Financial Inclusion of Rural and Urban Households and the Dodd-Frank Act

Kumuditha D Hikkaduwa Epa Liyanage[1], Denis Nadolnyak[2] & Valentina Hartarska[2]

[1] Otis L. Floyd Nursery Research Center, Tennessee State University, USA

[2] Department of Agricultural Economics and Rural Sociology, Auburn University, USA

Correspondence: Denis Nadolnyak, Department of Agricultural Economics and Rural Sociology, Auburn University, 310 Comer Hall, Auburn, AL 36849, USA. Tel: 1-334-559-0362.

Abstract

This paper examines the consequences of the Dodd–Frank Wall Street Reform and Consumer Protection Act of 2010 on financial inclusion in rural areas. The Act imposed changes in the U.S. banking industry that contributed to closures or consolidation of smaller community banks, mostly in the rural areas, that could not sustain the higher regulatory burden. We evaluate whether the Act had differential impacts on the financial inclusion of rural and urban unbanked households. Financial inclusion is measured by the utilization of banking services such as checking or savings account and by relying less on Alternative Financial Services (AFS). We employ the Changes-in-Changes quantile model to establish if rural unbanked households were more affected relative to their urban counterparts and provide robustness checks through ordered and binomial logistic regressions. We analyze both the short- and the long-term impacts of the Act using household-level data from the FDIC National Surveys of Unbanked and Underbanked Households. Results indicate that rural unbanked households on average were more likely to plan to open a bank account shortly after 2010 but the magnitude of the effect decreased in long-term. The rural unbanked households did not use more AFS services for credit and transaction purposes than urban households in the short term. However, in the long term, they increased their use of AFS for credit relative to their urban counterparts, likely because they were less able to obtain credit from banks. The policy implications point at the need to promote technologies that may help close the rural-urban financial inclusion gap and indentify a potential for combination of Fintech and banking services provision.

Keywords: financial inclusion, alternative financial services, unbanked rural households, Dodd-Frank Act, difference-in-differences, changes-in-changes

1. Introduction

Financial inclusion has become a major topic of interest to the financial world for the last two decades. The financial crisis of 2008 lead to a historically high failure of banks and, at least temporarily, limited the availability of banking services. In response to the financial crisis, in 2010 the Congress passed the Dodd–Frank Wall Street Reform and Consumer Protection Act. The Act affected all federal financial regulatory agencies and aimed to prevent a future financial crisis and to protect consumers from predatory and unfair financial practices (Geler, 2020) (Note 1). The resulting changes in the banking industry included continuous consolidation of banks and the closure of bank branches with detrimental effects to many low-income households, especially in rural areas. This paper focuses on the impacts of these developments on financial inclusion and evaluates whether there were differential impacts of this legislation on the unbanked households in rural and urban areas.

Financial inclusion is measured by the proportion of the population that is part of the formal financial system, typically having a formal bank account and not relying exclusively on Alternative Financial Services (AFS), many of which are relatively expensive. Data from the Household Use of Banking and Financial Services in the United States by the Recent Federal Deposit Insurance Corporation (FDIC) shows that, in 2019, about 5.4% of the U.S. households (nearly 7.1 million people) were unbanked meaning that no one in the household had a checking or savings bank account. This was the lowest rate since the survey began in 2009 when it was 7.6% suggesting a trend towards a more inclusive banking system. More detailed data from the 2017 National Survey on Unbanked and Underbanked Households by FDIC show that unbanked population was 6.5%, representing approximately 8.4 million U.S. households, or 14.1 million adults and 6.4 million children. These unbanked

households were using financial products or services outside of the formal banking system. Between 2017 and 2019, the unbanked rate dropped by 1.1%, which was an increase of around 1.5 million banked households. This decline in the unbanked rate was attributed to the improvement of the socioeconomic conditions of the U.S. households over this period.

Compared to the general U.S. population, unbanked individuals have lower and more variable income, less formal education, and are younger and more likely to be of racial or ethnic minority (FDIC, 2021). Recent FDIC surveys show that the AFS use continues to be much higher among unbanked than among banked households. The proportion of unbanked households that used AFS decreased substantially in recent years and is comparable to declines in the use of AFS for both transaction and for credit needs over this period. It is also consistent with the decline in the use of AFS among banked households (FDIC survey, 2017).

Rural and urban unbanked households differ by their access to the formal financial system. The Survey of Consumer Finances (SCF) in 2010 reported that 11% of rural households did not have bank accounts (versus 7.6% overall) and that these households regularly turned to AFS for services such as cashing their checks, which is relatively expensive because no fair rules constrained the AFS providers. A survey conducted by the Federal Reserve revealed that 25% of the unbanked rural households did not have a checking account because they did not like dealing with banks while 10% indicated the service charges were too high.

The low availability of bank branches also contributed to the lower levels of financial inclusion in rural areas. In 2017, the WSJ reported that "Of America's 1,980 rural counties, 625 don't have a locally owned community bank—double the number in 1994, and that at least 35 counties have no bank, while about 115 were served by just one branch". In fact, banking deserts are a major challenge in rural areas (Morgan et al., 2017) (Note 2). In the post financial crisis period of 2008 to 2016 alone, 86 new bank deserts were created in rural counties (Taylor, 2017). Some researchers have argued that the closings of rural bank branches may be driven by demand side factors such as decline in banking needs due to depopulation of some areas (Hinton, Thieme, & Woodhead, 2017) or deteriorated economic conditions following crises (Morgan, Pinkovskiy, & Yang, 2016). Some also argued that the Dodd-Frank Act harmed small, local lenders by imposing on them one-size-fits-all financial parameters aimed mostly at the big Wall Street banks (Covington & Courtney, 2014).

Finally, this work is also motivated by the theoretical and empirical literature on local credit markets, geographic market diversification, and access to credit in banking. It contributes to understanding the role of distance that is essential in rural markets and soft information, especially in the broader context related to the rise of Fintech and shadow banking (*e.g.*, Bellucci et al., 2019; Buchak et al., 2018; Erel & Liebersohn, 2020; Castellani & Afonso, 2020; Goetz et al., 2013; Rajan et al., 2015; Nguyen, 2019).

We provide new evidence on the differential impacts of the Dodd-Frank Act on financial inclusion of rural and urban households. It uses household level data from the FDIC National Surveys of Unbanked and Underbanked Households that is a special supplement to the U.S. Census Bureau's Current Population Survey (CPS). We use three rounds of the survey: in 2009 before the Act, in 2011 to capture short-term impacts, and in 2019 for long-term impacts. We evaluate whether the Dodd-Frank Act affected the financial inclusion in rural areas by comparing it to the "control" group of unbanked urban households. Financial inclusion is measured by the degree to which unbanked consumers plan to use the formal financial sector (opening a bank account) and to what extent they have to use Alternative Financial Services (AFS) for credit and transaction purposes. The results indicate that rural households on average were more likely to plan to open a bank account shortly after 2010 but less so later on. We also find that, in the long-term, rural unbanked households increased the use of AFS for credit relative to their urban counterparts, likely because they were unable to obtain credit from banks suggesting the need to promote technologies that may help close the rural-urban financial inclusion gap.

The remaining sections are organized as follows. The next section reviews the literature on financial inclusion. The third section describes the data and the empirical approach. The fourth section presents and discusses the empirical results. The last section concludes.

2. Literature Review

In the last two decades, financial inclusion has gained recognition in development economics along with education, healthcare, property rights, and infrastructure, all of which increase economic growth and reduce poverty (Karp & Nash-Stacey, 2015). According to the FDIC, financial inclusion is defined as the variety of public and private efforts aimed at bringing unbanked and underbanked consumers who may only have access to alternative financial services (AFS) into the formal finance sector. Financial inclusion is also defined as the degree to which individuals and businesses have access to useful and affordable financial products and services that meet their needs - transactions, payments, savings, credit, and insurance - delivered in a responsible and

sustainable way (World Bank, 2018). According to the FDIC, opening bank accounts can be one of the most important steps taken toward reaching the financial goals of unbanked households. Having a formal bank account provides the benefits of financial safety, protection against error and fraud, easy access to funds and online purchases, proof of payments and bills from any location, savings from check-cashing fees, and overall financial peace of mind.

Several empirical studies have considered whether the growth of the financial sector helps increase financial inclusion. Demirgüç-Kunt and Klapper (2013) find positive and significant relationship between a country's domestic credit as percentage of GDP and the percent of adults that report having a formal bank account and also find that financial inclusion is generally correlated with economic development. Country level studies have identified the relationship between being unbanked and financial inclusion using time series data. For example, Aportela (1999) shows that the expansion of a Mexican savings institute increased the average savings rate of affected low-income households and advanced financial inclusion. Burgess and Pande (2005) provide evidence that opening bank branches in unbanked rural areas (state-led expansion) in India was associated with reduction of poverty and higher financial inclusion. Rhine and Greene (2006) concluded that income, wealth, and education were important determinants of being unbanked based on the same identification approach. Osili and Paulson (2008) found that immigrants in the US who have more effective institutions in their countries than other immigrants were more likely to have a relationship with a bank and use more formal banking services.

A recent study by Celerier and Matray (2019) found that, following U.S. branching deregulation, both the number of bank branches and financial inclusion had increased and that financial inclusion such as having a bank account allowed low-income households to accumulate both liquid and also permanent assets. Dunham (2019) examined whether sociodemographic characteristics and mortgage lending is associated with the relative prevalence of alternative financial service providers like check-cashing outlets over commercial banks in southeastern Pennsylvania on the census tract levels. The findings indicate that the prevalence the alternative providers is positively associated with lower median household income, higher percentage of Black and Latin residents, and lower percentage of residents aged 65 or above.

The literature also indicates that financial inclusion provides economic benefits. Ruiz (2013) showed that formal financial services providers help to cover unexpected expenses of households who have savings accounts. Other benefits include female empowerment (Ashraf, Karlan, & Yin, 2010), greater investment in both education and businesses (Brune, Giné, Goldberg, & Yang, 2011), better physical health (Dupas & Robinson 2013), lower economy-wide inequality (Beck, Demirgüç-Kunt, & Levine, 2007), and greater entrepreneurship due to better first time access to financial services (Banerjee et al., 2010; Karlan & Zinman, 2010; Demirgüç-Kunt & Klapper, 2013).

There are a number of barriers to financial inclusion that prevent unbanked households from entering formal banking sector. Ashraf, Karlan, and Yin (2006) identified upfront costs and other fees associated with opening a bank account, minimum balance and documentation requirements, and costs associated with opening an account as potential barriers. Other barriers include distrust of banks and lack of financial capability even though the causal link between financial inclusion and these barriers is not entirely clear (Karlan, Ratan, & Zinman, 2014; Fernandes, Lynch, & Netemeyer, 2014). Hayashi (2013) used the Federal Deposit Insurance Corporation (FDIC) and the Board of Governors of the Federal Reserve System surveys to find that the main reason for not using banking services is the high cost of maintaining an account due to low and unstable income, banks' fees and qualification requirements, attributes of bank accounts and payment services that do not meet the needs of certain groups of unbanked consumers, negative perceptions or experiences with banks, and banks' physical accessibility of banks such as locations and hours.

Rhine and Greene (2013) analyzed the dynamics of becoming unbanked in the United States and found that families are significantly more likely to become unbanked when there is a decline in family income, loss of employment, or loss of health insurance coverage. In a related study, Campbell, Martinez-Jerez and Tufano (2012) show that involuntary bank account closures are more frequent in U.S. counties with lower wealth, lower education, higher unemployment and, importantly, access to payday lending leads.

Earlier studies using the FDIC's National Survey of Unbanked Households show similar results. Barr (2002), Caskey (2002), Hogarth et al. (2005), Berry (2004), and Sherraden (2010) used data from the 1990s and early 2000s to find that unmarried, young, less educated, minority, and less wealthy individuals tend to be without checking or savings accounts. Similarly, unbanked households tended to have low income and less education, be young, immigrants, and female head of households (Beard, 2010). Vermilyea and Wilcox (2002) also concluded that income, home ownership, spending habits, age, race/ethnicity, education, and employment were all

significantly associated with no traditional banking. The NY Neighborhood Financial Services Study (2008) found that thousands of low-income New York families chose to stay unbanked because of excessive banking fees and turn to non-traditional financing services because of lack of educational awareness to choose formal banking services. Meghan (2008) found that longevity of residence in the United States, educational background, legal status, income, and the English language proficiency impacted the likelihood of remaining unbanked or underbanked in immigrant communities. Smith et al. (2008) analyzed the location of AFS providers and found evidence that these providers are located in places that lack access to traditional banks. Bradley et al. (2009) found that nonbank AFS providing institutions operate outside the federally insured system and include money transmitters, car title lenders, pawnshops, and rent-to-own stores. Finally, Cole and Greene (2016) used data from the Survey of Consumer Payment Choice (SCPC) conducted by the Federal Reserve Bank of Boston to examine the relationship between consumers' banking status and their sociodemographic characteristics.

According to a recent report of the Board of governors of the Federal Reserve System (2019), majority of rural communities either had more or the same number of branches in 2017 than they did in 2012, yet over 40 percent of rural counties lost branches during those five years. The loss of bank branches in these rural counties negatively affected communities whose residents were poorer, less likely to have finished high school or college degree, and had a greater proportion of African-American residents.

The Dodd-Frank Act addressed many issues that policymakers believe contributed to the financial crisis in 2008 (Le, 2017). However, the act has disproportionately impacted community banks by subjecting them to many of the same regulations and fixed compliance costs designed for banks of all asset sizes (Schorgl, 2018). Because community banks rely on limited sources of funding and do not benefit from economies of scale, it has become economically impossible for many community banks to make profits that cover increased compliance costs, leaving rural communities with even less access to basic banking services.

Therefore, it is reasonable to hypothesize that the Dodd-Frank Act of 2010 affected the unbanked rural households and might have decreased their ability to meet their banking needs and thus become part of the financial system. We operationalize this hypothesis by evaluating to what extent rural unbanked households were more likely than urban unbanked households to plan to open a bank account and, additionally, to use AFS for credit and transaction purposes. We test these hypotheses in both short-term and long-term using 2011 and 2019 data.

3. Data and Methodology

This paper uses data from the Federal Deposit Insurance Corporation's (FDIC's) National household survey from the years of 2009, 2011 and 2019. This survey data contains information on households' intention to open a bank account, use of AFS for credit and for money transfer purposes, as well as households' demographic and socioeconomic characteristics. The numbers of unbanked households in the samples are 3033 (4.2%) in 2009, 3219 (4.5%) in 2011, and 1611 (2.3%) in 2019. Table 1 provides a description of the covariates used in the study.

Table 1. Description of all variables of Unbanked rural and urban households included in the model

Variable	Variable description
Like to open a bank account	1 = Not at all likely to open a bank account
	2 = Not very likely to open a bank account
	3 = Somewhat likely to open a bank account
	4 = Very likely to open a bank account
AFS Credit use	1 = Household use AFS credit services
	0 = Household do not use AFS credit services
AFS Transaction use	1 = Household use AFS transaction services
	0 = Household do not use AFS transaction services
Age	Household respondent's age
Number of persons in the household	Number of people who live in the household
Rural	1 = Household live in the rural/non-metropolitan area
Family income less than $15k	1 = Family income of the household is less than $15,000
High school diploma	1 = Education level of the household is high school diploma
College degree	1 = Education level of the household is a college degree
Employed	1 = Household is employed
US born / foreign born citizen	1 = Household is a US born or foreign born citizen in US

Race / Ethnicity	1 = Black
	2 = Hispanic
	3 = Asian
	4 = White
	5 = Other
Married	1 = Marital status of the household is married
Female headed family	1 = Household type identified as a female head
Homeowner	1 = Respondent is identified as a home owner
Previously banked	1 = Household had used bank services or an account earlier
Bank branches density	Number of bank branches per 100,000 people in a county

We utilize a Difference-in-Differences (DID) methodological approach to evaluate whether the Dodd-Frank Act had a differential impact on financial inclusion of rural households that we label the "treatment" group of interest relative to urban households that we label as the "control" group. To measure the differences in the short and long term we use two different post-event years: 2011 and 2019. An alternative approach is the Changes in Changes (CIC) model proposed by Athey and Imbens (2006) and extended by Melly and Santangelo (2015) to the case where the identifying assumptions hold conditional on covariates. The CIC method relaxes the more restrictive assumptions of the DID by treating groups and time periods asymmetrically and relaxing the parallel trend assumption but retaining the rank preservation assumption. This method uses the entire "before" and "after" outcome distributions of the control group to non-parametrically estimate the change in the control group over time and recovers the whole distribution of the counterfactual outcome. This estimation is relatively straightforward in the absence of covariates. The Melly and Santangelo method is also semi-parametric and incorporates covariates in the Athey and Imbens procedure to obtain unconditional estimates. Chernozhukov et al. (2013) consider identification of the conditional Average Treatment Effect (ATE) and Quantile Treatment Effect (QTE) for non-separable panel data models under the time homogeneity condition. D'Haultfoeuille et al. (2015) present identification of non-separable models using repeated cross sections.

Within the empirical design of the special case of difference in-differences approach to examine the differential trends, there are only two groups, urban and rural ($g = u, r$), observed in two time periods, before and after the Act ($t = 1, 2$), corresponding to a 2×2 matrix of outcomes y. In this study, y_1 is the outcome in the presence of the Dodd-Frank effect as the treatment and y_0 is the outcome in the absence of the Dodd-Frank effect. The variables of interest are the Likelihood of opening a bank account, AFS credit use, and AFS transaction use. Groups u and r are control and treatment, respectively. The treatment is observed only if $g = r$ and $t = 2$. In our two-period difference-in-differences context, time $t = 1$ corresponds to 2009, the year before the Dodd-Frank Act implemented, and time $t = 2$ corresponds to 2011 and 2019, the last sample year. Group $g = 2$ is rural households that were affected by the Dodd-Frank Act in years 2011 and 2019.

This study adopts the conventional categories of metropolitan (or metro) and nonmetropolitan (or non-metro) areas to define the urban and rural households classified by the United States Department of Agriculture Economic Research Service (USDA-ERS). Metropolitan Statistical Areas (MSAs) are the ones that encompass an urban core with population of at least 50,000 people and non-metropolitan are the ones with less than that. In the basic model, the average treatment effect on the treated can be written as

$$\tau DID = E[y_{r2}^1] - E[y_{r2}^0] = E[y_{r2}] - E[y_{r1}] - (E[y_{u2}] - E[y_{u1}]) \tag{1}$$

The basic empirical model is estimated at the individual household level i in time period t

$$Y_{it} = f(T_t, Z, X_t) \tag{2}$$

where Y_{it} is the outcome variable, T_t is given the binary time period t, and Z represents the treatment and control groups (rural and urban households). X_t is the vector of covariates representing household's characteristics that controls for observable differences in their distribution between the treatment and control groups. This regression model is parameterized following the difference-in-differences literature as

$$Y_{it} = \beta_0 + \beta_1 Time + \beta_2 Treatment + \beta_3 (Time \times Treatment) + \beta_4 X_{it} + \varepsilon_{it} \tag{3}$$

where we use three dependent variables for Y_{it} are how likely to open a bank account, use of alternative financial services for credit (payday loan, pawn shop loan, rent-to-own service, and refund anticipation loan), and use of alternative financial services for transactions (check cashing, money order). The vector X_{it} contains the set of demographic and socio-economic characteristics from Table 1, and ε_{it} represents the standard idiosyncratic disturbance error term. β_1 represents the effect of time on outcomes for the non-treated group and β_2 represents the treatment effect on outcomes in the pre-treatment period. β_3 is the coefficient of interest as it

is the estimator for the difference-in-differences effect of the treatment on the treated.

In addition to accommodating non-continuous outcome variables, we are interested in differences in results along the whole distribution of outcomes. Unlike linear regression model that estimates the conditional expectations of outcome at the mean, the quantile regression model (Koenker & Bassett, 1978; Chernozhukov & Hansen, 2006) estimates conditional expectations by quantiles and is also more robust against outliers. In the spirit of the DID estimation, we adopt the Changes-in-Changes method outlined as in Athey and Imbens (2006) and Melly and Santangelo (2015) to estimate the impact of the Dodd-frank Act on the distribution of the outcome variables. The treatment effect is identified as

$$\gamma^{CIC} = F_{Y_1|D=1}^{-1}(\gamma) - F_{Y_0|D=1}^{-1}(\gamma) \tag{4}$$

where $F_{Y_1|D=1}(.)$ represents the distribution of treated potential outcomes for the treated group and $F_{Y_0|D=1}(.)$ is the distribution of untreated potential outcomes for the treated group. $F_{Y_1|D=1}(y)$ is identified directly because we observe the distribution of the treated outcome for the treated. Because $F_{Y_0|D=1}(.)$ cannot be directly identified from the data, the estimator uses proxies for changes in the outcome variables that would have occurred in the treatment group in the absence of the policy, namely the change in the outcome that did occur at a certain quantile of the control group.

The Changes-in-Changes approach (CIC) provides the Quantile Treatment Effects (QTE) in estimating the impacts of the Dodd-frank Act on the outcome distribution of financial inclusion indicators of unbanked rural households. These quantile treatment effects estimates allow us to assess the impact of the policy on the lower, middle, and upper parts of the outcome distribution.

4. Results and Discussion

Table 2 presents the summary statistics for the dependent variables as well as the demographic and county characteristics of rural and urban households for the years of 2009, 2011, and 2019. Households in rural areas are older (46 vs 44 years) and smaller, have higher share of households with income below $15,000 and smaller share of employed (0.36 versus 0.42) but higher proportion of homeowners (0.39 versus 0.21) and previously banked (0.54 versus 0.048). Bank branches density per 100,000 people is 32 for the rural and 46 for urban areas suggesting that rural households have more limited access to banks and that a legislation affecting availability of bank branches may affect these households.

Table 2. Summary statistics of total unbanked, rural and urban households

Household Variables	Total unbanked (N = 7801) Mean (SD)	Unbanked rural (Treated, n=1767) Mean (SD)	Unbanked urban (Control, n=6034) Mean (SD)
Outcome variables			
Like to open a bank account	1.96 (1.06)	1.86 (1.02)	1.99 (1.07)
AFS Credit use	0.28 (0.45)	0.30 (0.46)	0.28 (0.45)
AFS Transaction use	0.66 (0.47)	0.65 (0.47)	0.66 (0.47)
Demographic variables			
Age of the household	44.47 (16.22)	45.86 (16.68)	44.06 (16.07)
Number of persons in the household	2.58 (1.70)	2.47 (1.57)	2.62 (1.73)
Family income less than $15000	0.49 (0.50)	0.56 (0.50)	0.47 (0.50)
Highschool diploma	0.38 (0.48)	0.40 (0.49)	0.37 (0.48)
College degree	0.05 (0.21)	0.02 (0.15)	0.05 (0.22)
Employed	0.41 (0.49)	0.36 (0.48)	0.42 (0.49)
U.S. born / foreign born citizen	0.84 (0.37)	0.94 (0.23)	0.80 (0.40)
Black	0.34 (0.47)	0.37 (0.48)	0.33 (0.47)
Hispanic	0.25 (0.43)	0.29 (0.09)	0.30 (0.46)
Asian	0.02 (0.13)	0.01 (0.11)	0.02 (0.14)
White	0.38 (0.48)	0.56 (0.49)	0.32 (0.47)
Other	0.04 (0.18)	0.27 (0.08)	0.15 (0.02)
Married	0.22 (0.42)	0.23 (0.42)	0.22 (0.41)
Female headed family	0.28 (0.45)	0.29 (0.45)	0.28 (0.45)
Homeowner	0.25 (0.43)	0.39 (0.49)	0.21 (0.40)
Previously banked	0.50 (0.50)	0.54 (0.50)	0.48 (0.50)
Bank branches density (per 100,000 people)	35.06 (20.65)	31.86 (20.20)	46.01 (18.30)

There are three key outcome variables in our empirical analysis: the likelihood of opening a bank account, the use of credit from AFS, and using AFS for transaction purposes. The differences between rural and urban households' outcome variables for 2009, 2011 and 2019 are presented in Figure 1. The charts illustrate similar growth trends in the likelihood to open a bank account in both groups. There is, however, a significant decrease in the rural households' use of AFS in 2019 compared to their urban counterparts.

Figure 1. Measures of financial inclusion for Unbanked Urban and Rural Households by year

The CIC method by Melly and Santangelo (2015) allows only two periods in the model with covariates and thus reveals only the average treatment effect on financial inclusion in the period after the implementation of the Dodd-Frank Act. We estimated the Quantile Treatment Effects for the Treated (QTET for unbanked rural households) for 2009/2011 and 2009/2019 years separately while controlling for all the covariates. Tables 3 and 4 present the estimates of the QTET for 2011 (short-term) and for 2019 (long-term).

Table 3. Quantile Treatment Effects with covariates of Unbanked Rural households for 2011

Year Quantile	2011					
	Likelihood of Opening a bank account		AFS Credit use		AFS Transaction use	
	QTE	SE	QTE	SE	QTE	SE
0.1	0.137	0.104	-1.00	0.52	0.00	0.00
0.2	-0.053	0.108	-1.00	0.52	0.00	0.00
0.3	-0.243	0.178	-1.00	0.52	0.00	0.00
0.4	-0.467	0.233	-1.00	0.00	0.00	0.00
0.5	0.333**	0.256	-1.00	0.00	0.00	0.00
0.6	0.085**	0.114	0.00	0.52	0.00	0.00
0.7	0.661*	0.397	0.00	0.00	-1.00	0.42
0.8	0.000	0.064	0.00	0.00	0.00	0.52
0.9	0.000	0.390	0.00	0.00	0.00	0.00

Note. ***, **, *, stand for significance at 1%, 5% and 10% respectively.

Table 4. Quantile Treatment Effects of Unbanked Rural households with covariates for 2019

| Year Quantile | 2019 | | | | | |
| | Likelihood of Opening a bank account | | AFS Credit use | | AFS Transaction use | |
	QTE	SE	QTE	SE	QTE	SE
0.1	0.00	0.00	0.00	0.00	0.00	0.00
0.2	0.00	0.00	0.00	0.00	0.00	0.037
0.3	0.00	0.00	0.00	0.00	0.00	0.349
0.4	0.00	0.00	0.00	0.00	-1.00	0.00
0.5	0.00	0.00	0.00	0.00	0.00	0.483
0.6	0.00	0.57	-1.00	0.15	0.00	0.00
0.7	0.44**	0.45	-1.00	0.48	0.00	0.00
0.8	0.82**	0.49	0.00	0.00	0.00	0.00
0.9	0.00	0.37	0.00	0.00	0.00	0.00

Note. ***, **, *, stand for significance at 1%, 5% and 10% respectively.

The results show a positive and significant effect on the fifth to seventh quantiles of the likelihood of opening a bank account in 2011. Specifically, at the median, the short term effects of the Dodd-Frank Act is associated with 0.33 higher likelihood that rural household would want to open a bank account relative to urban households. This effect continues to be positive in the sixth quantile and is double the median in the seventh. However, there is no statistically significant difference between rural and urban households in terms of using ATS for credit and transaction services. The same is true in year 2019, with a significant positive impact on only seventh and eighth quantiles of the likelihood of opening a bank account (0.44 and 0.82 respectively) suggesting once again that the effects are stronger in the right tail of the distribution.

Table 5. Average Treatment Effect (ATE) for the outcomes of unbanked rural households with covariates

| Outcome variable | 2011 | | | 2019 | | |
	Average Effect	S.E.	Obs.	Average Effect	S.E.	Obs.
Like to open a Bank account	0.19**	0.10	6190	0.11**	0.10	4619
AFS Credit services use	-0.54	0.14	6190	-0.14	0.04	4619
AFS Transaction services use	-0.06	0.23	6190	-0.18	0.048	4619

Note. ***, **, *, stand for significance at 1%, 5% and 10% respectively.

Table 5 presents the Average Treatment Effects for opening a bank account and AFS credit and transaction use by unbanked rural households controlling for covariates in 2011 and 2019. On average, unbanked rural households were more likely to open a bank account after the Dodd-Frank Act and the effect is stronger in 2011 at 0.19 compared to 0.11 in 2019. However, relative to unbanked households in urban areas, they decreased their use of AFS for credit and transaction services, although the difference is only marginally significant. Overall, the results suggest that the positive impacts of the Dodd-Frank Act on the likelihood of opening a bank account decreased in time while controlling for the full set of covariates including bank branch density. At the same time, the use of AFS for credit and transactions by the unbanked rural households does not seem to have been significantly impacted both in the short and long term.

5. Robustness Checks

We estimate logistic regressions for each of the three outcome variables (households' intention to use banks services, use AFS for credit or use AFS for transaction purposes) as a robustness check. This serves as an alternative way to establish whether the unbanked rural households differ from the unbanked urban households in terms of their likelihood to use banking services or AFS while controlling for the socioeconomic characteristics. For that, we use the full sample of unbanked rural and urban households for 2009, 2011, and 2019.

For the first outcome, the intention to open a bank account measured by four categories (very likely, somewhat likely, not very likely, and not at all likely), we use ordered logit regressions and estimate them separately for the unbanked rural and unbanked urban households. The results from regressions with a full set of controls for household characteristics and county variables are presented in Table 6. Estimates suggest that, for rural unbanked households, the likelihood of opening an account (moving from one category to another, i.e., from not very likely to somewhat likely) is higher for those with a college degree, in a family headed by a woman (female head of family), and previously banked, but the likelihood decreases with age. For the urban unbanked households, while still decreasing with age, the likelihood increases with being employed, being Black or Asian

(relative to white), being married, being a family headed by a woman, and for those who were previously banked.

Of primary interest for the robustness check are the estimates of the coefficients for years 2011 and 2019. The short-term (2011) effect of the Dodd-Frank Act for both groups is increased likelihood of opening a bank account that is larger for rural relative to urban households, which is consistent with the main result from the CIC model. In the long-term (2019), this effect became insignificant for the rural and negative for the urban households, which is also in line with the decreasing likelihood of opening an account over time.

Table 6. Ordered Logistic Regression Results for Unbanked rural and urban households from 2009, 2011 and 2019

Dependent Variable	Likelihood of opening a bank account	
	Unbanked rural	Unbanked urban
Household control variables		
Age	0.964***	0.971***
	(0.004)	(0.002)
Number of persons in the household	1.035	1.002
	(0.042)	(0.021)
Family income less than $15000	1.004	0.993
	(0.109)	(0.056)
Highs chool diploma	1.041	1.049
	(0.106)	(0.059)
College degree	2.715***	1.210
	(0.951)	(0.148)
Employed	1.153	1.202***
	(0.128)	(0.069)
U.S. born or foreign born citizen	1.063	0.970
	(0.294)	(0.082)
Race / Ethnicity		
White (Reference category)		
Black	1.039	1.383***
	(0.149)	(0.092)
Hispanic	1.021	1.026
	(0.208)	(0.083)
Asian	2.614*	1.769***
	(1.299)	(0.345)
Other	1.158	0.931
	(0.219)	(0.162)
Married	1.204	1.338***
	(0.184)	(0.110)
Female headed family	1.365**	1.298***
	(0.186)	(0.093)
Homeowner	1.005	0.958
	(0.111)	(0.067)
Previously banked/ Had a bank account	3.163***	2.787***
	(0.339)	(0.159)
County control variables		
Bank density	0.997	0.998
	(0.002)	(0.001)
Year Dummies		
2011	1.249**	1.216***
	(0.136)	(0.070)
2019	0.769	0.617***
	(0.138)	(0.048)
Number of observations	1580	5265
LR chi^2(18)	316.41	806.99
Prob > chi^2	0.0000	0.0000
Pseudo R^2	0.4832	0.4602
Log likelihood	-1743.40	-6298.44

Note. ***, **, *, stand for significance at 1%, 5% and 10% respectively. Standard errors in parentheses.

Table 7 focuses on the relationship between the control variables of unbanked rural and urban households and their use of AFS for credit (Column 1) and for transactions purposes (Column 2). The results from the binomial logit model show that household respondent's age, number of persons in the household, having a college degree, employed, U.S. born or foreign born citizen, Black, Hispanic and Asian households compared to the reference category white, being married, a homeowner, and previously banked characteristics show significant associations for AFS credit uses of unbanked households. For using AFS for transaction purposes, same covariates except Black and Hispanic are also significant. The likelihood of AFS credit and transaction use decreases with age, having a college degree, being a home owner, and being Asian, and Black and Hispanic (for AFS credit use). It increases with the size of the household, being U.S. born or foreign-born citizen, and being married and previously banked. Compared to urban, rural unbanked households were less likely to use AFS for credit.

Table 7. Binomial Logistic Regression Results for Unbanked households from 2009, 2011 and 2019

Dependent Variable	AFS Credit use	AFS Transactions use
Household control variables		
Age	0.981***	0.988***
	(0.002)	(0.002)
Number of persons in the household	1.119***	1.038*
	(0.025)	(0.022)
Family income less than $15000	1.025	0.965
	(0.064)	(0.056)
High school diploma	1.019	1.021
	(0.073)	(0.058)
College degree	0.627***	0.487***
	(0.101)	(0.061)
Employed	1.148**	1.424***
	(0.082)	(0.085)
U.S. born or foreign born citizen	3.139***	1.217**
	(0.382)	(0.112)
Race / Ethnicity		
Black	0.652***	0.999
	(0.047)	(0.068)
Hispanic	0.594***	1.012
	(0.055)	(0.087)
Asian	0.315***	0.412***
	(0.111)	(0.087)
Other	0.986	1.119
	(0.145)	(0.163)
Married	1.274***	1.254***
	(0.117)	(0.105)
Female headed family	1.132	1.200
	(0.089)	(0.089)
Homeowner	0.689***	0.806***
	(0.051)	(0.053)
Previously banked/ Had a bank account	2.555***	2.184***
	(0.157)	(0.123)
County control variables		
Bank density	1.001	0.999
	(0.001)	(0.001)
Rural	0.786**	1.004
	(0.088)	(0.105)
Year Dummies		
2011	1.304***	1.328***
	(0.092)	(0.091)
2019	0.335***	0.650***
	(0.037)	(0.053)

Interactions		
Rural $\times$ 2011	1.165	1.018
	(0.168)	(0.145)
Rural $\times$ 2019	2.152***	0.876
	(0.473)	(0.154)
Observations	6912	7046
LR chi^2(21)	1100.89	601.50
Prob > chi^2	0.0000	0.0000
Pseudo R^2	0.5323	0.4673
Log likelihood	-3610.30	-4170.37

Note. ***, **, *, stand for significance at 1%, 5% and 10% respectively. Standard errors in parentheses.

In terms of short- and long-term effects (year dummies), the AFS use by both groups increased in 2011 but decreased in 2019 compared to 2009. Most importantly, the year-rural interactions indicate that AFS credit use increased by the rural unbanked in 2019 suggesting that, in long-term, rural unbanked households were more likely to resort to the use of AFS, perhaps due to the absence of adequate banking services in their locations.

6. Conclusion

This paper evaluates the differential impacts of the Dodd-Frank Act of 2010 on financial inclusion of unbanked households in rural and urban areas in the U.S. Financial inclusion is defined as being part of the formal financial system and less reliant on Alternative Financial Services that offer much needed but also high cost services. The Dodd-Frank Act imposed significant compliance costs on smaller banks, many of which operate in rural areas, which might have contributed to, or at least coincided with, closing of bank branches that affected disproportionally more rural than urban unbanked populations. We test the hypothesis that rural households became more excluded from the financial system by estimating whether they were affected differently than the urban unbanked households in terms of their plans to open a bank account and their use of Alternative Financial Services (AFS).

We estimate Quantile Treatment Effects (QTE) using the Changes-in-Changes (CIC) model with household data from the National Household Survey conducted by the FDIC in 2009 (prior to the Act implementation), 2011 (to capture the short-term effect), and 2019 (to capture the long-term effect). The CIC model estimates the QTE for the treated group of unbanked rural households to identify the average treatment effects of the "treated" group by percentile. The controls include relevant demographic characteristics for the unbanked households and bank branch density.

The results indicate that the Dodd-Frank Act is associated with increased intention to open a bank account by the unbanked rural households relative to urban households in both short and long term but with a smaller long-term effect. We do not find consistent statistically significant differences between the two household groups in terms of their use of AFS either for credit or for transaction and payment purposes. However, there is evidence that, relative to urban households, rural households are more likely to use AFS for credit purposes in the long run (2019), which may be related to the resulting closures of banking infrastructure in rural areas that reduced bank branch density from 32 to 24 per 100,000 people between 2009 to 2019.

Overall, our results suggest that the Dodd-Frank Act may have led to an increased intention of the unbanked rural population to shift towards using formal banking services and away from the AFS, which is an indicator of improved inclusion of this group relative to the unbanked urban population. This indicates that there is demand for banking services by the unbanked in rural areas but the closing of rural and community bank branches that happened during the last decade likely negatively affected these populations despite other institutions offering their services. To address this issue effectively, financial institutions in rural communities need solutions and cost saving practices such as the introduction and promotion of mobile/online banking technologies. With better tools, community banks and credit unions can operate more efficiently and provide better services for rural communities in need of banking services.

From the policy perspective, advancing financial inclusion efforts in rural communities would help meet these needs. The growth of mobile devices' use in the past decade offers opportunity for banks to utilize digital channels to provide banking services, especially if offered without fees. Policies that encourage banks to offer checking and savings accounts via new mobile technologies are likely to increase financial inclusion of unbanked rural households. Likewise, educational efforts to improve financial literacy and engage unbanked rural communities may also be promising. With mobile and online banking accounts, rural and community banks

can make a real difference by expanding the frontier of finance and bringing more unbanked people to the formal banking system.

References

Aportela, F. (1999). *Effects of Financial Access on Savings by Low-Income People*. Mimeo, Banco de México.

Ashraf, N., Dean, K., & Wesley, Y. (2006). Deposit Collectors. *Advances in Economic Analysis & Policy, 6*, 1-22. https://doi.org/10.2202/1538-0637.1483

Athey, S., & Imbens, G. W. (2006). Identification and inference in nonlinear difference in difference. *Econometrica, 74*(2), 431-497. https://doi.org/10.1111/j.1468-0262.2006.00668.x

Banerjee, A., Esther, D., Rachel, G., & Cynthia, K. (2010). The Miracle of Microfinance? Evidence from a Randomized Evaluation. *MIT Bureau for Research and Economic Analysis of Development Working Paper no. 278*. Massachusetts Institute of Technology. https://doi.org/10.2139/ssrn.2250500

Barr, M. S. (2004). *Banking the Poor*. University of Michigan Law School, Law & Economics Working Papers Archive: 2003–2009. Retrieved from https:// repository.law.umich.edu/law_econ_archive/art49/

Beck, T., Demirgüç-Kunt, A., & Ross, L. (2007). Finance, inequality and the poor. *Journal of Economic Growth, 12*(1), 27-49. https://doi.org/10.1007/s10887-007-9010-6

Bellucci, A., Borisov, A., Giombini, G., & Zazzaro, A. (2019). Collateralization and distance. *Journal of Banking & Finance, 100*, 205-217. https://doi.org/10.1016/j.jbankfin.2019.01.011

Berry, C. (2004). To Bank or Not to Bank? A Survey of Low-Income Households. *Joint Center for Housing Studies Working Paper Series*, BABC 04-3, February 2004.

Board of governors of the federal reserve system. (2019). *Perspectives from Main Street: Bank Branch Access in Rural Communities*. Retrieved from https://www.federalreserve.gov/publications/files/bank-branch-access-in-rural-communities.pdf

Brune, L., Xavier, G., Jessica, G., & Dean, Y. (2011). Commitments to save: A field experiment in rural Malawi. *World Bank Policy Research Working Paper Series*. https://doi.org/10.1596/1813-9450-5748

Buchak, G., Matvos, G., Piskorski, T., & Seru, A. (2018). Fintech, regulatory arbitrage, and the rise of shadow banks. *Journal of Financial Economics, 130*(3), 453-483. https://doi.org/10.1016/j.jfineco.2018.03.011

Burgess, R., & Pande, R. (2005). Can Rural Banks Reduce Poverty? Evidence from the Indian social banking experiment. *American Economic Review, 95*(3), 780-795. https://doi.org/10.1257/0002828054201242

Campbell, D., Martinez-Jerez, F. A., & Tufano, P. (2012). Bouncing Out of the Banking System: An Empirical Analysis of Involuntary Bank Account Closures. *Journal of Banking and Finance, 36*, 1224-1235. https://doi.org/10.1016/j.jbankfin.2011.11.014

Caskey, J. P. (2002). *Bringing Unbanked Households into the Banking System*. Retrieved from https://www.brookings.edu/articles/bringing-unbanked-households-into-the-banking-system/

Castellani, D., & Afonso, J. S. (2021). Geographic diversification and credit supply in times of trouble: Evidence from microlending. *Journal of Business Research, 132*, 848-859. https://doi.org/10.1016/j.jbusres.2020.10.071

Célerier, C., & Matray, A. (2019). Bank-branch supply, financial inclusion, and wealth accumulation. *The Review of Financial Studies*, *32*(12), 4767-4809. https://doi.org/10.1093/rfs/hhz046

Chernozhukov, V., & Hansen, C. (2006). Instrumental quantile regression inference for structural and treatment effect models. *J. Econometrics, 132*(2), 491-525. https://doi.org/10.1016/j.jeconom.2005.02.009

Chernozhukov, V., Fernandez V, I., Hahn, J., & Newey, W. (2013b). Average and quantile effects in nonseparable panel models. *Econometrica, 81*(2), 535-580. https://doi.org/10.3982/ECTA8405

Cole, A., & Claire, G. (2016). Financial Inclusion and Consumer Payment Choice. *Federal Reserve Bank of Boston, Research Data Reports, no. 16-05*. Retrieved from https://www.bostonfed.org/publications/research-data-report/2016/financial-inclusion-and-consumer-payment-choice.aspx

Council of Economic Advisors Issue Brief. (2016). *Financial Inclusion in the United States*. Retrieved from https://obamawhitehouse.archives.gov/sites/default/files/docs/20160610_financial_inclusion_cea_issue_brief.pdf

Covington, M., & Courtney, J. (2014). *Banking in Rural America, Insight from a Community Development Financial Institution (CDFI).* Retrieved from https://southernpartners.org/public-policy/banking-in-rural-america-insight-from-a-cdfi/

D'Haultfoeuille, X., Hoderlein, S., & Sasaki, Y. (2022). Nonlinear Difference-in-Differences in Repeated Cross Sections with Continuous Treatments. *Journal of Econometrics* (forthcoming). https://doi.org/10.1016/j.jeconom.2022.07.003

Demirgüç-Kunt, A., & Klapper, L. (2013). Measuring Financial Inclusion: Explaining Variation in Use of Financial Services across and within Countries. *Brookings Papers on Economic Activity Spring 2013* (pp. 279-340). https://doi.org/10.1353/eca.2013.0002

Dunham, I. M. (2019). Landscapes of financial exclusion: Alternative financial service providers and the dual financial service delivery system. *Business and Society Review*, *124*(3), 365-383. https://doi.org/10.1111/basr.12180

Dupas, P., & Robinson, J. (2013). Why Don't the Poor Save More? Evidence from Health Savings Experiments. *American Economic Review, 103*, 1138-71. https://doi.org/10.1257/aer.103.4.1138

Erel, I., & Liebersohn, J. (2020). *Does Fintech substitute for banks? Evidence from the paycheck protection program.* Technical report, National Bureau of Economic Research. https://doi.org/10.3386/w27659

Federal Deposit Insurance Corporation. (2017). *National Survey of Unbanked and Underbanked Households.* Retrieved from https://www.fdic.gov/analysis/household-survey/2017/index.html

Federal Deposit Insurance Corporation. (2021). *How America Banks: Household Use of Banking and Financial Services.* Household Survey Analysis. Retrieved from https://www.fdic.gov/analysis/household-survey/2019/index.html

Fernandes, D., John, G. L. Jr, & Richard, G. N. (2014). Financial literacy, financial education, and downstream financial behaviors. *Management Science, 60*(8), 1861-1883. http://dx.doi.org/10.1287/mnsc.2013.1849

Geler, B. (2020). *What the Dodd-Frank Act Did (and How It's Changed).* Retrieved from https://smartasset.com/investing/dodd-frank-act

Goetz, M. R., Laeven, L., & Levine, R. (2013). Identifying the valuation effects and agency costs of corporate diversification: Evidence from the geographic diversification of US banks. *The Review of Financial Studies*, *26*(7), 1787-1823. https://doi.org/10.1093/rfs/hht021

Hinton, N. L, Thieme, D. K., & Woodhead, A. N. (2017). Factors shaping recent trends in banking office structure for community and non community banks. *FDIC Quarterly Report, 11(*4). 31-40. Retrieved from https://www.fdic.gov/analysis/quarterly-banking-profile/fdic-quarterly/2017-vol11-4/fdic-v11n4-3q2017-article1.pdf

Hogarth, J. M., Anguelov, C. E.,& Lee, J. (2005). Who Has a Bank Account? Exploring Changes Over Time, 1989-2001. *Journal of Family and Economic Issues, 26*(1), 7-30. https://doi.org/10.1007/s10834-004-1410-6

Karlan, D., & Zinman, J. (2010). Expanding Credit Access: Using Randomized Supply Decisions to Estimate the Impacts. *Review of Financial Studies, 23*(1), 433-64. https://doi.org/10.1093/rfs/hhp092

Karlan, D., Ratan, A. L., & Zinman, J. (2014). Savings by and for the Poor: A Research Review and Agenda. *Review of Income and Wealth, 60*(1), 36-78. https://doi.org/10.1111/roiw.12101

Koenker, R., & Bassett, G. (1978). Regression Quantiles. *Econometrica, 46*(1), 33-50. https://doi.org/10.2307/1913643

Le, H. (2017). *The Effects of the Dodd-Frank Act on Community Banks.* MS Thesis. Retrieved from https://openprairie.sdstate.edu/etd/1709/

Melly, B., & Santangelo, G. (2015). *The changes-in-changes model with covariates* (Working Paper). Retrieved from http://www.hec.unil.ch/documents/seminars/deep/1591.pdf

Morgan, D. P., Pinkovskiy, M. L., & Yang, B. (2016). Banking deserts, branch closings, and soft information. *Liberty Street Economics. The Federal Reserve Bank of New York.* Retrieved from https://libertystreeteconomics.newyorkfed.org/2016/03/banking-deserts-branch-closings-and-soft-information/

Nguyen, H. L. Q. (2019). Are credit markets still local? Evidence from bank branch closings. *American*

Economic Journal: Applied Economics, 11(1), 1-32. https://doi.org/10.1257/app.20170543

Osili, U. O., & Paulson, A. (2008). What Can We Learn about Financial Access from U.S. Immigrants? The Role of Country of Origin Institutions and Immigrant Beliefs. *World Bank Economic Review, 22*(3), 431-455. https://doi.org/10.1093/wber/lhn019

Rajan, U., Seru, A., & Vig, V. (2015). The failure of models that predict failure: distance, incentives, and defaults. *Journal of Financial Economics, 115*(2), 237-260. https://doi.org/10.1016/j.jfineco.2014.09.012

Rhine, S. L. W., & Greene, W. H. (2006). The Determinants of Being Unbanked for U.S. Immigrants. *Journal of Consumer Affairs, 40*(1), 21-40. https://doi.org/10.1111/j.1745-6606.2006.00044.x

Rhine, S. L. W., & Greene, W. H. (2013). Factors That Contribute to Becoming Unbanked. *Journal of Consumer Affairs, 47*(1), 27-45. https://doi.org/10.1111/j.1745-6606.2012.01244.x

Ruiz, O. C. (2013). From pawn shops to banks: The impact of formal credit on informal households. *World Bank policy research working paper 6634*. https://doi.org/10.1596/1813-9450-6634

Schorgl, M. (2018). *The Dodd-Frank Act and its Impact on Community Bank Mortgage Lending* (Doctoral dissertation, University of Mississippi). Retrieved from https://egrove.olemiss.edu/hon_thesis/634/

Wheelock, D. (2012). Too big to fail: The pros and cons of breaking up big banks. *The Regional Economist,* Oct, 10-11. Retrieved from https://EconPapers.repec.org/RePEc:fip:fedlre:y:2012:i:oct:p:10-11

Notes

Note 1. The Act created the Consumer Financial Protection Bureau (CFPB) and Financial Stability Oversight Council (FSOC). The Consumer Finance Protection Bureau CFPB can stop banks from enrolling customers in expensive overdraft programs without consumers' consent and supervise and control over larger AFS companies such as check cashers and payday lenders to prevent harmful practices that help families to avoid hidden fees.

Note 2. Banking deserts are service gaps where there are no banks within 10 miles of populated areas.

Copyrights