures matter in the literature, while the direction of effects has been found to be mixed. *Inefficiency* is defined as the expense ratio, which is calculated by dividing total interest expense, including the interest expense and non-interest expense, by total income. This variable tests for the overall efficiency of the cost structure of the banking institution.

The next set of variables tests the capital structure of the individual banks, including the equity structure and the overall fund availability of the banking institution. *Equity* is calculated as the ratio of equity to assets, which is used to capture the effect of the equity capital structure. *Fund Availability* examines how much extra funds are available for lending, testing for the possibility of capital injection through consolidations, especially for banking institutions that have little

amounts of funds left for lending. This variable is calculated by dividing the deposit loan amount by the amount of total loans and leases.

Lastly, we also calculate the state-level Herfindahl-Hirschman Index or *HHI*, which is calculated based on the state-level deposit amount. This variable proxies for the local market concentration and tests whether the local market competition affects the probability of two institutions consolidating through M&As. The HHI index for this study is calculated as:

$$HHI_t = S_1^2 + S_2^2 + S_3^2 + S_4^2 \ldots$$

Each S_n is defined as the market share of bank *n* expressed as a whole number. Market share is calculated by dividing a bank's total deposit amount by the sum of the total deposit of all banks in that state at time *t*. As indicated in Equation (1), we test these characteristics for both the acquirer and the target in a simultaneous equation. Depending on whether each bank characteristic is that of the acquirer or the target, the variable is preceded by *Acq* and *Tgt* for acquirer characteristics and target characteristics, respectively.

Relative Differences: Capability Deployment and Market Concentration

Capability deployment occurs when the acquirer with greater strength in business capability acquires the target with weaker strength and the acquirer's capability is transferred to the target (Berchicci et al., 2012; Kaul and Wu, 2016). Because the value from capability deployment comes from raising the target's capability level, an acquirer would prefer a target with weak capabilities. However, the literature has also provided the theory of capability acquisition, in which M&A is triggered by an acquirer with the goal of improving the business performance by acquiring a target with better capability (Capron et al., 1998; Kaul and Wu, 2016). We measure the possibility of the capability deployment triggering community bank M&A activities by

examining the relative differences in profitability and business efficiency. First, we examine whether the capability deployment in terms of profit maximation and cost efficiency increases the probability of bank M&As. To test these, we create two indicator variables, *Capability: ROE* and *Capability: Efficiency*. *Capability: ROE* is an indicator variable that takes a value of 1 if the acquirer has higher ROE than that of the target, which is used to test whether the potential acquirer with a better profit-maximizing structure is more likely to engage in worse-performing bank acquisition with the purpose of capability deployment. Similarly, *Capability: Efficiency* takes a value of 1 if the acquirer has better efficiency than that of the target, and this is another proxy for the capability deployment in terms of the cost structure. Assuming that the potential acquirer pursues M&A for the goal of capability deployment rather than capability acquisition, we expect these variables to have a positive effect on the probability of M&A happening.

The next two variables test whether the capability to inject capital into a more financially distressed target increases the probability of bank M&As or not. We create two other indicator variables, including *Capability: Equity* and *Capability: Funds Availability*. *Capability: Equity* takes a value of 1 if the acquiring bank has a higher equity-to-asset ratio, and this tests whether the capability of the acquirer to inject more equity capital, which in turn will lower the financial risk level of the target, increases the likelihood of M&As. Similarly, *Capability: Funds Availability* takes a value of 1 if the acquirer has a higher deposit-to-loan ratio than that of the target, which is used to examine whether the acquirer with more fund availability will engage in M&A with the goal of expanding the available funds for the potential target.

Relative Differences: Asset and Geographic Diversification

The next set of variables examines the implication of diversification in M&A activities. First, it has been suggested that the new capital regulations may provide incentives to banks to diversify the loan portfolio to reduce the overall portfolio risk, despite a possible diversification discount (Campa and Kedia, 2002; Shim, 2013; Brester and Watts, 2018; Kim and Katchova, 2020). To test whether these two different types of diversification significantly affect the probability of mergers and acquisitions, we create two indicator variables for each.

To examine the effect of different loan concentrations on the probability of M&As happening, we first create an asset diversification indicator variable. *Asset Diversification* is an indicator variable that takes a value of 1 if the two consolidating banks have different asset concentrations based on the loan concentration hierarchy, based on the loan information provided from the FDIC database. *Geographic Diversification* takes a value of 1 if the headquarters of two banks are located in different states, following the general definition from the literature.

Relative Measures: Regulatory and State Backgrounds

It has been stated that bank M&As differ from nonbank M&As because of the stringency of bank regulations and consolidations both on the federal level and the state level (Cheng et al.,1989), but the lift of intrastate branching deregulation or de novo branching deregulation in recent decades greatly lifted the regulatory stringency on multi-state banking M&As (Davis and Katchova, 2020). Despite the multistate banking deregulation, legal similarity in terms of bank charter class or the regulatory district may reduce the associated cost of M&As as the transition and the consolidations of businesses will be monitored by the same federal regulators, including the federal bank regulators and the Federal Reserve. To test whether the relative similarity in regulatory and state legal backgrounds affects the probability of M&As, we include *Same Charter*

and *Same District* indicator variables which take a value of 1 if the two banks are under the same bank charter class or under the same federal reserve district. Related to diversification or geographic district, but proposing a different implication, we include *Concentration* indicator variable which takes a value of 1 if the headquarter state of the acquirer has a higher market concentration in terms of HHI relative to the headquarter state of the target. This particular measure is used to examine whether a potential acquirer, when faced with a relatively greater concentration within the headquarter state, enters a less concentrated market through M&A.

Agricultural Macroeconomic Conditions and Government Guarantees

In the last set of variables, we pay close attention to macroeconomic variables that are related to the agricultural economy but have not been examined in the previous literature. An interesting aspect of agricultural loans held by commercial banks is that the agricultural delinquency ratio does not fluctuate over time despite observed volatility in farm receipts, as the decrease in farm receipts is likely to be compensated by government payments as we have observed in recent years. Implicit government guarantee that compensates farmers when farm production does not reach certain levels implies indirect government support for agricultural loans, similar to insurance; if agricultural loan defaults occur when farmers are unable to pay the interest payments and the principal payments of their debt outstanding, then government payments implicitly lower the risk of agricultural delinquency probability as farmers may pay the existing debt obligations from those government payments. Such implicit guarantees may influence the M&A decision because the risk profile of community banks that are more likely to make agricultural loans than large national banks may improve. Therefore, to evaluate whether those variables affect the probability of acquisitions we include net farm income and government

payment levels which are labeled as *NFI* and *GP* in the main equation, respectively. To test whether the implicit guarantees affect the M&A decisions more directly, we create the *GP/NFI* variable which is the ratio of government payments to the net farm income. Table 2 provides the description of each variable above and how they are calculated.

Table 2: Variable Description

Individual Bank Characteristics		
Size	Size of the bank	Log(Total Asset)
ROE	Return on equity. Proxy for profitability	Net Income/Equity
Inefficiency	Inverse measure of cost efficiency	(Interest + Non-Interest Expense)/(Net Income)
Equity	Amount of equity to total asset. Also called as leverage ratio, a measure of capital structure	Equity/Total Asset
Funds Availability	Amount of funds available for lending	Total Deposit/Total Loans
HHI	HHI index based on the deposit amount, state level	$HHI_t = S_1^2 + S_2^2 + S_3^2 \ldots$
Relative Measures		
Asset Diversification	Asset concentration of two banks differs, following the FDIC definition	1 if asset concentration is different; 0, otherwise
Geographic Diversification	States of incorporation of two banks differ, following headquarter location	1 if two banks are headquartered in different states: 0, otherwise
Same District	Two banks are under the same federal district	1 if both banks are under the same district; 0, otherwise
Same Charter	Two banks are under the same bank charter class	1 if both banks are under the same charter; 0, otherwise
Capability: ROE	Acquirer has better profitability structure than that of the target, creating room for capability deployment	1 if the acquirer has higher ROE than that of the target; 0, otherwise
Capability: Efficiency	Acquirer has better cost structure than that of the target, creating room for capability deployment	1 if the acquirer has better efficiency than that of the target; 0, otherwise
Capability: Equity	Acquirer has better equity structure than that of the target, creating room for capital injection	1 if the acquirer has higher equity-to-asset ratio than that of the target; 0, otherwise
Capability: Funds Availability	Acquirer has greater funds availability, creating a room for capital injection	1 if the acquirer has higher deposit-to-loan ratio than that of the target; 0, otherwise

Concentration	Acquirer enters less concentrated market through M&A	1 if the HHI of acquirer is higher than the HHI of target; 0, otherwise
Macroeconomic Condition Variables		
NFI	National level net farm income from USDA	Log(Net Farm Income)
GP	Farm-sector government payments from USDA	Log(Government Payments)
GP/NFI	Percentage of government payments relative to net farm income	Government Payments/Net Farm Income

Determinants of National Bank-Community Bank Acquisitions

Because we expect a greater magnitude of market disruption created when a large national bank enters the local lending market through M&As, we first pay close attention to acquisition activities in which involved acquiring bank is a national bank. Table 3 reports the results for the rare event logistic regressions from national bank-community bank combinations.

First, coefficients on the acquiring bank characteristics imply that a well-structured and better-performing bank as measured through various measures do not engage in M&As in general. Coefficients on *Acq: Equity* and *Acq: Funds Availability* are -4.605*** and -0.310** respectively, signaling that the probability of M&A decreases for the potential acquirer that has already secured enough capital and greater loan flexibility. Also, the negative coefficient for *Acq: Inefficiency* indicates that better-performing national banks may not pursue M&As. These findings suggest that M&As are less likely to be initiated by large national banks with greater performance measures. Yet, results from the target bank characteristics show that target operating performance measures are inversely correlated with the probability of M&A events; statistically significant coefficients on $Tgt{:}ROE_{t-1}$ of -.468*** and $Tgt{:}Inefficiency_{t-1}$ of 0.005*** indicate that community bank acquisition triggered by large national multistate banks will occur more like with lower ROE and higher expense ratio of the target. These findings are somewhat consistent with the previous findings, such as those of Featherstone (1996) as the initial analysis of the participants in

community (agricultural) bank consolidations show that target community banks initially have lower profitability ratios relative to those of the acquirer (Featherstone, 1996; Hernando et al., 2009). With respect to sizes, we observe that coefficients on both *Acq: Size* and *Tgt: Size* are positive and statistically significant. These findings are similar to previous findings within the literature as large national banks with greater resources to acquire from its size will engage in more M&A activities, while the size of target bank institutions may increase the probability of M&As because the consolidation with a large target may grant "too-big-to-fail" status for the acquiring banks (DeYoung et al., 2009).

Our results show that the possibility of capability deployment triggers the community bank M&As, as the coefficient on *Capability:*ROE_{t-1} is statistically significant and positive (0.343***) and the coefficient on *Capability:*$Efficiency_{t-1}$ is statistically significant and positive (0.229*). These indicate that M&A is more likely to occur if the potential acquirer has relatively higher profitability, measured through ROE, and that the probability of M&A is also higher when the potential acquirer has relatively better efficiency in terms of cost structure, suggesting that the probability of M&A increases when there are more relatively efficient acquirers. These coefficients suggest that bank M&A is more likely to occur if the acquirer has better capability in creating profit or reducing cost relative to the potential target, even after controlling for the individual characteristics of ROE_{t-1} and $Efficiency_{t-1}$ as shown previously. These findings also provide certain implications regarding the future intensity of lending institution M&As, as we can expect that we would further observe continued consolidation activities as the economy of scale enable large national banks to consistently maintain higher profitability and cost structure relative to smaller community banks.

With respect to the effect of the local market competition, while the statistically insignificant coefficient on *Acquirer:HHI*$_{t-1}$ and statistically significant coefficient on *Target:HHI*$_{t-1}$ (0.000***) may suggest that only the local competitive market of the target may have a significant effect on the probability of M&A, what we observe on *Concentration*$_{t-1}$ again highlights the importance of the relative differences between the acquirer and the target. The statistically significant and non-marginal coefficient of 0.327** suggests that when faced with a greater concentration within the local lending market where the headquarter is located, then those large national banks are more likely to acquire community banks in other states with lower market concentration. Putting the findings together, the results suggest that while a bank in a more concentrated market might face a greater probability of being acquired, such M&A is more likely to happen if the potential acquirer faces greater market concentration at its location.

Our results also show that the pursuit of diversification further triggers the likelihood of M&A happening, as the coefficients on two different types of diversification – asset diversification and geographic diversification – have positive and significant coefficients with seemingly large magnitudes. If two banks have different asset concentrations in terms of loan portfolio composition, then the probability of M&A increases by 1.658%, and M&A is more likely to happen if two banks are located in geographically different states by 2.119%. The positive coefficient on asset diversification signals that a bank acquisition will be more likely to happen if the asset concentrations of the two banks are different. Previous literature has suggested that the Post-Great Recession banking regulations such as Dodd-Frank or the Basel III Capital Regulation would encourage the diversification of loan portfolio as the diversification may reduce the underlying volatility of the loan portfolio, as discussed previously, despite the largely documented negative impact of M&As in general (Campa and Kedia, 2002).

While the coefficient on *Same Charter* is not statistically significant, the coefficient is positive. Our results also highlight that M&As are more likely to occur if two banks are under the same Federal Reserve district, as indicated by the positive and statistically significant coefficient on *Same District*. These results suggest that shared legal backgrounds may increase the M&A probability as the expected legal processing costs might be smaller compared to those M&As that lack such legal or district similarities.

With respect to the selected macroeconomic conditional variables, our results show that government payments as denoted as *GP* has negatively correlated with the probability of community bank M&As while the ratio of government payments-to-net farm income (*GP/NFI*) is positively correlated with the M&A probability. As discussed previously, the magnitude of government payments relative to the farm sector income may signal the government's willingness to support the agricultural sector, which may change the risk profile of community banks that are more likely to engage in agricultural lending than large national banks. While the negative coefficient on *GP* may reduce the probability of community bank M&A because the increase in the nominal amount of government payment could signal the greater financial difficulty in the agricultural sector, the positive coefficient on *GP/NFI*, should provide another signal regarding the government's willingness to compensate farmers for their loss.

Table 3: Rare event logistic regressions for national-community bank pairs, 2012-2018

Variables	Coefficient	SE	P>|z|
Acquirer Characteristics			
Acq: Size	0.076***	0.022	0
Acq: ROE	0.130	0.351	0.71
Acq: Inefficiency	-0.007***	0.002	0.003
Acq: Equity	-4.605***	1.408	0.001
Acq: Funds Availability	-0.310**	0.122	0.011
Acq: HHI	0.000	0.000	0.737
Target Characteristics			
Tgt: Size	0.605***	0.040	0
Tgt: ROE	-0.468***	0.008	0
Tgt: Inefficiency	0.005***	0.001	0
Tgt: Equity	-0.979	2.206	0.657
Acq: Funds Availability	0.293***	0.001	0
Tgt: HHI	0.000***	0.000	0
Relative Measures			
Asset Diversification	1.658***	0.163	0
Geographic Diversification	2.119***	0.231	0
Same District	2.160***	0.192	0
Same Charter	0.186	0.123	0.13
Capability: ROE	0.343***	0.126	0.006
Capability: Efficiency	0.369**	0.164	0.024
Capability: Equity	-0.229*	0.128	0.072
Capability: Funds Availability	0.452*	0.236	0.055
Concentration	0.327**	0.133	0.014
Macro Condition			
NFI	2.809	1.769	0.112
GP	-4.116*	2.397	0.086
GP/NFI	0.228*	0.132	0.085
Constant	-8.175	23.395	0.727

Notes: This table reports results from rare event logistic regressions examining the predictors of community bank acquisitions between national banks and community banks, from June 30, 2012, to June 30, 2018. All variables are lagged for one year. ***, **, or * indicates the significance level of 1%, 5%, or 10%, respectively.

Determinants of Community Bank-Community Bank Acquisitions

In this section, we separately examine the determinants of community bank M&As that occur between community banks, in which both the acquirer and the target are community banks that do not have a multistate presence. While the expected spillover effect of such M&As should

be less than that of M&As occurring between large national banks and community banks from other non-consolidating community banks, it is worthwhile to examine the determinants of these mergers of equal since the majority of community bank acquisitions occur between community banks. As discussed previously, the number of M&As that occur between community banks is significantly larger than the number of M&As that occur between national banks and community banks, as 1,001 bank M&A activities have occurred between community bank pairs between 2012 and 2018 which is significantly larger than 300 recorded bank M&A activities between national banks and community banks of the previous section.

Rare logistic regression results for community bank-community bank pairs are reported in Table 4. While the overall direction of coefficients is similar to those of Table 3, we have some notable exceptions. For instance, coefficients on target bank characteristics show that most performance measures, including ROE, inefficiency, and equity, are inversely correlated with the probability of M&As, hinting that a poorly performing community bank is more likely to be targeted by another community bank. The first notable difference between national bank-community bank pairs and community bank-community bank pairs is the size of the target community bank as the coefficient on target size (*Tgt: Size*) is positive and statistically significant in community bank-community bank M&As. In contrast to the national bank and community bank pairs this is the opposite of what we observed. We previously discussed that the probability of M&As increases with the size of the target because consolidation involving a large target may grant "too-big-to-fail" status for the national banks. This may not hold for community bank-community bank M&As, however. First, it is very unlikely that acquiring another community bank will grant "too-big-to-fail" status for acquiring community banks because by definition, acquiring community bank is a regional bank that does not have a multistate presence nor large asset size,

and thus the consolidation business may not make those banks systematically important for the overall U.S. economy. Second, acquiring community banks might be more capital restrained relative to large national banks, and thus these banks may not have enough resources to acquire large counterparty.

Similar to the results from Table 3, we observe that diversification is the main driver of community bank M&As; M&As are more likely to occur between community banks if two banks have different asset hierarchies and geographic locations, as indicated by the statistically positive coefficients on *Asset Diversification* and *Geographic Diversification*. These findings provide interesting implications as many community banks have been exempted from new bank capital regulations such as Basel III through the new Regulatory Flexibility Act (Kim and Katchova, 2020). From the fact that community banks have a concentrated loan hierarchy and limited local presence in general, these coefficients hint that relatively smaller community banks are choosing to engage in M&As as their growth model choice to enter new markets rather than because of the new bank capital regulations introduced after the Great Recession. While the coefficient on *Same Charter* is not statistically significant between national bank and community bank M&As, the coefficient is positive and statistically significant in community bank-community bank pairs, and the same finding is shown from the coefficient on *Same Distric*t. These results again show that shared legal backgrounds increasing the M&A probability as the expected legal processing costs might be smaller.

Table 4: Rare event logistic regressions for community-community bank pairs, 2012-2018

Variables	Coefficient	SE	P>|z|
Acquirer Characteristics			
Acq: Size	0.851***	0.020	0.000
Acq: ROE	-1.308***	0.023	0.000
Acq: Inefficiency	-0.003***	0.000	0.000
Acq: Equity	2.983***	0.987	0.003
Acq: Funds Availability	-0.674***	0.122	0.000
Acq: HHI	0.000***	0.000	0.009
Target Characteristics			
Tgt: Size	-0.340***	0.029	0.000
Tgt: ROE	-0.095***	0.006	0.000
Tgt: Inefficiency	-0.001	0.001	0.196
Tgt: Equity	-1.470	1.009	0.145
Tgt: Deposit	0.018***	0.000	0.000
Tgt: HHI	0.000	0.000	0.660
Relative Measures			
Asset Diversification	0.897***	0.068	0.000
Geographic Diversification	2.783***	0.155	0.000
Same District	2.723***	0.166	0.000
Same Charter	0.128**	0.065	0.047
Capability: ROE	0.405***	0.068	0.000
Capability: Efficiency	0.067	0.065	0.304
Capability: Equity	0.245***	0.084	0.003
Capability: Funds Availability	-0.056	0.079	0.477
Concentration	-0.233	0.182	0.201
Macro Condition			
NFI	2.372*	1.248	0.057
GP	-3.643*	1.957	0.063
GP/NFI	0.202**	0.097	0.038
Constant	-5.345	17.703	0.763

Notes: This table reports results from rare event logistic regressions examining the predictors of community bank acquisitions between community banks and community banks, from June 30, 2012, to June 30, 2018. All variables are lagged for one year. ***, **, or * indicates the significance level of 1%, 5%, or 10%, respectively.

Overall, our findings highlight the importance of relative differences between the acquirer and the target in predicting M&A probability as most of the coefficients on those relative measures are statistically significant. More specifically, whether the M&A is between a national bank and a community bank or not, we observe that asset and geographic diversifications are consistent drivers of banking institution M&As. Second, our results suggest that bank M&As are triggered especially when there is room for capability deployment, in which a better performing banking

institution is more likely to acquire worse-performing community banks. This particular finding creates important implications regarding the expected magnitude of future community bank M&A intensity, which will be discussed in the next section. Third, our results suggest that implicit government payments for the agricultural sector may work as insurance for underlying agricultural loans, and such implicit guarantee could increase the likelihood of community bank M&As as the underlying risk of loans is expected to be reduced in the presence of government support.

Discussion and Conclusion

Literature has suggested that small community banks operating at the regional level induce more local economic growth when compared with big interregional banks (Hakenes et al., 2015), as these community banks are more effective in dealing with local borrowers and the reliance on soft information or non-quantifiable information by the community banks enable those banks to make more effective small business lending to businesses, including agribusiness, within close proximity (Scott, 2004; Chen et al., 2015). Yet, the continued decrease in the number of community banks and the entrance of the large national banks through M&As in the local lending market have created concerns for various stakeholders. In this study, we examine different determinants of community bank acquisitions and try to enhance our understanding of why these intensive M&As continue and whether the relative differences between the financial health between the acquiring bank and the target bank matter. Utilizing a novel approach that has not been utilized in the literature, we test for comprehensive sets of the isolated characteristics of potential acquiring bank and target bank, relative differences between those banks, and macroeconomic conditional variables. Our results highlight the importance of examining individual bank characteristics as well as the relative differences between the acquirer and the

target, as they provide a new set of insights regarding the likelihood of community bank M&A happening.

The most important implication among the various finding is the implication of capability deployment between a national bank and a community bank M&As. Utilizing the economies of scale and scope, large national banks have maintained a higher level of performance and capital structure relative to those of smaller community banks. Further consolidations between large national banks and community banks are expected to continue based on our results because systematic differences between national banks and community banks will continue to enable national banks to maintain relatively higher profitability, better cost efficiency, and capital structure, which are found to be one of the major determinants of community bank M&As. Thus, we expect the intensity of community bank M&As to continue in foreseeable future, assuming no major structural changes in the banking sector. The question is then whether the capability deployment achieved through M&As benefits not only the consolidated banking institution but also the local borrowers. While the capability deployment would almost certainly benefit the consolidated banking institutions as the acquirer's superior knowledge in running business will be transferred to the consolidated target businesses, there is no guarantee that the benefit of the consolidation will ultimately affect the local borrowers, as hinted by previous findings such as Erel 2011.

Our findings provide both regulatory implications and new research opportunities. The number of community banks has already decreased significantly over the last few decades, and our results imply that the intensity of M&As is likely to be continued in the foreseeable future. It will be in the interest of both the federal and the state regulators as these M&As will affect not only the consolidated banking institutions but also the local competitive lending market as well as

the end borrowers. With community banks being documented to be more effective in promoting local growth, rapid increase in market concentration and the decrease in those community banks because of M&As will be in the interest of the bank regulators as well as the academia as the ramification of such concentration may not benefit the local borrowers at the end.

Appendix

Appendix 1: FDIC definition of community banks

FDIC defines community banks as banking institutions that:

Exclude any organization with:

A: No loans or no core deposits

B: Foreign Assets ≥ 10% of total assets

C: More than 50% of assets in certain specialty banks, including:

- credit card specialists
- consumer nonbank banks
- industrial loan companies
- trust companies
- bankers' banks

and includes all remaining banking organizations with:

A: Total assets < $1 billion

B: Total assets ≥ $1 billion, where:

- Loan to assets > 33%
- Core deposits to assets > 50%
- More than 1 office but no more than 75
- Number of large MSAs with offices ≤ 2
- Number of states with offices ≤ 3
- No single office with deposits > $5 billion

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