Population Density and Performance of Community and Non-Community Banks in the U.S.

Alex Fayman, Rey Hernandez-Julian and Timothy Mayes

Metropolitan State University of Denver, USA

This paper examines the effect of county level population density in the United States on the performance of community and non-community banks spanning 2001-2017. Previous literature highlighted the disadvantages faced by community banks due to the cost of competition against the larger rivals, their inability to keep up with investments in information technology, the mounting cost of the regulatory burden and the lack of scale to generate performance efficiencies. In spite of with these apparent disadvantages, the benefits of relationship banking and the ability to lend to informationally opaque business borrowers, have been named as consistent benefits of the community banking model. We examine the impact of population density across the U.S. on how these advantages and disadvantages impact the performance of community banks as well as their counterparts. The results of this study show that population density negatively impacts performance of all banks but has a smaller negative impact on community banks. Further, as population density increases, community banks make more loans, become less liquid, and employ higher leverage, while higher population density has the exact opposite effect on non-community banks.

JEL classification: G0, G1, G2, G4
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1. Introduction

The U.S. banking system is a conduit for all economic activity in the country and thus receives much attention and scrutiny. Going back to McFadden Act of 1927 that outlawed interstate branching to Riegle-Neil Act of 1994 that allowed it once again, the banking system as we know it is a product of tumultuous waves of regulatory activity and economic cycles. Because of the regulatory dialectics that defined the branching laws and the dual banking system, it is apparent that the financial markets have spawned a growing number of large banks and a sizable but shrinking number of small community banks. These smaller institutions are vital agents that foster economic activity and development because they inhabit less populated areas and extend credit and financial services to local businesses. Indeed, community banks derive their name from their propensity to lend to businesses that have a higher likelihood of reinvestment in their communities. As will be presented in the following section during the discussion of previous literature, community banks are able to leverage relationships they form in closely-knit neighborhoods to create a competitive advantage over large banks which historically rely on transactional relationships with clients and base their lending decisions on financial

statements and scoring models. Arguably, in the absence of relationship banking, many of the smaller borrowers would not qualify for loans at large institutions. This factor makes the community bank model highly important to economic activity. Yet in recent decades, community banks have experienced operational difficulties due to their inability to scale increasing costs of the regulatory burden and the prohibitive costs of matching technological advancements made by larger banks that continue chipping away at the relationship banking advantage of small community banks.

In order to enhance the understanding of how population measures impact performance of community and non-community banks, this research paper estimates the population density of every county in all 50 states to measure its impact on the performance of community and large banks. This research shows that community banks tend to underperform their larger counterparts and that higher population density negatively impacts all banks. However, the data also shows that the negative impact of growing population density is smaller on community banks than it is on non-community banks. Bank regulators can employ these findings to enhance their understanding of the differences in approach to banking by community and non-community banks and consider a two prong approach in regulating these firms instead of placing them under the same regulatory umbrella.

The paper is organized as follows: Section 1.2 contains the literature review, Section 1.3 describes the data, Section 1.4 summarizes the results and the paper concludes with Section 1.5.

2. Literature Review

With his paper, "The demise of community banks? Local economic shocks are not to blame", Yeager (2004) determined that geographic risk driven by shocks to local economies was not the reason for the decline in both the number and the asset share of community banks. The title of the paper, however, clearly speaks to the perception of community banking and the perceived trajectory of the industry. This is a potentially serious problem because without community banks, 1,200 U.S. counties and 16 million Americans would experience a shortage of banking institutions (Marsh et. Al. 2013). Further, statistics reveal troubling trends for the entire banking industry. It appears that the numbers of all bank charters has declined by 50% from 1985-2013, including the loss of 417 banks and thrifts that failed between 2006 and 2011 as the result of the Great Recession (Gilbert et. Al. 2013).

To highlight the importance of community banks, Timothy Geitner, who was then President of the Independent Community Bankers of America stated, "*Pundits continue to mistakenly announce the demise of the community-based banking sector… community banks continue to provide the customized personal financial services that can compete effectively with other providers…. small banks have always been more nimble and responsive than huge banks and have been able to position themselves much faster than the bureaucratic giants.*" (Geitner 2002)

In light of falling numbers of community banks and growing concentration of assets in the banking industry, the confidence exhibited by Mr. Geitner, at least in

part, is based on the relationship banking component of the community banking model (DeYoung et. al. 2004). The lasting relationships established by community bankers is the foundation of the lending business at community banks. At its core, relationship banking carries a well-defined historical lineage that is juxtaposed to the transactional banking provided for customers by large banks (Marsh 2015). Community banks are able to build strong relationships with clients because their organizational structure is much flatter (Coles et. al 2004 and Feng et al., 2012), which creates more opportunities for interaction between loan managers and their customers.

The enhanced level of interaction allows community bank loan officers to collect "soft information" (qualitative information) on their customers. This soft information is more expensive to obtain and more valuable in its application than the "hard information" (quantitative information) from financial statements relied upon by large banks. Indeed, larger banks inherently possess a more vertical hierarchy that generates greater distance between loan officers, managers and customers as well as a greater level of loan officer turnover that resets developing bonds between loan officers and customers (Berger et. al 2014, DeYoung et. al. 2004, Gilbert et. all., 2013). Additionally, the relationships that are formed between depository institutions and customers have been found to be stronger when they are formed with community banks (Scott 2004 and Berger et. al. 2014).

The relationship banking advantage has helped community banks to carve out a niche in small business lending. According to literature, as banks grow larger geographically, it becomes more difficult to collect and pass information through the hierarchy of the bank managers and small business lending tends to decline as banking organizations grow (Berger et al., 1998, 2001, Strahan et al., 1998). It seems that soft information becomes more difficult to collect as banks grow in size and this costlier form of information becomes even more expensive to obtain relative to transaction-based data used by large banks (Yeager 2004). The data further shows that large banks lend primarily to larger firms with good accounting records, whereas community banks lend to more difficult credits (Berger et al., 2005). As it becomes more difficult to collect soft information, larger banks adjust by decreasing their small business lending. According to Berger et all., (2011), in 2005, community banks held 13% of all banking assets and funded 33% of all small business loans. All these arguments further highlight the importance of community banking to small business lending. Research also shows that despite the fact that community banks lend more to the informationally opaque borrowers, the presence of these smaller community-centric depository institutions in a given region is inversely related to regional foreclosure rates (Fogel et al., 2010).

Community banks have long been fighting a difficult uphill battle for survival against large banks. As was stated above, large banks enjoy efficiencies derived from economies of scale in lowering the average cost of services provided to customers, the ability to make investments in new technology, and spreading that cost over a

greater client base without having to wager most or all future profits in case that the technological investment does not pan out (DeYoung et al., 2002, 2004, Jones et all., 2005). In fact, Acharya et al., (2008), Hosein (2010) and DeYoung et al., (2007) argue that despite being at a considerable disadvantage to large firms, community banks must continue to invest in information technology in order to enhance their portfolio of offerings and to maintain a competitive standing in the marketplace.

Technologically enhanced product offerings help to attract customers because it is essential for community banks to provide loans to small businesses that tend to make investments in their respective communities. In addition to beneficial impact of bank size on scale borne efficiencies, larger banks also enjoy the benefit of risk diversification not enjoyed by smaller community banks (Emmons et al., 2004). Considering that the business of banking is tightly interwoven with risk management, the risk diversification advantage is akin to having a tilted playing field.

In addition to the cost pressures inherent in the smaller scale of community banks when it comes to offering services and investing in new technologies, the cost of the regulatory burden creates yet another disadvantage. Dahl et al (2016) estimates that it costs banks with less than $100 million in assets 8.7% of their noninterest expense versus 2.9% for banks with $1-$10 billion. It is apparent that in an industry with rather tight profit margins, there is a great discrepancy in the heft of the regulatory burden on the small versus large banks. As Federal Reserve Board Gov. Jerome Powell stated, "The risks and vulnerabilities of community banks differ substantially from those of larger banks, and an explicit tailoring of regulation and supervision for community banks is appropriate" (Powell 2015).

The regulation that has received considerable attention from researchers and community bankers was enacted in January 2010 when Congress passed the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank). The intent of Dodd-Frank was to protect the financial system from another meltdown and a Great Recession. In the wake of the new legislation, industry veterans and researchers argued that community banks did not cause the crisis by securitizing risky mortgages, conducting subprime lending or speculating in risky derivatives. Community banks were certainly not too big to fail and did not need a government bailout to keep afloat, so the necessity for the entire banking sector (including community banks) to bear the increased costs of the regulatory burden is at least debatable (Marsh et al., 2013 and Marsh 2015). To exacerbate the inequity even further, it has been argued that the government bailout of large banks could help large banks attract depositors by offering an additional promise of an extra layer of government protection. This implied certification effect may further enhance business at large banks even as new technology allows these institutions to overcome geographical distances and information gaps (Gilbert et al., 2013). Stiroh (2004) finds that community banks fail to compete effectively because they experience difficulty diversifying their income beyond areas of advantage and when they try, they lack technology and scale.

Even as they continue to be more involved in and committed to local communities, literature shows that community banks are facing growing competition from both large banks and nonbank lenders due to growing technological innovation and lack of regulations for nonbank lenders. These developments are making it easier for megabanks and nonbank lenders to compete for informationally opaque business customers (Jajtiani et al., 2016 and Berger et al., 2014). Despite these problems, it appears that one variable may help community banks going forward as it is heavily tilted in their favor: public trust. Hurley et al., (2014) show that in the aftermath of the financial crisis, large banks lost a significant amount of public trust, while community banks were able to circumvent this problem by being better able to meet stakeholder expectations during the Great Recession. Another argument for the advantages of the community banking model is that past research has shown that well-run community banks can earn higher profits than average large banks by using higher core deposit funding and incurring less noninterest expenses while posting lower noninterest income (DeYoung et al., 2004). Yet evidently, these advantages were not sufficient to fix issues facing community banks as small business lending, the bread and butter of community banking business, started declining in the 1990s and continued to decline since (Wiersch et al., 2013).

Gilbert et al., (2013) state that well managed community banks remain competitive in rural areas and less so in urban markets because of their ability to collect the soft information from opaque borrowers in those markets. The contribution of this study will provide further evidence on how population density affects performance of community and non-community banks. It is important to examine whether community banks perform better in lesser populated counties as the previous literature suggests and whether large banks benefit from increasing population.

3. Data

The data for this project was gathered from the Federal Reserve Board of Chicago, the Federal Financial Institutions Examination Council (FFIEC), and the Federal Deposit Insurance Corporation (FDIC). Bank financial data was initially collected from Call Reports filed by all U.S. depository institutions between December 2001 and December 2010 from the Federal Reserve Board of Chicago website. The FFIEC Call Reports for the period of 2001 to 2017 were also collected and then the reports from the two agencies were merged for each year using the Pandas library and Python. The resulting files containing differing numbers of variables were then combined with data from the FDIC for 2001-2017. Pandas was used to merge the files containing all of the data for each year. Additionally, the FDIC assigns banks to institutions that meet its definition of a community banks. The flag that was assigned by FDIC to identify community banks was utilized for the purpose of this study. Finally, county population estimates and county land area was taken from U.S.

Census Bureau and combined to calculate county-level population densities for each year.

Table 1

The table presents the definitions of the variables analyzed in this research.

Ratio/Variable Name	Abbreviation	Ratio Formula
Return on Equity	ROE	Net Income / Total Equity
Return on Assets	ROA	Net Income / Total Assets
Net Profit Margin	NPM	Net Income / (Noninterest Income + Interest Income)
Equity Multiplier	EM	Total Assets / Total Equity
Loan Ratio	LNRAT	Net Loans / Total Equity
Deposit Ratio	DEPRAT	Total Deposits / Total Equity
Loans to Assets	LNASS	Net Loans / Total Assets
Loans to Deposits	LNSDEP	Net Loans / Total Deposits
Liquidity Ratio	LIQRAT	(Total Securities + Cash) / Total Assets
Income per Employee	INCEMP	Net Income / Number of Employees
County Density on non CBs	CNTYDENS	Impact of population density on non-community banks
County Density on CBs	CB X CNTYDENS	Impact of population density on community banks
Multi State Bank	MLSTAT	=1 if bank operates in multiple states
Number of Employees	NUMEMP	Measures number of employees in a bank

4. Methodology

This study aims to estimate the relationship between measures of bank performance, the bank's local population density, and how that relationship depends on whether the bank is a community bank. We estimate this relationship using an ordinary least squares regression of the form:

$$bankperformance_{icjkt} = \gamma_1 CB_i + \gamma_2 CNTYDENS_{ct} + \gamma_3 CB\_X\_CNTYDENScb_{ict} + \beta X_{it} + + s_k + \tau_t + + u_{icjkt,}$$

where the outcomes are several measures of the performance of a bank i located in county c, of bank class j, in Federal Reserve district k, and in year t. CB_i is dummy variable identifying whether a bank holds a community bank designation (which does not vary for a bank over time), $CNTYDENS_{ct}$ is the density of the county the bank is located in year t. $CB\_X\_CNTYDENS$ is an interaction of the previous two variables. X_{it} is a matrix of time-varying traits of a bank, such as whether it has branches in multiple states and its number of employees. stands in for bank class level fixed effects, which also controls for the bank's regulatory agency, s_k are fixed effects for the bank's Federal Reserve district, and τ_t are year fixed effects. Standard errors are clustered by county and year.

The coefficient estimates of interest, γ_1, γ_2, and γ_3, estimate the impact of population density on bank performance for both community and non-community

banks. γ_1 estimates the average difference in bank performance between the two bank types holding population density constant. γ_2 estimates the impact of increasing population density on the performance of a non-community bank. γ_1 estimates the differential impact of population density on a community bank relative to a non-community bank. Our estimation strategy seeks to generate unbiased estimates of these three coefficients, which guides our inclusion of control variables. The X_{it} captures other bank-specific traits that vary over time and that may be correlated with population density, while the regional fixed effects capture regulatory traits that may vary between different parts of the country. The time fixed effects capture any shocks that affect all banks in a given year; these are particularly important as our sample includes years before, during, and after the recession that spanned from 2007-2009 and the economic downturn that followed it.

Table 2 presents summary statistics on the variables both for the full sample and separately for community and non-community banks.

5. Results

The goal of this study is to examine the impact of county level population density in the United States on community and non-community banks. The question this research seeks to answer is whether community banks still harbor advantages from relationship banking in lesser populated areas while larger banks benefit from economies of scale, diversification of asset portfolios, ability for greater spending on technological innovation, and are better able to handle the increasing cost of the regulatory burden in more densely populated regions. The results presented in Table 3 reveal some answers. As can be seen in the ROE and ROA models, variable CB, which is equal to 1 when a sample bank is a community bank and equal 0 when a sample bank is a non-community bank, is negative and highly significant. This result indicates that community banks produce less profit per dollar of invested equity and assets. CB coefficient is 3 times larger for ROE than ROA (-0.0391 vs. -0.0117) due to the effects of leverage. As can be seen in Table 3, EM (equity multiplier) is positively related to CB. According to this result, community banks tend to carry a greater amount of leverage than non-community banks. Thus, whether it is the increased competition, increased regulatory burden, inability to invest in technology or decrease in importance of relationship banking, community banks post lower performance.

The next question answered by the models in Table 3 is whether county level population density has an impact on bank performance. Looking at Table 3, CNTYDENS, which measures the impact of a 1 unit increase in population density on non-community banks is negatively related to the performance of non-community banks as demonstrated by the coefficients in the ROE and ROA models. To examine how county level population density impacts the performance of community banks, the two independent variables of interest are CNTYDENS and CB_X_CNTYDENS.

Table 2

This table presents the descriptive statistics of the data analyzed in this research.

	All Banks			Community Banks			Non-Community Banks		
	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.
CB	122,836	0.91	0.28	111,998	1.00	0.00	10,838	0.00	0.00
CNTYDENS *	122,836	1058.8	5449.24	111,998	808.93	4201.70	10,838	3640.92	12116.64
MLSTAT *	122,836	0.08	0.26	111,998	0.05	0.22	10,838	0.31	0.46
NUMEMP *	122,836	270.58	4205.78	111,998	64.82	99.21	10,838	2396.84	13979.81
ROE	122,836	0.05	3.00	111,998	0.05	3.13	10,838	0.07	0.92
ROA *	122,836	0.01	0.12	111,998	0.01	0.02	10,822	0.01	0.41
NPM *	122,807	0.08	3.27	111,998	0.09	2.23	10,838	-0.03	8.34
EM	122,836	10.11	41.68	111,998	10.17	43.53	10,808	9.44	10.19
LNSDEP*	122,806	6.34	424.22	111,998	0.78	7.52	10,838	64.01	1428.56
LIQRAT*	122,836	0.26	0.16	111,998	0.26	0.15	10,838	0.26	0.22
DEPRAT*	122,836	8.47	39.39	111,998	8.60	41.15	10,838	7.19	8.8
LNASS*	122,836	0.62	0.17	111,998	0.62	0.16	10,838	0.59	0.25
INCEMP*	122,582	99.21	4331.53	111,983	28.89	303.31	108,599	842.25	14677.69

* denotes significant difference at 5 percent between CB and non-CB

If the sum of the two coefficients for these two variables is negative, then population density has a negative impact on performance of community banks and if the sum is positive, population density positively affects community banks. As can be seen in Table 3, sum of the coefficients is negative for both ROE and ROA, however, the sum of the coefficients is less negative than the coefficient for CNTYDENS. Thus, higher population density negatively impacts all banks, but increasing density has a smaller negative impact on community banks than on non-community banks.

Additionally, from Table 3, EM (equity multiplier) is also negatively related to population density for non-community banks but is found to be positively related to population density for community banks. Finally, NPM (net profit margin) is negatively related to population density for non-community banks and the coefficient is less negative for community banks. From the results stated above, it is possible to conclude that as population density grows, community banks are able to aim their relationship banking skills at a larger audience, they increase their leverage and even though their profitability suffers, it does not decline as much as the performance of large banks which decrease their leverage. The fact that community banks greet greater population density with increased leverage means that they see opportunity, while large banks decreasing their leverage in response to greater population density means that this subset of firms sees increased risk.

Table 3

The table presents the results of four OLS models where ROE, ROA, NPM (net profit margin) and EM (equity multiplier) are dependent variables and CB (dummy variables =1 if a bank is a community bank and 0 otherwise), CNTYDENS (measures impact of county population density on non-community banks), CB X CNTYDENS (measures impact of county density on community banks), MLSTAT (dummy variable =1 if bank operates in multiple states and 0 otherwise) and NUMEMP (measures number of employees in a bank) are independent variables.

Variables	**ROE**	**ROA**	**NPM**	**EM**
CB	-0.0391**	-0.0117***	-0.0122	0.834***
CNTYDENS	-4.29e-06***	-1.79e-06***	-3.30e-05***	-1.27e-05**
CB x CNTYDENS	2.86e-06*	1.70e-06***	2.68e-05***	7.67E-06
MLTSTAT	0.0208**	0.00156	0.107	0.635***
NUMEMP	3.82E-07	2.20E-08	1.94E-06	8.30e-06*
Constant	0.0316	0.0217	0.195	9.774***
Observations	122,836	122,837	122,807	122,836
R-squared	0.001	0.004	0.003	0.000

*** p<0.01, ** p<0.05, * p<0.1

In Table 4, the models focus on 6 bank ratios that highlight the impact of population density on specific areas of bank performance. For instance, LNSDEP, which measures the level of loans to deposits, is negatively related to CB. This result may signal a greater degree of risk aversion by community banks or may signal that community banks lack quality borrowers to whom they could lend their money. It is

also evident that LIQRAT (liquidity ratio) is positively related to CNTYDENS and negatively related to CB_X_CNTYDENS . Apparently, as population density increases, non-community banks tend to become more liquid while community banks tend to become less liquid. This result is consistent with the risk-seeking behavior of community banks in relation to greater population density discussed above as it pertained to the positive relationship between EM and population density for community banks. To sum up these findings, in more densely populated counties, community banks seem to increase leverage, decrease liquidity and experience a smaller adverse effect of higher population density than larger banks.

Table 4

The table presents the results of six OLS models where LNSDEP (net loans to total deposits), LIQRAT (securities plus cash to total assets), LNRAT (net loans to total equity), DEPRAT (total deposits to total equity), LNASS (net loans to total assets) and INCEMP (net income to number of employees) are dependent variables and CB (dummy variables =1 if a bank is a community bank and 0 otherwise), CNTYDENS (measures impact of county population density on non-community banks), CB X CNTYDENS (measures impact of county density on community banks), MLSTAT (dummy variable =1 if bank operates in multiple states and 0 otherwise) and NUMEMP (measures number of employees in a bank) are independent variables.

Variables	LNSDEP	LIQRAT	LNRAT	DEPRAT	LNSASS	INCEMP
CB	-55.60**	-0.00483	0.818***	1.401***	0.0480***	-803.6***
CNTYDENS	1.83E-03	2.04e-06***	-3.58e-05***	-1.46e-05**	-3.23e-06***	9.25E-03
CBx CNTYDENS	-1.48E-03	-2.97e-06***	4.14e-05**	8.23E-06	3.94e-06***	-6.30E-03
MLTSTAT	-29.95*	-0.0401***	0.773***	0.417***	0.0541***	-349.2***
Constant	81.43**	0.254***	5.922***	7.796***	0.557***	995.1***
Observations	122,807	122,837	122,836	122,836	122,837	122,582
R-squared	0.004	0.08	0.001	0.001	0.08	0.005

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Interestingly, from Table 4, LNRAT (loans to equity) is positively related to CB. LNRAT is a risk tolerance metric which reveals that community banks have a greater appetite for risk while making loans. Relationship banking and soft information, as discussed above, does allow community banks to make safer lending decisions and perhaps a small degree of latitude when it comes to greater leverage than larger banks. Further, CNTYDENS is negatively related to LNRAT. Thus, non-community banks decrease proportion of loans to equity as population density decreases while community banks, as demonstrated by coefficient for CB_X_CNTYDENS, tend to increase it. Community banks also tend to have a greater LNSASS (loans to assets).

Since in the LNASS model the coefficient for CNTYDENS is negative and CB_X_CNTYDENS is positive, it is evident that as population density increases, non-

community banks tend to decrease the proportion of their portfolios devoted to the most profitable asset category while community banks tend to increase it. The pattern that emerged from these findings suggests that when population density grows, community banks take chances and opportunities to expand their loan portfolios, while large banks become more risk averse.

6. Conclusion

The goal of this study was to assess the relationship between county level population density in the U.S. and performance of community and non-community banks in all 50 states. Community banks historically operated in less populated markets, established close banking relationships that allowed greater levels of lending to opaque business borrowers that had a greater tendency to reinvest the money in the community. Because it is apparent that community banks play a vital role in the neighborhoods all across the United States, as their numbers began to shrink in the final decades of the 20th century and in the early part of the 21st century, they have received much scrutiny from researchers, regulators and investors. It has long been established that community banks thrive in smaller communities where they face less competition and can utilize relationship banking to bolster performance, while large banks thrive in urban markets where they could employ their scale to boost operational efficiency and profitability. To analyze these assertations, this study looks at the performance of community and non-community banks in relation to population density.

The results show that higher population density is negatively related to the performance of all banks, however, increasing population density has a smaller adverse effect on the performance of community banks. Additionally, as population density increases, community banks tend to increase their leverage (while large banks tend to decrease it) and decrease their liquidity (while large banks increase it). Further, because lending in the community is an important component of business for community banks, this paper looks at loans to assets and loans to equity ratios. The findings show that both loans to assets and loans to equity ratios are negatively related to population density for non-community banks and positively related to population density for community banks.

The results of this study shed light on the effect of population density on performance of banks in the United States. These findings are valuable to bank regulators, bank executives, investors and researchers who may take an additional look at the impact of population trends, relationship banking and perceived advantages of urban markets on performance of banking organizations.

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