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Abstract

This paper conducts a detailed exploration of the factors associated with unbanked status among U.S. households and how these relationships evolved between 2015 and 2019. Biennial FDIC household survey data on bank account ownership and household characteristics, combined with state-level variables, are examined with application of both fixed effects and multilevel modeling. The analysis finds that even as rising incomes drove a decline in the unbanked percentage of the population over this period, income remained the most significant differentiator, with strong associations with race and ethnicity also persisting. Unbanked status became more concentrated among single individuals and disabled individuals and less concentrated among younger households over this period, and less strongly related to unemployment spells. New factors identified by the analysis include lack of digital access and non-citizen immigrant status, both associated with significantly higher likelihood of being unbanked. Identified state-level relationships include an association between financial literacy measures and percent unbanked. Overall, the findings suggest that continuation of recent efforts by policymakers to bridge the digital divide in rural and urban areas and to enhance financial literacy could help expand financial inclusion. Another key takeaway is that unknown structural factors still pose a challenge to explaining who is unbanked, especially regarding gaps by race and ethnicity, underscoring a need to capture more granular data on the unbanked.

Keywords: unbanked, consumer banking, financial inclusion, financial literacy, multilevel modeling

JEL Code: D14, D31, G21, G53, C81, C83

I. Introduction

According to the biennial FDIC National Survey of Unbanked and Underbanked Households, unbanked rates have been declining in the U.S., down from 7 percent in 2015 to 5.4 percent in 2019. The newly released 2023 survey reports further improvement, with the national unbanked rate dropping to 4.3 percent, a historical low.[1]

Unbanked rates, while improving across all demographic groups, vary across states and remain stubbornly high for certain segments of the population. For example, 13.8 percent of Black households and 12.2 percent of Hispanic households were unbanked in 2019, compared to 2.5 percent of White households, down from 18.5, 16.3, and 3.1 in 2015, respectively.[2]

Unbanked households remain reliant on high-cost transactional alternatives such as check cashing outlets. Moreover, lack of a bank account may exacerbate financial insecurity and impede the development of financial skills, whereas having a bank account may promote saving, improve cash management, and facilitate financial learning.[3] Thus, persistently high unbanked percentages within certain segments of the population remain a policy concern (Caskey 1994; Barcellos and Zamarro 2019; Beshears et al. 2018).

This paper seeks to expand understanding of the factors associated with unbanked status and of the challenges that remain, using data from the 2015, 2017, and 2019 FDIC household surveys on bank account ownership combined with state-level data.[4] We identify previously overlooked relationships by examining the full set of potential explanatory variables available within the FDIC survey data, and we explore state-level alongside these household-level factors through use of multilevel modeling. Additionally, via use of the multi-year sample we highlight how the factors associated with unbanked

[1] The unbanked rate had already fallen to 4.5 percent as of 2021. Part of this improvement may have come about because of the critical role of banks in facilitating COVID-19 relief programs. In fact, according to the 2021 Survey, about one in three (34.9 percent) recently banked households reported that receiving a government benefit payment contributed to opening a bank account since March 2020.

[2] As of 2023, unbanked rates for Black, Hispanic, and White households had fallen to 10.6, 9.5, and 1.9, respectively.

[3] It is well understood and documented that having a bank account reduces the direct and indirect costs of conducting financial transactions (Barr 2004; Barr, et al. 2012; Armstrong 2016). One reason wealth prospects are enhanced with a bank account is that consumers can more readily qualify for credit products to facilitate the acquisition of assets and smooth credit shocks (Brevoort and Kambara 2017).

[4] Because some of the improvement between 2019 and 2021 may be tied to the pandemic relief programs and is therefore transient, and because of substantial revisions to the FDIC survey in 2021 (such as no longer collecting data on smartphone ownership), our analysis restricts attention to the 2015 through 2019 surveys.

status have evolved, as in Hogarth et al. (2005).[5] Through this integrated approach, the analysis unites and builds upon various themes from previous studies. The analysis finds that even as rising incomes drove a decline in the unbanked percentage of the population over this period, income remained the most significant differentiator, with strong associations with race and ethnicity also persisting. Unbanked status became more concentrated among single individuals and disabled individuals and less concentrated among younger households over this period, and less strongly related to unemployment spells.

New factors identified by the analysis include lack of digital access and non-citizen immigrant status, both associated with significantly higher likelihood of being unbanked. Thus, on the one hand, the analysis suggests that, in addition to income and employment gains in the lower-income strata of the population, a driver of improving financial inclusion has been growth in the use of mobile banking technology.[6] On the other hand, lagging digital access appears to be a major factor in why households remaining unbanked.

State-level relationships identified by the analysis include an association between financial literacy measures and percent unbanked similar to the approach found in Barcellos and Zamarro (2019) but this analysis differs by using more granular and updated cross-sectional data. Specifically, we find that states with lower levels of reading and math proficiency have higher unbanked rates. Thus, the analysis provides evidence consistent with a relationship between financial inclusion and financial literacy, which in part depends on reading and math proficiency and has been found to affect financial health in other contexts. For instance, Lusardi, Michaud, and Mitchell (2017) have demonstrated the importance of financial literacy for savings and wealth accumulation.

Conceptually, availability of payday loans might help consumers maintain a bank account by providing backup liquidity to mitigate the risk of overdrawing the account, or they may harm household financial health due to high fees making it harder to maintain a bank account. We find that restrictions on

[5] At the household level, factors assessed include range and volatility of income; race and ethnicity category; education level; employment and disability status; the presence of a smartphone in the household; access to high-speed internet; age, marital status and family size; and immigration status. At the state level, the analysis considers educational proficiency scores; the percentage of the population lacking health care coverage; and categorization of payday lending laws, among other factors.

[6] Relatedly, Friedline and Chen (2021) study rates of fintech penetration in high-poverty communities. They find that areas with higher percentage Black population have lower rates of fintech adoption. Friedline, Naraharisetti, and Weaver (2020) find that fintech adoption in rural communities is inversely related to poverty rates and percent minority. Boel and Zimmerman (2022), Sakong and Zentefis (2022), and Mushtaq and Bruneau (2019) all highlight how fintech, smartphone, or information technology advances impact financial inclusion.

payday lending in the past were associated with a higher percentage of unbanked households in a state, but this relationship appears to have dissipated.

We also test for an association across Core-Based Statistical Areas (CBSAs) between unbanked status and CBSA-level measures of branch accessibility, as measured by branches-per-capita or by average distance to the nearest branch (restricting the sample to households located in CBSAs.) Past research on financial inclusion, such as Caskey (1994, 2012), emphasizes the role of physical outreach via bank branches or more limited service "outlets" conveniently located near lower-income populations. However, we find no significant relationship between measures of bank branch coverage and percent unbanked.

As we lack direct information on what factors caused individual households to transition from unbanked to banked, it is not possible to assess the factors driving the overall decline in percent unbanked. But based on the cross-sectional results, we can infer that rising incomes, falling unemployment, and expanding digital access were likely contributing factors. In other words, the estimated cross-sectional relationships to smartphone ownership, unemployment, and income suggest that the decline in the unbanked rate between 2015 and 2019 in part is tied to improving economic conditions and increased smartphone ownership.

The pooled model results, including the significant narrowing of the gaps by age and the increasing concentration within these segments, suggest that other, unobserved factors also played a role. For instance, increased availability of more affordable banking options such as the national Bank On program may have accelerated the transition out of unbanked status for those households that are more actively seeking a bank account.

These findings suggest that continuation of recent efforts by policymakers to bridge the digital divide in rural and urban areas, enhance financial literacy, and encourage banks' efforts to innovate affordable banking options could help expand financial inclusion. The results also highlight key challenges facing policymakers. The persistence of income as the strongest differentiator of who owns a bank account suggests that it may be unrealistic to expect universal bank account ownership among households with extremely low incomes. Here, the challenge of bringing households into the banking system is somewhat inseparable from the broader challenge of fostering inclusive economic growth. The results also suggest that further progress in financial inclusion may be tied to progress in digital inclusion and on addressing challenges faced by the expanding, foreign-born non-citizen population.

The fact that gaps by race and ethnicity have persisted in magnitude, even with our inclusion of a maximal set of control variables and despite the overall improvement in household financial health, underscores that more information is needed than presently available in the FDIC survey. Identifying the structural factors contributing to these gaps might best be accomplished by expanding the survey to include a broader range of potential explanatory factors.

The subsequent sections of the paper are organized as follows. Section 2 provides a concise literature review, and Section 3 describes the data used in this study. The analysis based on estimation of models with state fixed effects is described in Section 4. Section 5 presents our multilevel analysis identifying the household-level and state-level factors associated with unbanked status, and the analysis of unbanked status in relation to bank branch accessibility for CBSAs. Section 6 concludes.

II. Literature Review

The literature on unbanked residents in the United States is multidisciplinary, spanning economics, consumer finance, public policy, and sociology. As highlighted in Boel and Zimmerman (2022), previous studies have pursued two main lines of investigation. First, studies have examined the causes of being unbanked or underbanked; and second, they have investigated the consequences of being unbanked. Here, we briefly review the literature on reasons for unbanked status, the primary focus of our own analysis.

Bank account fees. Prior studies have shown that the costs associated with maintaining a banking account such as meeting minimum balance requirements and paying high fees for overdrafts or other services are major reasons for not having a bank account. The early literature on bank account ownership documented high rates of account closure among overdraft users due to high overdraft fees (Barr 2004, Hogarth, et al. 2003, 2005). Servon (2017) and Rhine and Greene (2013) showed that lack of clarity around what fees will be charged can lead to consumers voluntarily becoming unbanked.[7] Barr and colleagues (2012) studied Detroit low- and middle-class families from 2005-2006 and found 30% of survey respondents remained unbanked due to high account fees, less convenience bank hours, excessive minimum balance requirements, and delays in accessing newly deposited funds. The risk of incurring high

[7] Servon (2017) also reports that consumers perceive fees at check cashing outlets to be more transparent, although higher, and may prefer the more immediate availability of funds offered by check cashers. Relatedly, Rhine, Greene, and Toussaint-Comeau (2006) find evidence that consumers weigh the relative cost of obtaining transaction services from banks versus check cashing outlets when deciding whether to establish or keep a bank account.

overdraft charges may also lead to avoidance of bank accounts (Prescott and Tatar 1999; Berre, Blickle, and Chakrabarti 2021).[8]

It is important to recognize, however, that paying a fee for the ability to overdraft can be a positive feature for some consumers, with a positive impact on financial inclusion. That is, for some, an overdraft is equivalent to taking on a short-term loan and may be less costly than available substitutes such as payday loans.

Consistent with the latter view, Akana and Santucci (2021) find that some households use overdrafts as implicit insurance against unanticipated liquidity needs, based on responses gathered from a special module in the Federal Reserve Bank of Philadelphia's CFI COVID-19 Survey of Consumers conducted in July 2021. Survey respondents who reported that they used overdrafts during the pandemic indicated that they did so intentionally; that is, knowing their account balance would not cover their expenses and that they would be charged a fee. Further evidence is provided by Dlugosz, Melzer, and Morgan (2021), who examined the consequences of a 2001 ruling by the Office of the Comptroller of the Currency (OCC) that exempted nationally chartered banks from state-imposed overdraft fee limits. The study found that affected banks lowered minimum balance requirements and expanded the supply of overdraft credit. Moreover, the exemption was found to have a positive effect on financial inclusion, as the percentage of low- or moderate-income households with a checking account increased in states with restrictive caps relative to other states.

Overall, the literature on the cost of bank account ownership suggests that financial inclusion is facilitated by banks offering a range of transaction account options. That is, consumers are less likely to remain unbanked when they can choose among lower cost accounts that may be less conveniently accessible or do not permit overdrafts and accounts with more liberal overdraft policies and higher fees. Thus, the decline in the percentage of households that are unbanked may in part be tied to increasing availability of low-cost, no-overdraft accounts in addition to accounts that allow overdrafts, such as those associated with the national Bank On program. Bank On comprises local partnerships of city, state, and federal government agencies, financial institutions and nonprofit organizations.[9] Data show that the take-

[8] Along these lines, Di Maggio et al. 2021 find that especially aggressive overdraft practices can be deleterious to consumers' financial health.

[9] These local Bank On coalitions are joined nationally under the leadership of the Cities for Financial Empowerment Fund, promoting financial inclusion via banks and credit unions offering deposit accounts that meet the National Account Standards developed for the program by the CFE Fund, its Advisory Board and other stakeholders.

up rate for Bank On accounts has been greatest in areas with high concentrations of lower-income and minority households.[10]

Financial literacy may play a particularly important role in this context. Low levels of financial literacy may be a barrier to unbanked households obtaining and evaluating information about low-cost bank accounts and acting on this information to become banked.

Previous bank account problems. Campbell, Martínez-Jerez, and Tufano (2012) analyze customer characteristics associated with bank accounts that were closed involuntarily. The analysis relies on data from ChexSystems, a reporting agency that collects information about depositors' problems with bank accounts.[11] The analysis indicates that involuntary closures are more frequent in U.S. counties with overall lower education levels, higher unemployment rates, and a larger fraction of single mothers, among other factors. In addition, counties with more competitive banking markets and fewer community banks experience higher closure rates.

Proximity and Technology. Another segment of the literature examining reasons why households are unbanked focuses on geographic proximity to bank branches. Goodstein and Rhine (2017) examine the influence of geographic proximity to a financial institution on a household's joint decision about whether to have a bank account and whether to use nonbank financial transaction services. Using 2011 data from the FDIC and U.S. Census Bureau, they find that a household with close geographic access to bank branches is more likely to have a bank account and is less likely to use nonbank financial transaction products. However, the effect of branch proximity is modest and less than that associated with income, education, or race. Celerier and Matray (2019), using FDIC and the Survey of Income and Program Participation (SIPP) datasets from 1993 to 2005, focusing on lower-income areas and households, find that proximity has statistical power. In particular, the expansion of bank branches of 20% in poor counties led to a 4% increase in financial inclusion among low-income households.

Boel and Zimmerman (2022) note that expansion of online banking and smartphone ownership and entry of fintech firms likely have reduced the importance of bank proximity. Examining the FDIC survey data, they find that smartphone and home internet access are higher in banked as opposed to

[10] See, for example, Calem and Abdul-Razeq (2023).

[11] Problems reported on ChexSystems, including unpaid overdraft fees, checks bounced at retailers, and suspected fraud, can adversely affect an individual's ability to open or keep a bank account. Banks use these data to assess the riskiness of a customer and, in turn, to make decisions about closing an existing account or approving a new customer account.

unbanked households. Our analysis here confirms that these are important factors in the probability of being banked.

Job Loss. A recent study by researchers at the FDIC (Goodstein and Kutzbach 2022) closely examines the role of income stability as a determinant of bank account ownership. The study investigates the effects of job loss on bank account ownership, using the 2011 through 2019 biennial FDIC survey data linked to the Current Population Survey. The analysis indicates that a household experiencing job loss in the months prior to the FDIC survey interview date is about 18 percentage points more likely to be without a bank account as of the survey date, compared to households that were employed prior to the survey date but lost their job during subsequent months.

Our paper confirms prior research that greater employment increases the chances of having a bank account. The economic significance and magnitude of estimated coefficients, however, decline markedly from the 2015 sample to the 2019 sample with inclusion of robust explanatory and control variables within a fixed effects model. The odds ratio for employment drops by nearly 40% over the sample periods.

III. Data

The primary dataset for the analysis is from the FDIC Survey of Household Use of Banking and Financial Services (formerly the FDIC National Survey of Unbanked and Underbanked Households). This survey has been conducted biennially since 2009 in partnership with the U.S. Census Bureau; we utilize the 2015, 2017, and 2019 survey datasets. Because of the special circumstances created by the presence of financial relief programs in 2021 and because of substantial revisions to the FDIC survey in 2021 (such as no longer collecting data on smartphone ownership), our analysis restricts attention to the 2015 through 2019 surveys.

The survey samples from 2015, 2017, and 2019 cover more than 32,000 household respondents each year.[12] They include questions on household bank account ownership, use of prepaid cards and nonbank financial transaction services, and use of bank and nonbank credit. The survey also collects information on demographic, economic, and other household characteristics. These include whether the

[12] Specifically, there are 36,189 observations in the 2015 survey sample; 35,217 in the 2017 sample; and 32,904 in the 2019 sample.

household possesses a smartphone; whether it has high-speed internet access; and the respondent's age, race or ethnicity, gender, marital status, and employment status. In addition, the data include the household's state of residence and, for households that reside in a CBSA, the CBSA number. The unbanked percentage of U.S. households declined between 2015 and 2019. Among all household respondents to the 2015 survey, 7.0 percent were unbanked, meaning that no one in the household had a checking or savings account at a bank or credit union. In 2017, 6.5 percent of U.S. households were unbanked, and by 2019, the unbanked share had fallen to 5.4 percent. The 2019 survey also found that unbanked households were about evenly divided between those that never had a bank account and those that once did but did not keep it.[13]

Summary statistics by survey year for other key variables of interest are shown in Table 1. These include ranges of age, income, and income volatility; educational attainment; race and ethnicity; marital status and number of dependents; immigration, employment and disability status; and two measures of digital inclusion: internet access and smartphone ownership. The data show significant improvement in economic measures between 2015 and 2019; most notably the share with incomes below $30,000 declined to one-fourth from nearly a third of the population. The data also show substantial gains in digital inclusion; most notably, the share of the population with a smartphone increased from 72 to 85 percent.

State-level data. We supplement the household-level FDIC survey data with state-level variables related to residents' financial health drawn from multiple sources. These include annual, state-level food stamp program participation rates from the Supplemental Nutrition Assistance Program (SNAP) of the U.S. Department of Agriculture, which we merge into the FDIC survey data by state and sample year.

We also merge in an average credit score by state and year, calculated from the FRBNY Consumer Credit Panel/Equifax (CCP) data,[14] a nationally representative sample of anonymized individual consumer credit records maintained by the Federal Reserve Bank of New York (Lee and van der Klaauw 2010). The credit score in these data is the Equifax Risk Score (Risk Score), with a higher score indicating a lower risk of defaulting on a loan and stronger financial capability. Map 1 shows the variation in average credit scores by state in 2019, the darker shade indicating higher average score. Alaska, Kansas, Mississippi, and Oklahoma rank lowest, indicating that their populations are in a comparatively poor financial position.

[13] More precisely, 47.1 percent never had a bank account, 50.5 percent once had a bank account, and 2.5 percent have an unknown account history.
[14] The CCP does not contain explicit race data about consumers.

We also supplement the data with categorizations of check cashing laws and payday lending laws by state (Washington 2006). For classification of state check cashing laws, we rely on a summary of state check cashing laws as of 2013 from Financial Service Centers of America. Our classifications of states' payday lending laws are based on a 2014 report from The Pew Charitable Trusts, which groups states according to the maximum permissible interest rate for payday loans along with providing information on average cost of payday loans to the borrowers.

Finally, we include several state-level of measures of the financial vulnerability of residents in a state for consideration as potential drivers of unbanked status, drawn from the Prosperity Now Scorecard, which synthesizes data from multiple sources to derive summary indicators.[15] These are listed in Table 2, along with a brief explanatory description. Of particular interest is the 8th grade combined math and reading proficiency score, as this serves as a proxy for financial literacy, and the percentage of residents without health insurance, which prior studies have shown to be highly correlated with poor financial outcomes.[16] Map 2 depicts the variation in average reading and math proficiency across states, according to which Alabama, Alaska, Louisiana, Mississippi, Oklahoma, and West Virginia rank lowest. Map 3 shows the variation in the uninsured rate across states, according to which Texas has the thinnest health coverage, followed by Florida, Georgia, Mississippi, Oklahoma, and Wyoming.

Bank branching data. Finally, for the purpose of testing whether unbanked status is associated with bank branch accessibility, we first exclude observations associated with households that reside outside of CBSAs from the FDIC survey sample. We then merge into this sample, by CBSA and year, two measures of branch accessibility at the CBSA level: number of branches per 10,000 residents and average distance to the nearest branch. These measures are constructed as follows using FDIC Summary of Deposits (SOD) data. At the Census tract level, we approximate the average distance of tract residents to their nearest bank branch as the number of miles between the centroid of the tract and the nearest branch location, using the listing of Census tract centroid locations from S&P Global Market Intelligence SNL U.S. Bank Branch Data[17] alongside the SOD data on location of U.S. bank branches. We then calculate

[15] As described by the organization on its website, "The Prosperity Now Scorecard is a comprehensive resource featuring data on family financial health and policy recommendations to help put all U.S. households on a path to prosperity. The Scorecard equips advocates, policymakers and practitioners with national, state and local data to jump-start a conversation about solutions and policies that put households on stronger financial footing across five issue areas: Financial Assets & Income; Businesses & Jobs; Homeownership & Housing; Health Care; and Education."
[16] See Angrisani, et al. (2020), Kaiser, et al. (2020), Lusardi, Michand, and Mitchell (2017) for details correlating the benefits of financial literacy and economic outcomes.
[17] S&P Global Market Intelligence. SNL U.S. Bank Branch Data, "Branch Analytics," accessed 2015, 2017, and 2019.

the weighted average of tract-level distances by CBSA, weighting by tract population.[18] Sample mean values for these measures by year are reported in Table 3.

IV. Regression Models with State Fixed Effects

We begin by examining relationships between unbanked status and household characteristics and how these may have changed over time, by estimating logistic regression equations with state-level fixed effects, separately by survey year. The dependent variable for these equations is an indicator for whether the household has a bank account (equal to 1) or is unbanked (equal to 0). The independent variables consist of household characteristics from the FDIC survey datasets, largely coinciding with those for which summary statistics were provided in Table 1, and a set of state dummy variables (fixed effects). The equations are estimated using the population weights provided with the FDIC datasets and with clustering of standard errors by state. Table 4, panel A presents coefficient estimates for our primary model specification, exclusive of the fixed effects terms, which we shall return to shortly.[19] Panel B presents the corresponding odds ratio estimates and their associated 95 percent confidence intervals.

The bar chart in Figure 1 provides a visual representation of the relative likelihood of having a bank account by borrower characteristic, based on the estimated odds ratios from the 2019 regression. Most of the explanatory variables are statistically significant at the 10 percent level or stronger, as indicated by solid shading. Two of the race/ethnicity categories, represented by dotted bars, fall short of these significance levels. Consistent with findings from previous studies, household income is a major differentiator between the banked and unbanked populations. Relative to households with annual incomes above $75,000, as of 2019, those with incomes below $15,000 are more than 10 times less likely to be banked. Those with incomes of $15,000 to $30,000 are more than six times less likely and those in the range $30,000 to $50,000 four times less likely to have a bank account compared to those in the greater than $75,000 range. Native American, Black, and Hispanic households also are markedly less likely to be banked (Washington 2006). Black households are about are two-fifths as likely and Native American and Hispanic households about half as likely to be banked compared to White households. These findings,

[18] For this calculation, tracts are assigned to counties based on centroid location and in turn to CBSAs using the NBER crosswalk.

[19] The estimation results do not change in any important way with inclusion of more granular age segments; distinguishing single male and single female households; appending an indicator for homeowner (highly correlated with age); and an indicator for rural versus urban location. Therefore, these variables are omitted from our final specification.

shared by Cox, et al. (2023), find race is a significant predictor of bank account and retirement account participation using a novel administrative tax dataset.

Age and family status are additional, major differentiators, consistent with findings from prior studies. Relative to households over age 65, those less than 55 are about one-third less likely to be banked, while those between 55 and 65 are about half as likely to be banked, holding income and other factors constant. There may be various reasons for this, such as accumulated savings and assets that may offset lower incomes. We find that, as of 2019, single parent households and larger families (those with more than three children) are about three-fifths as likely to have a bank account compared to other households, possibly tied to higher or less predictable day-to-day expenses that hinder maintaining a bank account. Income variability is also an important factor. Households reporting highly variable incomes are about three-fifths as likely and those reporting somewhat variable incomes are about four-fifths as likely to be banked compared to those with stable incomes. Those experiencing disability are about three-fourths as likely and those experiencing unemployment about three-fourths as likely to be banked compared to those not so affected.

Two factors unique to our study are internet and smartphone access. Inclusion of these variables sheds light on the degree to which financial inclusion and digital inclusion may be complementary. We find that internet access is a major differentiating factor—households with access are three times as likely to have a bank account compared to those without. This may reflect the reduced value of a bank account to those unable to conduct online banking from home, consistent with digital inclusion motivating and facilitating digital inclusion. Alternatively, it may reflect inability to afford monthly payments for internet services, which may be associated with inability to afford bank account services or it may serve as a generic indicator of economic and social exclusion. Households that lack a mobile phone are two-fifths as likely to be banked compared to those that have a smartphone, while those that have a mobile phone that is not a smartphone are about two-thirds as likely to be banked. As with internet access, lack of a mobile phone may indicate broader economic and social exclusion, while having a mobile phone that is not a smartphone may reduce the value of having a bank account due to inability to conduct mobile banking.

Immigration and citizenship status are additional factors typically not considered in prior studies (Rhine and Greene 2006). We find that foreign born non-citizens are three-fifths as likely to be banked as non-immigrants, but the latter are three-fifths as likely to be unbanked as foreign-born citizens.

Changes over time. To test for significant changes over time in the relationships to unbanked, we estimate a pooled model for the combined 2015 and 2019 samples, in which each household-level explanatory variable in Table 4 is interacted with dummy variables for each year.[20] The estimation results are presented in Table 5, where we limit attention to odds ratio estimates and associated 95 percent confidence intervals and statistical significance of the pairwise differences between the 2015 and 2019 coefficient estimates.

We find that the gap based on employment status narrowed significantly between 2015 and 2019. In 2015, a household experiencing unemployment was about half as likely to be banked compared to an employed household, while in 2019, the gap narrows to about three-fourths as likely. The reduced association with unemployment might reflect improved economic conditions mitigating the effects of job loss via shortened unemployment spells or boosted savings.

In contrast, the gaps based on marital status and disability status widened considerably between 2015 and 2019. For instance, married households were about 20 percent more likely to have a bank account in 2015 and 50 percent more likely in 2019 compared to single households. However, being a single parent became a less important differentiator of being unbanked, conditional on single. In addition, conditional on not owning a smartphone, not having any mobile phone at all became a more significant differentiator of unbanked status. Altogether, these findings indicate that unbanked status may have become more concentrated among households that may be socially less connected, as indicated by living alone, lacking a mobile phone, or being disabled.

Given that we are relying on cross-sectional snapshots from three biennial surveys, we have no direct information on what factors caused individual households to transition from unbanked to banked, and hence it is not possible to assess the factors driving the overall decline in percent unbanked. But based on the cross-sectional results, we can infer those rising incomes, falling unemployment, and expanding digital access were likely contributing factors. In other words, the estimated cross-sectional relationships to smartphone ownership, unemployment, and income suggest that the decline in the unbanked rate between 2015 and 2019 in part is tied to improving economic conditions and increased smartphone ownership.

[20] We define the year dummy variables YR_2015=1 for 2015 observations, 0 otherwise and YR_2019=1 for 2019 observations, 0 otherwise. These are interacted with the explanatory variables in Table 4. Pairwise differences were assessed by testing for equality of coefficients.

The pooled model results, including the significant narrowing of the gaps by age and the increasing concentration within these segments, suggest that other, unobserved factors also played a role. For instance, increased availability of more affordable banking options such as the national Bank On program may have accelerated the transition out of unbanked status for those households that are more actively seeking a bank account.

Estimated fixed effects. Odds ratio estimates for the state fixed effects and their associated 95 percent confidence intervals from the individual estimated equations for 2019 and 2015 (those associated with Table 4) are presented in Table 6. These represent the likelihood of being banked for a household in that state relative to one in Pennsylvania, holding household-level factors constant, for each of the 50 states plus the District of Columbia. The bar charts in Figure 2 provide visual representations of these state-level estimated odds ratios, in increasing order, for 2019 in panel A and 2015 in panel B. Additionally, we show the estimated odds ratios for the pooled model with interaction terms in panel C. The light blue shading indicates statistical significance of 10 percent or stronger; in these states, the likelihood that a resident of the state is banked differs from that of a Pennsylvania resident with a probability of 90 percent or greater, holding household-level characteristics constant.

For 2019, 19 states are statistically different from Pennsylvania at the 90 percent level, of which only two (New Hampshire and Vermont) have a higher likelihood of a resident being banked compared to Pennsylvania. There is less variation across the states in 2015 compared to 2019, in the sense that just 13 states are statistically different from Pennsylvania at the 90 percent level, all at the lower end. Of the latter, 11 are statistically different from Pennsylvania, with lower likelihood of being banked, in both years. The rank ordering of states is reasonably stable: only two states with an estimated fixed effect coefficient greater than one in 2015 (higher likelihood of a resident being banked) have an estimated coefficient that is statistically different from and less than one in 2019 (Wyoming and New Mexico.)[21]

Further study to investigate the reasons underlying the divergent performance of the states that are statistically different from Pennsylvania seems warranted. A closer examination of factors contributing to unbanked status in these states might shed light on potential policy solutions that could benefit these

[21] The change in the estimated coefficient for each of these states is statistically significant. Colorado also exhibits are relatively large decline in the estimated fixed effect coefficient, but the change is not statistically significant. We do not attempt to measure the interaction of state laws such as caps on check cashing fees and the impact on geographic location as in Washington (2006).

and other states as well. The analysis of state-level factors presented in the next section is an initial effort in this regard, but more study is needed.

V. Multilevel Analysis (Assessment of State and CBSA Level Factors)

The fixed effects model results demonstrate that unbanked rates vary significantly across states but do not identify state-level factors that might generate these differences. For that purpose, a multilevel model is appropriate. Multilevel modeling is suitable for hierarchical or nested data structures such as present here, where individual households residing within the same state are subject to a set of common, state-level factors. The primary purpose of a multilevel model is to enable correct inference of standard errors and statistical significance of explanatory variables at each level of the hierarchy (Gelman and Hill 2007).[22]

We again estimate separate equations by year, with the dependent variable an indicator for whether the household has a bank account. The independent variables include both household characteristics and state-level factors. The equations are estimated using the population weights provided with the FDIC datasets.

Our primary model specification incorporates the same set of household-level variables as in Table 4 along with the average, state-level 8th grade combined math and reading proficiency score, which measures financial literacy; the percentage of residents without health insurance; and our classification of state laws governing payday loans.[23] Specifically, it includes an indicator for average combined math and reading proficiency score greater than 29.1 (which corresponds to the 25th percentile across states as of 2019) and an indicator for percent of uninsured residents greater than 5.7 (likewise the 25th percentile as of 2019). The payday loan law classification groups states into three categories derived from the 2014 Pew report; there has been little change in state payday loan laws since then.[24] These are: (1)

[22] A clear and concise introduction to multilevel modeling can be found the following What are multilevel models and why should I use them? | Centre for Multilevel Modelling | University of Bristol.

[23] Additional state-level variables examined include SNAP annual participation rates; average credit score by state and year; categorizations of check cashing laws; the additional health status measures listed in Table 2; and the reading and math proficiency measures individually. Ethnic and racial group characteristics (Creamer and Warren 2022) as well as personality traits (Greene and Stavins 2023) have been used in other studies as important covariates.

[24] New Mexico imposed a significantly lower rate cap in 2018. The set of states that don't allow payday lending was the same in 2019 as in 2014. The results are robust to switching New Mexico over to the below $375 average cost group for 2019. Ohio also lowered its rate cap in April 2019, but since the 2019 survey was done in June, that would be too soon to affect banked/unbanked in the state.

states that ban payday lending; (2) states where the average cost to borrow $300 for 5 months is less than $375; and (3) states where the average cost to borrow $300 for 5 months is greater than $375.[25]

Coefficient estimates are shown in Table 7. For the household-level variables, these are almost identical to the estimated coefficients in Table 4 from the fixed effects model. The estimated coefficients of the financial literacy indicator are statistically significant, at the 5 percent level in 2019 and the 1 percent level in 2015 and 2017, confirming an association between state-level financial literacy and unbanked rates. Moreover, these exhibit little year-to-year variation in magnitude. Additionally, the estimated coefficients of the health insurance coverage indicator are statistically significant at the 10 percent level in 2017 and 2019, but the relationship to unbanked is of modest magnitude. They also exhibit little year-to-year variation.

Finally, the results suggest that state restrictions on payday lending in the past were associated with a higher percentage of unbanked households, but that this relationship is no longer present as of 2019. In 2015, residents of states that ban payday lending were about three-fourths as likely to be banked as those in states with relatively tight restrictions on payday lending (average cost below $375) and, to a narrower degree, less likely to be banked than those in states with weak or no restrictions (average cost above $375.) In 2019, the estimated coefficients for the payday loan classifications switch signs and are no longer statistically significant.

The positive relationship between percent banked status in 2015 and permissibility of payday lending in a state may reflect the fact that a bank account is required to obtain a payday loan. Alternatively, it may reflect that payday lending might help consumers meet temporary cash shortfalls, enabling them to open and maintain bank accounts.[26] However, in light of evidence that payday borrowing may increase household debt burdens and long-run financial health, such as in Melzer (2011 and 2018), consumers are not necessarily better off opening bank accounts in order to access payday loans.

The absence of this relationship in 2019 suggests that with the improvement in economic conditions since 2015 and accompanying relaxation of credit constraints, low- and moderate-income

[25] This classification aligns quite well with the maximum rate cap groupings specified in the 2014 Pew report, as it separates out the "lower than average rate cap" category and includes just two exceptions from the average and high-rate cap categories: Washington and Delaware, which cap the number of rollovers the borrower can have.

[26] Conversely, Bhutta, et al. 2016 find that when payday lending is restricted, consumers often respond by shifting to other forms of high-cost credit that may not require a bank account, such as pawn shops.

households may have become less dependent on payday lenders to meet cash shortfalls. Also, growth in the online (compared to storefront) share of payday lending between 2015 and 2019 may have made state laws less relevant, to the extent that these loans were being originated by nonbanks partnering with national banks, which have not subject to state restrictions under the OCC's preemption standards.[27]

Income and race relationships to being banked, with and without controls. In the popular press and among policymakers and financial inclusion advocacy organizations, unbanked status typically is viewed as closely tied to low income and minority status.[28] Our empirical results demonstrate, however, that multiple other factors are relevant for understanding and crafting solutions to household financial exclusion. A natural question arising in this context is, how much of the association with unbanked status unilaterally attributed to being low income or having minority status reflects other observable factors, and how much appears separable from the other factors?

Figure 3, panel A shows the estimated odds ratios for the income ranges from a series of five regression equations, the first of which includes only these variables. The second equation additionally includes education, marital status, family size, and race/ethnicity; the third adds on mobile phone and internet status; the fourth consists of all household-level explanatory factors, with the last being the full, multilevel model specification including the state-level factors. The two lowest income ranges are observed to be most affected by inclusion of additional factors, with inclusion of education, marital status, family size, and race/ethnicity having the greatest impact. Without controlling for other factors, households in the two lowest income ranges (under $15,000 and $15,000 - $30,000) are, respectively, 21.7 and 9.4 times more likely to be unbanked compared to a household in the highest income range (greater than $75,000.) After including the full set of explanatory factors, households in these two lowest ranges are, respectively, 13.3 and 6.7 times more likely to be unbanked compared to a household in the highest range.

Figure 3, panel B shows the estimated odds ratios for three race/ethnicity groups (American Indian or Alaska Native, Black, and Hispanic) from a series of five regression equations, the first of which

[27] Graham and Golden 2019 documents growth in the online share of payday loans during this period. The Office of the Comptroller of the Currency's preemption standards are outlined in OCC Interpretive Letter 1173, December 2020.

[28] See, for example, Joint Economic Committee Democrats (2022). The literature on unbanked status and race has grown recently as evidenced by Hayashi and Minhas 2018, Beshears, et al. 2018, Barcellos and Zamarro 2019, Blanco et al. 2019, and Creamer and Warren 2022.

includes only these variables.[29] The second equation additionally includes education, marital status, family size, and income. Again, the third adds on mobile phone and internet status; the fourth consists of all household-level explanatory factors, with the last being the full, multilevel model specification including the state-level factors. The inclusion of additional explanatory factors has only a small effect on the estimated odds ratio for Black households, suggesting the presence of structural impediments to financial inclusion that are unrelated to the other factors and distinctive to Black households (Blinder 1973, Oaxaca 1973, and Oaxaca and Ransom 1994). For the other two demographic groups, each additional set of explanatory factors has a moderating effect on the estimated odds ratio for race/ethnicity, with the largest effect attributable to the mobile phone and internet status variables.

Without controlling for other factors, Black households are 3.4 times more likely to be unbanked compared to a White household. After including the full set of explanatory factors, Black households are 2.9 times more likely to be unbanked compared to a White household. Without controlling for other factors, American Indian or Alaska Native households and Hispanic households are, respectively, 3.2 and 3.1 times more likely to be unbanked compared to a White household. After including the full set of explanatory factors, American Indian or Alaska Native households and Hispanic households are, respectively, 2.2 and 2.3 times more likely to be unbanked compared to a White household.

CBSA-level model with branch coverage measures. Just 2.2 percent of 2019 survey respondents who lack a bank account cited inconvenient branch locations as their main reason for being unbanked, contrary to common perceptions that lack of access to physical branches is a key factor. Consistent with the survey response, Morgan, Pinkovskiy, and Perlman (2018) find that across states, the share of the population that is unbanked is not positively correlated with the share residing in what the article defines to be "banking deserts"—areas lacking a proximate bank branch.[30]

We further explore this issue using the subsample of our analysis dataset consisting of the 2019 survey data restricted to Core-Based Statistical Areas. We conduct a multilevel analysis at the household and CBSA level, with the same set of household-level variables included in our state-level fixed effect and multilevel models, plus a branch coverage measure, in two alternative specifications. The first

[29] The other two race/ethnicity variables, Asian and Native Hawaiian or Other Pacific Islander, are not statistically significant in any of the five specifications.

[30] Morgan, Pinkovskiy, and Perlman (2018) use data from the 2015 FDIC survey on financial inclusion.

specification appends the number of branches per 10,000 residents and the second uses average distance to the nearest branch.

The estimation results are reported in Table 8. The branch coverage measures are not statistically significant in either specification. Thus, as in Morgan, Pinkovskiy, and Perlman (2018), we do not find support for the view that local branch accessibility matters for unbanked rates.

VI. Concluding Comments

This paper has offered a comprehensive analysis of the characteristics of unbanked households, merging household data from the 2015, 2017, and 2019 FDIC financial inclusion surveys with state-level socioeconomic variables.[31] The analysis explores state-level effects alongside household-level factors associated with unbanked status, through use of fixed effects and multilevel modeling, and it examines how the factors associated with unbanked status have been evolving over the five-year period.

The analysis finds income to be the sharpest differentiator of who is unbanked, with little change in the estimated coefficients for relationships between 2015 and 2019. Thus, the analysis confirms findings of previous studies that insufficient or unstable incomes are major contributing factors to why households remain unbanked.

The role of unemployment appears to have moderated, while single status and disabled status have become stronger differentiators. The analysis also finds that not only race or ethnicity but also being a non-citizen immigrant are strongly associated with unbanked status. Lagging digital access appears to be a major factor in households remaining unbanked.

At the state level, financial literacy exhibits a strong association with unbanked rates, which is a similar finding to Barcellos and Zamarro (2019) who leverage online surveys from the American Life Panel using sample weights that approximate distributions in the Current Population Survey. Financial literacy in this paper is measured as a continuous variable that mapped differences in human capital endowments across geographic areas using multilevel models. We also find that restrictions on payday lending in the

[31] Because some of the improvement between 2019 and 2021 may be tied to the pandemic relief programs and therefore transient, and because of substantial revisions to the FDIC survey in 2021 (such as no longer collecting data on smartphone ownership), our analysis restricts attention to the 2015 through 2019 surveys.

past were associated with a higher percentage of unbanked households in a state, but this relationship appears to have dissipated.

Our findings suggest that it may be unrealistic to expect universal bank account ownership among households with extremely low income, where the challenge of bringing households into the banking system is somewhat inseparable from the broader challenge of fostering inclusive economic growth. Likewise, the results suggest that further progress in financial inclusion may be tied to progress in addressing digital and social exclusion and on addressing challenges faced by the expanding, foreign-born non-citizen population.

Despite the many explanatory factors included in our analysis, and the overall decline in percent unbanked, there has been no noticeable narrowing of the race and ethnicity differentials over the analysis period. Moreover, for Black households, we find that inclusion of the other household explanatory factors does not narrow the gap, unlike for Hispanic and Native American households, where some narrowing occurs. More information is needed to explain these persistent gaps by race and ethnicity, as well as to understand the apparently expanding gap within the disabled population cohort. Moreover, while our multi-level analysis offers some insights, more information is needed to identify why certain states have relatively high unbanked rates that have persisted over time, as indicated by our fixed effects specifications.

Identifying the structural factors contributing to these gaps might best be accomplished by expanding the survey to include a broader range of potential explanatory factors. In particular, the set of responses offered for why individuals lack a bank account could be expanded from what is currently offered—many individuals have been selecting "Other" or providing no response to this question. Policymakers could also encourage the expansion of existing efforts such as the Bank On program whose purpose is to improve financial stability of unbanked and underbanked households through safe, low-cost transaction accounts. In conjunction with supporting and expanding such programs, data collection efforts through the Federal Reserve's National Data Hub could shed valuable insights on the structural factors that keep certain communities locked in poverty and disinvestment.[32]

[32] See www.stlouisfed.org/community-development/bank-on-national-data-hub for more details on Bank On and the Federal Reserve Bank of St. Louis National Data Hub service.

Table 1: Summary Statistics for the FDIC Survey Samples

Variable name	Description	2015	2017	2019
Income range	<$30,000	30.9%	27.7%	25.1%
	$30,000 to $50,000	19.9%	19.8%	18.8%
	$50,000 to $75,000	18.0%	18.4%	18.2%
	At least $75,000	31.2%	34.1%	37.9%
Educational attainment	No high school diploma	10.8%	9.6%	8.7%
	High school diploma	26.1%	25.8%	24.9%
	Some college	29.4%	28.9%	28.3%
	College degree	33.7%	35.7%	38.1%
Marital status	Single	53.3%	52.7%	53.6%
Number of dependents	Number of children under 18 < 3	93.1%	93.5%	93.7%
Employment status	Employed	97.0%	97.3%	97.8%
	Unemployed	3.0%	2.7%	2.2%
Disability status	Disabled, aged 25 to 64	9.0%	8.7%	8.1%
	Not applicable (not aged 25 to 64)	29.1%	30.2%	31.0%
	Not disabled, aged 25 to 64	61.9%	61.1%	60.9%
Age of respondent	15 to 24 years	5.2%	5.1%	4.8%
	25 to 34 years	16.5%	16.2%	16.3%
	35 to 44 years	17.0%	16.7%	17.0%
	45 to 54 years	18.6%	18.0%	17.0%
	55 to 64 years	18.8%	18.9%	18.6%
	65 years or more	23.9%	25.0%	26.2%
Region	Midwest	21.7%	21.4%	21.6%
	Northeast	17.8%	17.6%	17.2%
	South	37.9%	38.2%	38.4%
	West	22.6%	22.8%	22.9%
Metropolitan status	Metropolitan area	85.3%	85.7%	86.2%
	Not identified	0.8%	0.9%	0.8%
	Not in metropolitan area	13.9%	13.4%	13.0%
Race/ethnicity	American Indian or Alaska Native	1.1%	1.3%	1.2%
	Asian	4.9%	5.3%	5.6%
	Black	14.1%	14.1%	14.2%
	Hispanic	12.6%	12.9%	13.0%
	Native Hawaiian or Other Pacific Island	0.2%	0.3%	0.3%
	White	67.0%	66.2%	65.6%
Smartphone status	No mobile phone	9.8%	7.8%	5.0%
	Non-smartphone	18.0%	12.6%	9.6%
	Smartphone	72.3%	79.6%	85.4%
Internet access	Has access	77.4%	79.4%	80.0%
Homeownership status	Renter	36.7%	36.4%	35.5%
Income volatility	Income varied a lot from month to month	4.9%	4.2%	4.1%
	Income varied somewhat from month to month	17.6%	17.8%	18.3%
	Income was about the same each month	77.5%	78.0%	77.7%
Immigration status	Foreign-born citizen	7.6%	7.9%	8.6%
	Foreign-born noncitizen	7.2%	6.9%	6.3%
	U.S.-born	85.2%	85.3%	85.1%
Single parent status	Single mom	8.6%	7.9%	7.8%
	Single dad	2.9%	2.9%	2.9%
	Non-single parent	88.5%	89.2%	89.3%

Source: FDIC Survey Samples in 2015, 2017 and 2019

Table 2: State-Level Measures of Financial Vulnerability from the Prosperity Now Scorecard

Indicator	Description
8th Grade Math Proficiency	*Percentage of 8th grade students who perform at or above proficient in math*
8th Grade Reading Proficiency	*Percentage of 8th grade students who perform at or above proficient in reading*
Average Reading and Math Proficiency	*Average of the 8th grade Math and Reading Proficiency Measures*
Uninsured rate – health coverage	*Percentage of the civilian noninstitutionalized population without health insurance*
Forgoing Doctor Visit Due to Cost	*Percentage of adults who reported that there was a time in the past 12 months when they needed to see a doctor but could not because of cost*
Poor or Fair Health Status	*Percent of adults reporting fair or poor health status*

Source: Prosperity Now Scorecard (Prosperity Now Scorecard)

Table 3: Sample Mean Values of the Branch Accessibility Measures (CBSA observations only)

Variable name	**Description**	**2015**	**2017**	**2019**
Branches per capita	Branches per 10,000 residents	2.43	2.36	2.26
Branch accessibility (distance)	Average distance to nearest branch	1.33	1.36	1.38

Source: FDIC Summary of Deposits Data and U.S. Census Bureau

Table 4: Fixed Effects Model Results

Panel A: Coefficient Estimates

	2019				2017				2015			
Variable	Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square
Intercept	5.22	0.35	224.18	***	5.56	0.35	252.60	***	5.63	0.34	270.02	***
Income < $15,000	-2.63	0.15	314.59	***	-2.87	0.17	279.07	***	-2.98	0.18	272.19	***
$15,000 to $30,000	-1.92	0.15	170.68	***	-2.25	0.17	172.55	***	-2.29	0.18	162.31	***
$30,000 to $50,000	-1.35	0.15	82.63	***	-1.59	0.17	84.25	***	-1.69	0.18	86.02	***
$50,000 to $75,000	-0.63	0.17	13.81	**	-0.58	0.20	8.36	**	-0.88	0.20	18.63	***
College degree or some college	0.56	0.07	71.71	***	0.54	0.06	69.15	***	0.52	0.06	70.57	***
Marital status: single	-0.37	0.08	20.66	***	-0.36	0.08	21.11	***	-0.18	0.07	5.70	*
No. of dependents: < 3 children	0.46	0.11	18.00	***	0.44	0.10	18.17	***	0.55	0.09	34.82	***
Employed	0.29	0.15	3.83	*	0.53	0.13	17.72	***	0.77	0.11	49.18	***
American Indian or Alaska Native	-0.80	0.17	21.01	***	-1.12	0.16	51.43	***	-1.16	0.16	50.73	***
Asian	0.25	0.22	1.22	0.2691	0.36	0.24	2.28	0.1311	-0.32	0.20	2.52	0.1123
Black	-0.99	0.08	156.79	***	-1.04	0.08	183.75	***	-1.00	0.07	184.04	***
Hispanic	-0.77	0.10	60.29	***	-0.75	0.10	55.62	***	-0.96	0.10	98.00	***
Native Hawaiian or Pacific Islander	-0.35	0.53	0.42	0.5179	0.14	0.50	0.08	0.7737	-1.05	0.43	6.01	*
No mobile phone	-0.88	0.09	87.97	***	-0.57	0.09	40.63	***	-0.81	0.08	96.18	***
Mobile phone but no smartphone	-0.38	0.08	19.64	***	-0.43	0.08	29.27	***	-0.54	0.07	56.09	***
No internet access	-1.09	0.07	255.64	***	-1.24	0.07	337.78	***	-1.22	0.06	359.35	***
Income highly variable	-0.58	0.12	23.82	***	-0.59	0.11	27.24	***	-0.35	0.10	11.06	**
Income somewhat variable	-0.19	0.08	6.27	*	-0.17	0.08	4.77	*	-0.27	0.07	14.32	**
Foreign-born citizen	0.45	0.14	10.21	**	0.15	0.14	1.15	0.2827	0.32	0.14	5.08	**
Foreign-born noncitizen	-0.52	0.11	21.90	***	-0.32	0.11	8.05	**	-0.53	0.10	26.91	***
Not a single mother	0.31	0.09	11.71	**	0.44	0.08	27.71	***	0.49	0.08	38.41	***
55 to 64 years of age	-0.74	0.10	49.52	***	-0.75	0.11	49.31	***	-1.12	0.11	107.00	***
< 55 years of age	-1.19	0.09	165.75	***	-1.41	0.09	225.47	***	-1.80	0.10	350.93	***
Not disabled	0.53	0.08	41.47	***	0.34	0.08	18.03	***	0.25	0.08	10.28	**

Panel B: Odds Ratio Estimates

	Odds	95% Confidence		Pr > Chi-	Odds	95% Confidence		Pr > Chi-	Odds	95% Confidence		Pr > Chi-
Variable	Ratio	Limits		Square	Ratio	Limits		Square	Ratio	Limits		Square
Income < $15,000	0.07	0.05	0.10	***	0.06	0.04	0.08	***	0.05	0.04	0.07	***
$15,000 to $30,000	0.15	0.11	0.20	***	0.11	0.08	0.15	***	0.10	0.07	0.14	***
$30,000 to $50,000	0.26	0.19	0.35	***	0.20	0.15	0.29	***	0.19	0.13	0.26	***
$50,000 to $75,000	0.53	0.38	0.74	**	0.56	0.38	0.83	**	0.42	0.28	0.62	***
College degree or some college	1.76	1.54	2.00	***	1.71	1.51	1.94	***	1.69	1.49	1.91	***
Marital status: single	0.69	0.59	0.81	***	0.70	0.60	0.81	***	0.84	0.72	0.97	*
No. of dependents: < 3 children	1.58	1.28	1.95	***	1.55	1.27	1.90	***	1.73	1.44	2.07	***
Employed	1.33	1.00	1.78	*	1.70	1.33	2.17	***	2.15	1.74	2.66	***
American Indian or Alaska Native	0.45	0.32	0.63	***	0.33	0.24	0.45	***	0.31	0.23	0.43	***
Asian	1.28	0.83	1.98	0.2691	1.44	0.90	2.30	0.1311	0.73	0.49	1.08	0.1123
Black	0.37	0.32	0.44	***	0.35	0.30	0.41	***	0.37	0.32	0.42	***
Hispanic	0.46	0.38	0.56	***	0.47	0.39	0.58	***	0.38	0.32	0.46	***
Native Hawaiian or Pacific Islander	0.71	0.25	2.02	0.5179	1.16	0.43	3.09	0.7737	0.35	0.15	0.81	*
No mobile phone	0.42	0.35	0.50	***	0.57	0.48	0.67	***	0.44	0.38	0.52	***
Mobile phone but no smartphone	0.69	0.58	0.81	***	0.65	0.56	0.76	***	0.58	0.50	0.67	***
No internet access	0.34	0.29	0.38	***	0.29	0.25	0.33	***	0.30	0.26	0.34	***
Income highly variable	0.56	0.44	0.71	***	0.55	0.44	0.69	***	0.71	0.58	0.87	**
Income somewhat variable	0.83	0.71	0.96	*	0.84	0.73	0.98	*	0.76	0.67	0.88	**
Foreign-born citizen	1.57	1.19	2.06	**	1.16	0.88	1.54	0.2827	1.38	1.04	1.82	*
Foreign-born noncitizen	0.59	0.48	0.74	***	0.73	0.58	0.91	**	0.59	0.48	0.72	***
Not a single mother	1.36	1.14	1.62	**	1.55	1.32	1.83	***	1.64	1.40	1.92	***
55 to 64 years of age	0.48	0.39	0.59	***	0.47	0.38	0.58	***	0.33	0.26	0.40	***
< 55 years of age	0.30	0.25	0.36	***	0.25	0.20	0.29	***	0.17	0.14	0.20	***
Not disabled	1.70	1.45	2.00	***	1.41	1.20	1.65	***	1.28	1.10	1.49	**

Table 4: Fixed Effects Model Results

Panel C: Goodness of Fit Statistics

Goodness-of-fit Measure	**2019**	**2017**	**2015**
Percent Concordant	90.4	91.6	91.8
Percent Discordant	9.6	8.4	8.2
Somers' D	0.808	0.832	0.836
Gamma	0.808	0.832	0.836
Tau-a	0.075	0.087	0.093
c	0.904	0.916	0.918
Pairs	50,381,730	53,655,539	62,251,904

Table 5: Pooled Model for 2015 versus 2019

	2015 Interaction Term			2019 Interaction Term			
Variable	Odds Ratio	95% Confidence Limits		Odds Ratio	95% Confidence Limits		Difference in Means Test
Income range (versus > $75,000 in 2015)							
< $15,000	0.05	0.04	0.07	0.04	0.02	0.08	-0.871
$15,000 to $30,000	0.1	0.07	0.14	0.08	0.04	0.16	-0.825
$30,000 to $50,000	0.18	0.13	0.26	0.14	0.07	0.29	-0.896
$50,000 to $75,000	0.41	0.28	0.62	0.29	0.14	0.61	-1.161
> $75,000	NA			0.54	0.25	1.16	
College degree or some college	1.71	1.51	1.93	1.72	1.51	1.96	0.09
Married (versus single 2015)	1.19	1.03	1.38	1.46	1.25	1.71	2.613
No. of dependents: < 3 children	1.72	1.44	2.06	1.58	1.28	1.95	-0.851
Employed	2.15	1.74	2.66	1.34	1	1.79	-3.714
Race (versus white 2015)							
American Indian, Alaska Native, Pacific	0.35	0.26	0.47	0.42	0.31	0.58	1.143
Asian	0.76	0.52	1.13	1.17	0.76	1.8	1.948
Black	0.36	0.32	0.42	0.38	0.33	0.44	0.747
Hispanic	0.41	0.34	0.49	0.43	0.35	0.51	0.506
Mobile phone status (versus no phone 2015)							
Mobile phone but not smartphone	1.3	1.11	1.52	1.63	1.34	1.99	2.441
Smartphone	2.25	1.91	2.64	2.4	2	2.87	0.735
Has internet access	3.38	2.98	3.83	2.96	2.59	3.38	-2.008
Income vol variable (versus stable 2015)							
Income highly variable	0.71	0.58	0.87	0.82	0.71	0.96	1.597
Income somewhat variable	0.77	0.67	0.89	0.82	0.71	0.96	0.834
citizenship (versus us-born 2015)							
Foreign-born citizen	1.38	1.05	1.81	1.58	1.21	2.08	0.962
Foreign-born noncitizen	0.59	0.48	0.71	0.6	0.48	0.74	0.16
Not a single mother (versus single 2015)	1.64	1.4	1.91	1.34	1.13	1.6	-2.4
Age range (versus 65-plus in 2015)							
55 to 64 years of age	0.33	0.27	0.41	0.48	0.39	0.58	3.564
< 55 years of age	0.17	0.14	0.2	0.3	0.25	0.36	5.995
Not disabled vs disabled in 2015	1.28	1.11	1.49	1.68	1.43	1.98	3.375

Table 6: Estimated Odds Ratios for the State Fixed Effects

	2019				2017				2015			
	Odds Ratio	95% Confidence Limits		Pr > Chi-Square	Odds Ratio	95% Confidence Limits		Pr > Chi-Square	Odds Ratio	95% Confidence Limits		Pr > Chi-Square
AK	0.84	0.39	1.83	0.664	0.88	0.37	2.09	0.770	1.88	0.83	4.24	0.131
AL	0.64	0.37	1.09	0.101	0.78	0.45	1.35	0.379	0.53	0.32	0.89	**
AR	0.66	0.37	1.17	0.153	0.51	0.29	0.89	**	0.60	0.35	1.04	*
AZ	1.02	0.54	1.92	0.962	0.93	0.49	1.78	0.832	0.99	0.56	1.75	0.966
CA	0.61	0.38	0.97	**	0.50	0.32	0.80	***	0.99	0.61	1.59	0.963
CO	0.57	0.26	1.25	0.159	0.68	0.30	1.53	0.350	1.36	0.61	3.03	0.449
CT	0.37	0.19	0.72	***	0.62	0.29	1.35	0.228	0.54	0.27	1.11	*
DC	0.53	0.30	0.93	**	0.89	0.49	1.62	0.696	0.56	0.33	0.96	**
DE	1.85	0.65	5.22	0.247	0.68	0.32	1.48	0.336	1.46	0.71	2.98	0.302
FL	1.13	0.67	1.92	0.650	0.75	0.45	1.23	0.253	1.17	0.71	1.93	0.540
GA	0.57	0.33	0.97	**	0.45	0.27	0.75	***	0.66	0.40	1.10	0.110
HI	0.80	0.34	1.88	0.611	0.66	0.29	1.51	0.324	1.53	0.65	3.59	0.331
IA	1.16	0.54	2.48	0.700	1.07	0.48	2.38	0.876	1.35	0.65	2.80	0.423
ID	0.94	0.49	1.80	0.861	1.90	0.81	4.46	0.140	1.40	0.73	2.71	0.313
IL	0.60	0.35	1.01	*	0.42	0.25	0.70	***	0.64	0.37	1.08	*
IN	0.75	0.41	1.39	0.363	0.98	0.51	1.87	0.940	1.49	0.75	2.94	0.256
KS	0.58	0.31	1.09	*	0.75	0.39	1.43	0.376	0.55	0.30	1.01	*
KY	0.70	0.39	1.26	0.235	0.45	0.26	0.79	***	0.59	0.34	1.05	*
LA	0.55	0.33	0.92	**	0.49	0.30	0.81	***	0.55	0.34	0.91	**
MA	0.76	0.40	1.45	0.406	1.87	0.87	4.03	0.108	0.84	0.46	1.53	0.574
MD	0.62	0.29	1.29	0.201	1.20	0.49	2.95	0.694	0.90	0.45	1.78	0.753
ME	1.07	0.46	2.48	0.883	1.01	0.47	2.18	0.985	1.31	0.60	2.86	0.506
MI	0.83	0.47	1.47	0.517	0.77	0.42	1.40	0.383	0.69	0.39	1.21	0.192
MN	0.94	0.45	1.98	0.874	1.73	0.67	4.42	0.255	1.41	0.66	3.01	0.371
MO	0.42	0.23	0.77	***	0.52	0.29	0.94	**	0.44	0.25	0.77	***
MS	0.44	0.27	0.72	***	0.49	0.30	0.80	***	0.66	0.40	1.09	0.106
MT	0.82	0.45	1.50	0.523	0.72	0.40	1.31	0.278	0.71	0.40	1.26	0.243
NC	1.64	0.89	3.04	0.115	1.11	0.61	2.00	0.734	0.96	0.55	1.65	0.872
ND	0.69	0.37	1.29	0.244	0.78	0.41	1.47	0.438	1.24	0.59	2.61	0.567
NE	0.64	0.34	1.22	0.173	0.93	0.42	2.06	0.862	0.65	0.34	1.24	0.191
NH	3.63	0.83	16.01	*	0.73	0.34	1.53	0.396	1.70	0.70	4.17	0.244
NJ	0.58	0.31	1.10	*	0.48	0.26	0.88	**	0.58	0.32	1.05	*
NM	0.58	0.34	1.00	*	0.62	0.37	1.03	*	1.32	0.76	2.28	0.325
NV	0.47	0.25	0.86	**	0.41	0.22	0.78	***	0.51	0.29	0.91	**
NY	0.61	0.37	1.00	**	0.41	0.25	0.67	***	0.64	0.39	1.05	*
OH	0.76	0.43	1.34	0.343	0.76	0.44	1.29	0.305	0.87	0.51	1.49	0.615
OK	0.45	0.26	0.78	***	0.67	0.37	1.22	0.189	0.51	0.30	0.86	**
OR	0.64	0.33	1.24	0.189	0.92	0.47	1.80	0.807	0.80	0.41	1.56	0.516
RI	0.86	0.40	1.88	0.708	0.77	0.36	1.61	0.482	1.03	0.49	2.19	0.934
SC	1.00	0.53	1.87	0.993	0.80	0.45	1.44	0.462	0.72	0.41	1.26	0.248
SD	0.74	0.37	1.50	0.409	0.57	0.30	1.07	*	0.94	0.46	1.89	0.851
TN	0.52	0.31	0.89	**	0.61	0.35	1.04	*	0.67	0.39	1.15	0.147
TX	0.63	0.39	1.00	*	0.52	0.32	0.82	***	0.70	0.44	1.12	0.136
UT	1.60	0.54	4.77	0.401	1.00	0.43	2.33	0.999	1.03	0.51	2.09	0.925
VA	0.68	0.37	1.26	0.221	1.71	0.75	3.87	0.202	0.87	0.47	1.60	0.647
VT	3.09	1.03	9.31	**	1.69	0.67	4.26	0.270	1.69	0.73	3.93	0.225
WA	0.55	0.31	1.00	*	1.10	0.54	2.23	0.789	0.84	0.45	1.57	0.585
WI	1.34	0.66	2.72	0.421	1.13	0.56	2.28	0.741	1.40	0.71	2.76	0.331
WV	1.07	0.61	1.87	0.816	0.63	0.37	1.08	*	0.74	0.43	1.26	0.259
WY	0.70	0.36	1.35	0.286	0.73	0.40	1.35	0.321	1.99	0.88	4.53	0.101

Table 7: Multilevel Model Results

Panel A: Coefficient Estimates

	2019			2017			2015		
Variable	**Estimate**	**Standard Error**	**Pr > Chi-Square**	**Estimate**	**Standard Error**	**Pr > Chi-Square**	**Estimate**	**Standard Error**	**Pr > Chi-Square**
Intercept	4.92	0.29	***	5.11	0.29	***	5.20	0.28	***
Income < $15,000	-1.90	0.15	***	-2.24	0.17	***	-2.27	0.18	***
$15,000 to $30,000	-1.32	0.15	***	-1.59	0.17	***	-1.67	0.18	***
$30,000 to $50,000	-0.61	0.17	**	-0.59	0.20	**	-0.87	0.20	***
$50,000 to $75,000	-2.59	0.15	***	-2.86	0.17	***	-2.97	0.18	***
College degree or some college	0.55	0.07	***	0.54	0.06	***	0.53	0.06	***
Marital status: single	-0.38	0.08	***	-0.36	0.08	***	-0.18	0.07	*
No. of dependents: < 3 children	0.46	0.11	***	0.44	0.10	***	0.53	0.09	***
Employed	0.29	0.15	*	0.50	0.12	***	0.75	0.11	***
American Indian or Alaska Native	-0.81	0.16	***	-1.06	0.15	***	-0.92	0.15	***
Asian	0.19	0.22	0.382	0.27	0.23	0.245	-0.23	0.20	0.242
Black	-1.07	0.07	***	-1.12	0.07	***	-1.09	0.07	***
Hispanic	-0.82	0.09	***	-0.82	0.09	***	-0.86	0.09	***
Native Hawaiian or Pacific Islander	-0.29	0.48	0.548	0.22	0.47	0.645	-0.64	0.40	0.109
No mobile phone	-0.83	0.09	***	-0.58	0.09	***	-0.78	0.08	***
Mobile phone but no smartphone	-0.38	0.08	***	-0.43	0.08	***	-0.54	0.07	***
No internet access	-1.09	0.07	***	-1.23	0.07	***	-1.22	0.06	***
Income highly variable	-0.57	0.12	***	-0.59	0.11	***	-0.33	0.10	**
Income somewhat variable	-0.19	0.08	*	-0.19	0.08	*	-0.27	0.07	**
Foreign-born citizen	0.40	0.14	**	0.07	0.14	0.611	0.29	0.14	*
Foreign-born noncitizen	-0.53	0.11	***	-0.35	0.11	**	-0.58	0.10	***
Not a single mother	0.29	0.09	**	0.46	0.08	***	0.47	0.08	***
55 to 64 years of age	-0.74	0.10	***	-0.75	0.11	***	-1.09	0.11	***
< 55 years of age	-1.20	0.09	***	-1.39	0.09	***	-1.77	0.10	***
Not disabled	0.52	0.08	***	0.35	0.08	***	0.26	0.08	**
Average math/reading score > 29.1	0.19	0.06	**	0.16	0.06	**	0.24	0.06	***
Uninsured health care rate > 5.7	-0.13	0.08	*	-0.13	0.08	*	-0.09	0.07	0.182
Average payday loan APR ≥ 375%	-0.09	0.07	0.200	0.01	0.07	0.846	0.12	0.06	*
Average payday loan APR < 375%	-0.06	0.09	0.537	0.18	0.09	*	0.28	0.09	**

Panel B: Odds Ratio Estimates

	2019				2017				2015			
Variable	**Odds Ratio**	**95% Confidence Limits**		**Pr > Chi-Square**	**Odds Ratio**	**95% Confidence Limits**		**Pr > Chi-Square**	**Odds Ratio**	**95% Confidence Limits**		**Pr > Chi-Square**
Income < $15,000	0.08	0.06	0.10	***	0.06	0.04	0.08	***	0.05	0.04	0.07	***
$15,000 to $30,000	0.15	0.11	0.20	***	0.11	0.08	0.15	***	0.10	0.07	0.15	***
$30,000 to $50,000	0.27	0.20	0.36	**	0.20	0.15	0.29	**	0.19	0.13	0.27	***
$50,000 to $75,000	0.55	0.39	0.76	***	0.56	0.38	0.83	***	0.42	0.28	0.62	***
College degree or some college	1.73	1.52	1.97	***	1.71	1.51	1.94	***	1.69	1.50	1.91	***
Marital status: single	0.69	0.59	0.80	***	0.70	0.60	0.82	***	0.83	0.72	0.96	*
No. of dependents: < 3 children	1.58	1.28	1.95	***	1.56	1.27	1.90	***	1.71	1.43	2.04	***
Employed	1.34	1.00	1.78	*	1.65	1.29	2.11	***	2.12	1.72	2.62	***
American Indian or Alaska Native	0.44	0.32	0.61	***	0.35	0.26	0.46	***	0.40	0.29	0.54	***
Asian	1.21	0.79	1.85	0.382	1.31	0.83	2.06	0.245	0.80	0.54	1.17	0.242
Black	0.34	0.30	0.40	***	0.33	0.28	0.38	***	0.34	0.30	0.39	***
Hispanic	0.44	0.37	0.53	***	0.44	0.37	0.53	***	0.42	0.35	0.50	***
Native Hawaiian or Pacific Islander	0.75	0.29	1.93	0.548	1.24	0.50	3.10	0.645	0.53	0.24	1.15	0.109
No mobile phone	0.44	0.36	0.52	***	0.56	0.47	0.67	***	0.46	0.39	0.54	***
Mobile phone but no smartphone	0.69	0.58	0.81	***	0.65	0.56	0.76	***	0.58	0.51	0.67	***
No internet access	0.34	0.30	0.39	***	0.29	0.26	0.33	***	0.30	0.26	0.34	***
Income highly variable	0.57	0.45	0.72	***	0.56	0.45	0.69	***	0.72	0.59	0.88	**
Income somewhat variable	0.82	0.71	0.96	*	0.83	0.72	0.97	*	0.76	0.66	0.88	**
Foreign-born citizen	1.49	1.14	1.95	**	1.07	0.82	1.41	0.611	1.34	1.02	1.76	*
Foreign-born noncitizen	0.59	0.47	0.73	***	0.70	0.57	0.87	**	0.56	0.46	0.68	***
Not a single mother	1.34	1.12	1.59	**	1.58	1.34	1.86	***	1.61	1.38	1.87	***
55 to 64 years of age	0.48	0.39	0.59	***	0.47	0.38	0.58	***	0.34	0.27	0.41	***
< 55 years of age	0.30	0.25	0.36	***	0.25	0.21	0.30	***	0.17	0.14	0.21	***
Not disabled	1.69	1.44	1.98	***	1.42	1.22	1.66	***	1.30	1.12	1.50	**
Average math/reading score > 29.1	1.21	1.07	1.38	**	1.18	1.04	1.33	**	1.27	1.13	1.42	***
Uninsured health care rate > 5.7	0.88	0.76	1.02	*	0.88	0.76	1.02	*	0.91	0.79	1.05	0.182
Average payday loan APR ≥ 375%	0.91	0.80	1.05	0.200	1.01	0.89	1.16	0.846	1.13	0.99	1.28	*
Average payday loan APR < 375%	0.95	0.79	1.13	0.537	1.20	1.00	1.44	*	1.33	1.12	1.58	**

Panel C: Goodness of Fit Statistics

Goodness of Fit Measure	**2019**	**2017**	**2015**
-2 Log Likelihood	8734.84	8905.93	9590.21
AIC (smaller is better)	8792.84	8963.93	9648.21
BIC (smaller is better)	9036.48	9206.85	9892.35
Pearson Chi-Square	28052.71	23990.61	24175.52
Pearson Chi-Square / DF	0.85	0.75	0.72

Table 8: Multilevel Model Results

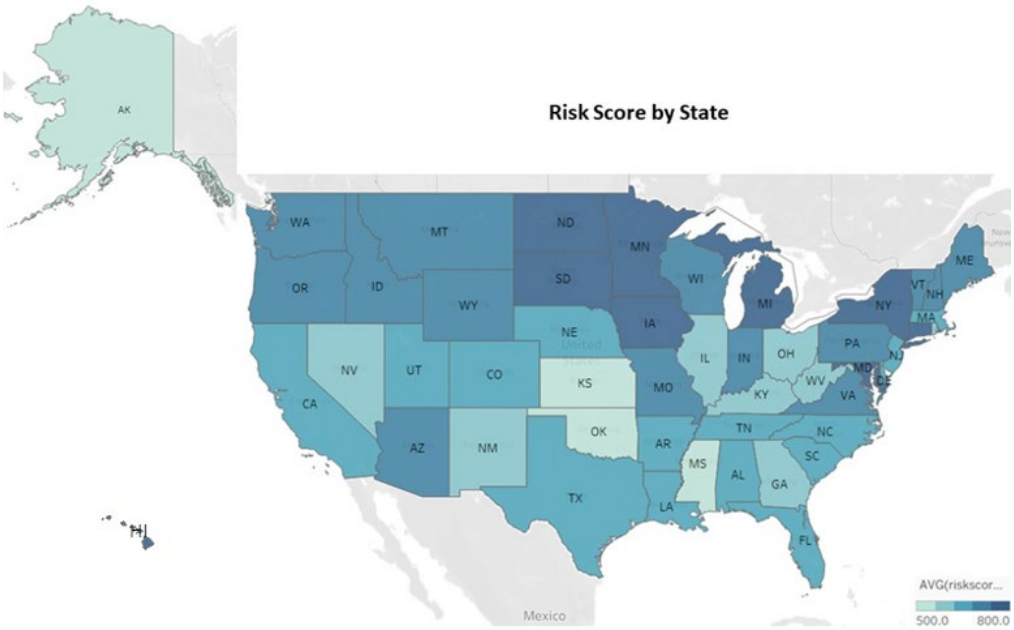
Panel A: Coefficient Estimates

	Model 1					Model 2			
Variable	Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square		Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square
Intercept	4.89	0.38	13.04	***		4.79	0.35	13.82	***
Income < $15,000	-2.49	0.17	-14.5	***		-2.48	0.17	-14.45	***
$15,000 to $30,000	-1.83	0.17	-10.7	***		-1.82	0.17	-10.61	***
$30,000 to $50,000	-1.24	0.17	-7.14	***		-1.22	0.17	-7.06	**
$50,000 to $75,000	-0.58	0.20	-2.91	***		-0.57	0.20	-2.87	***
College degree or some college	0.69	0.08	8.37	***		0.69	0.08	8.4	***
Marital status: single	-0.47	0.10	-4.65	***		-0.48	0.10	-4.71	***
No. of dependents: < 3 children	0.42	0.13	3.11	***		0.42	0.13	3.11	***
Employed	0.23	0.18	1.29	0.1956		0.23	0.18	1.31	0.1919
American Indian or Alaska Native	-0.87	0.29	-2.99	***		-0.81	0.29	-2.77	***
Asian	0.15	0.24	0.62	0.5354		0.16	0.24	0.68	0.4946
Black	-1.12	0.09	-12.58	***		-1.13	0.09	-12.6	***
Hispanic	-0.94	0.11	-8.43	***		-0.92	0.11	-8.49	***
Native Hawaiian or Pacific Islander	0.04	0.66	0.05	0.9568		0.08	0.66	0.12	0.905
No mobile phone	-0.71	0.12	-5.94	***		-0.71	0.12	-5.94	***
Mobile phone but no smartphone	-0.24	0.11	-2.27	**		-0.24	0.11	-2.24	**
No internet access	-1.14	0.08	-13.75	***		-1.14	0.08	-13.71	***
Income highly variable	-0.68	0.14	-4.73	***		-0.68	0.14	-4.71	***
Income somewhat variable	-0.13	0.09	-1.42	0.1555		-0.13	0.09	-1.37	0.1717
Foreign-born citizen	0.48	0.15	3.2	***		0.45	0.15	3.01	***
Foreign-born noncitizen	-0.54	0.12	-4.4	***		-0.55	0.12	-4.51	**
Not a single mother	0.26	0.11	2.34	**		0.25	0.11	2.31	**
55 to 64 years of age	-0.60	0.13	-4.7	***		-0.60	0.13	-4.69	***
< 55 years of age	-0.93	0.11	-8.36	***		-0.93	0.11	-8.36	***
Not disabled	0.59	0.10	5.65	***		0.59	0.10	5.63	***
Number of branches per 10,000	-0.08	0.07	-1.18	0.2386					
Average distance to bank branch						-0.06	0.05	-1.19	0.2324

Panel B: Goodness of Fit Statistics

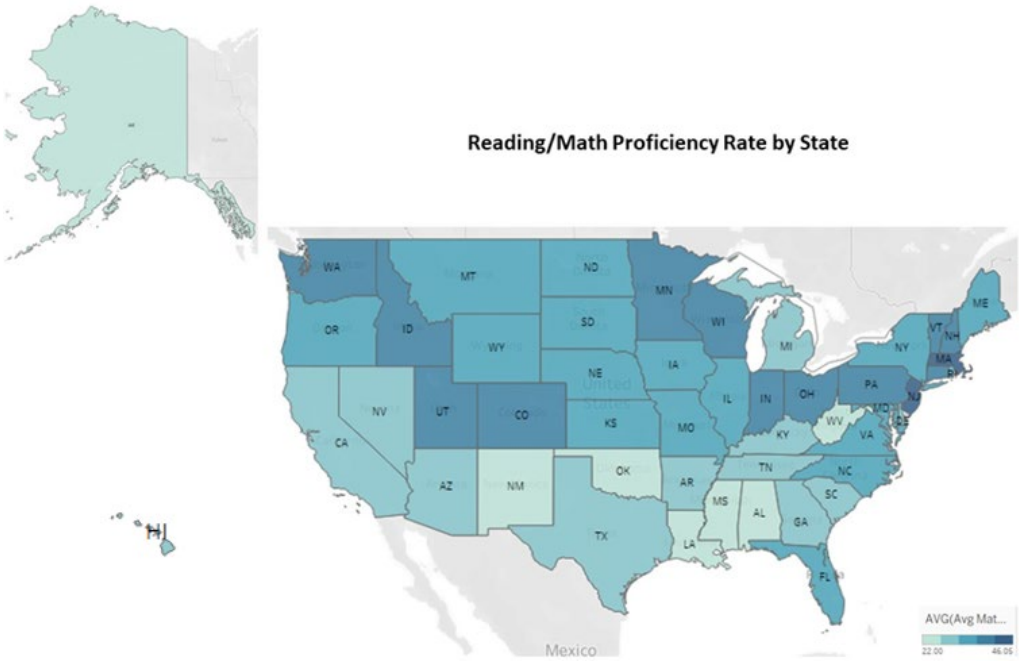
Goodness of Fit Measure	Model1	Model2
-2 Log Likelihood	5728.78	5728.77
AIC	5780.78	5780.77
BIC	5989.48	5989.47
Pearson Chi-Square	18113.13	17866.71
Pearson Chi-Square / DF	0.8	0.79

Map 1



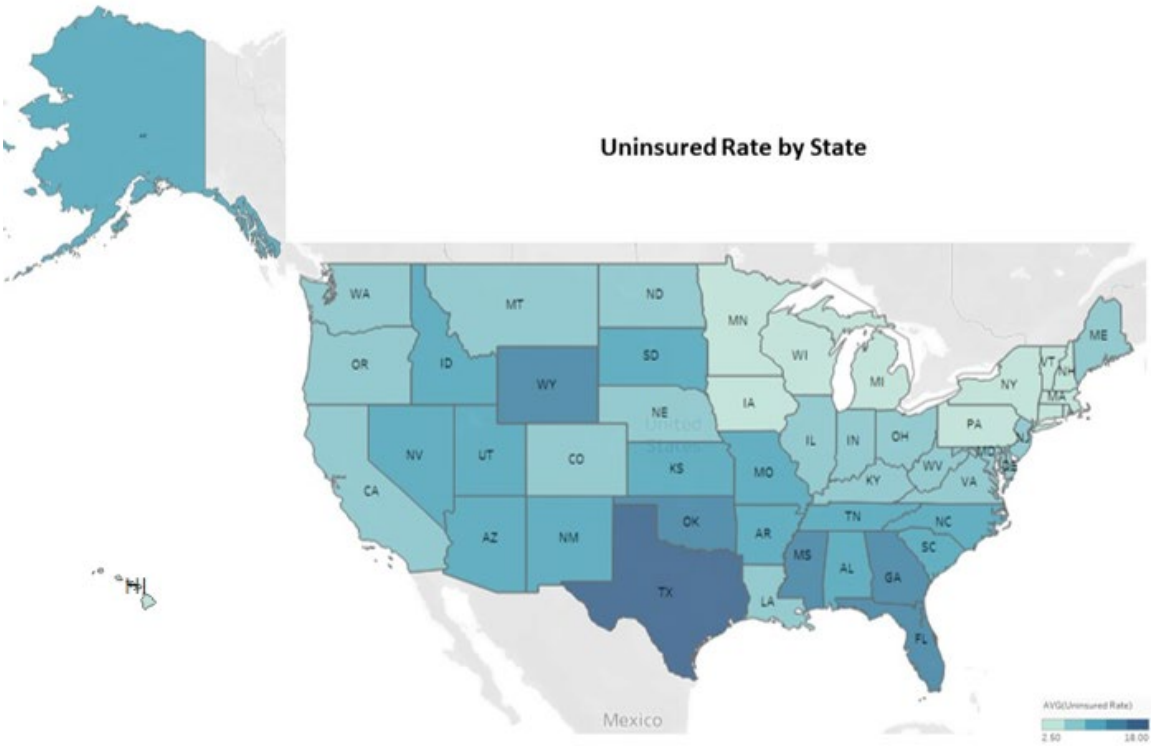
Source: FRBNY Consumer Credit Panel/Equifax (CCP) data

Map 2



Source: Prosperity Now Scorecard

Map 3



Source: Prosperity Now Scorecard

Figure 1: Estimated Odds Ratios for 2019

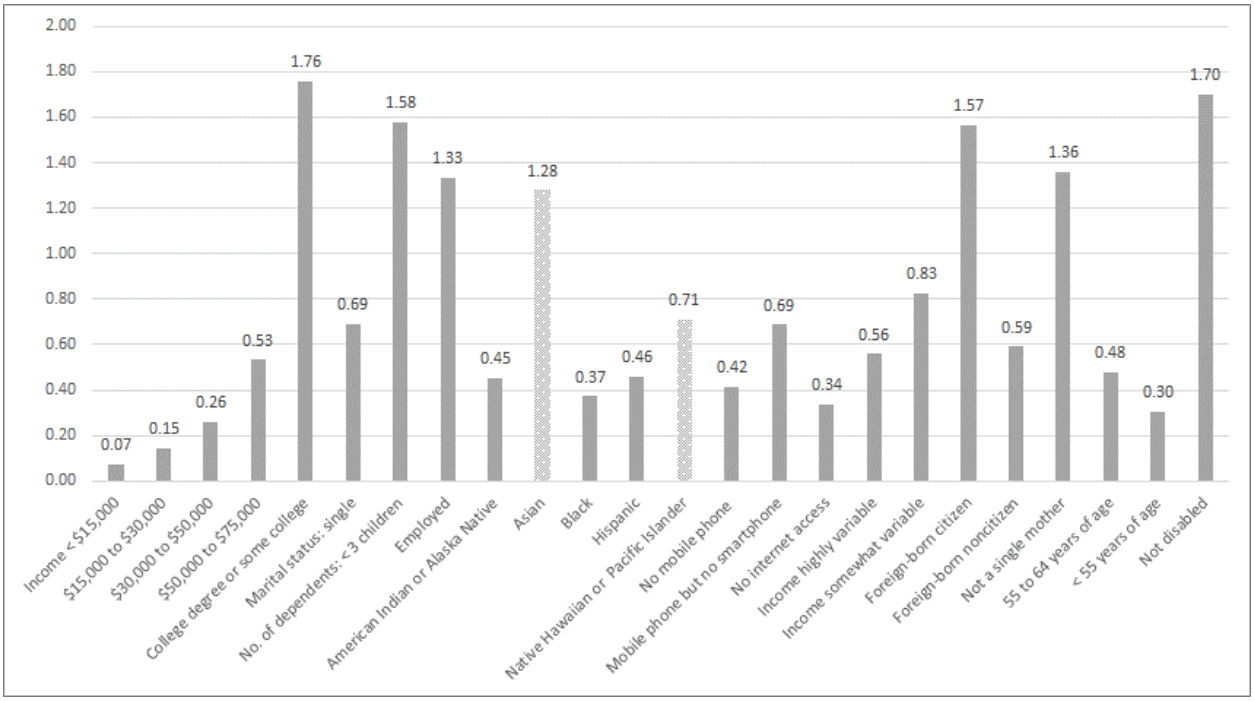
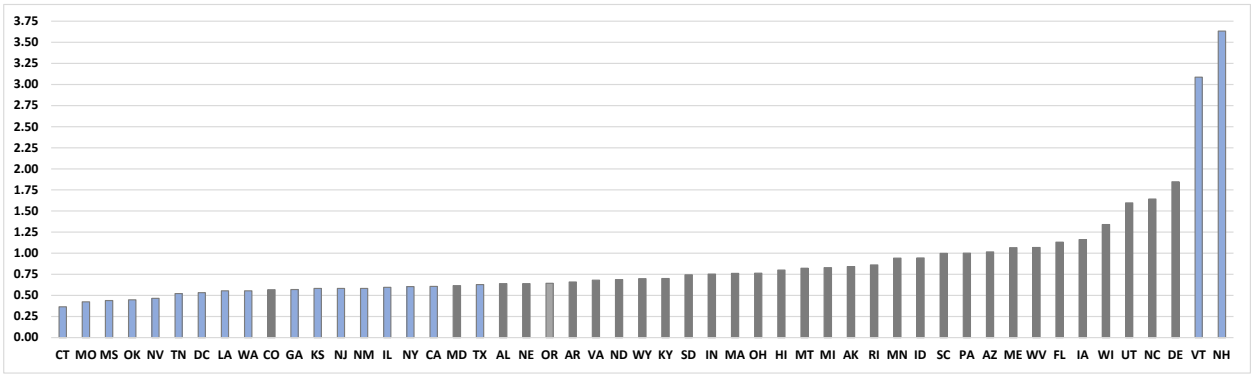
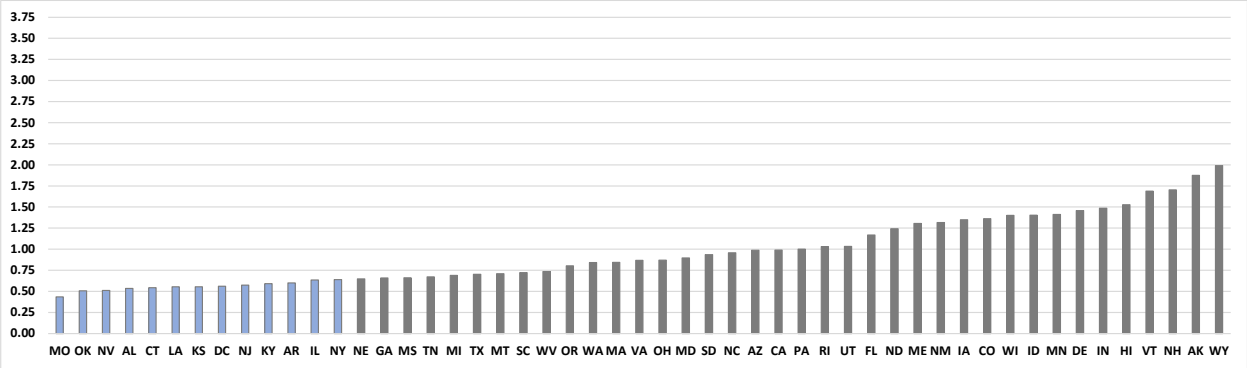


Figure 2: Estimated Odds Ratios from the State Fixed Effects

Panel A: 2019



Panel B: 2015



Panel C: Pooled Model

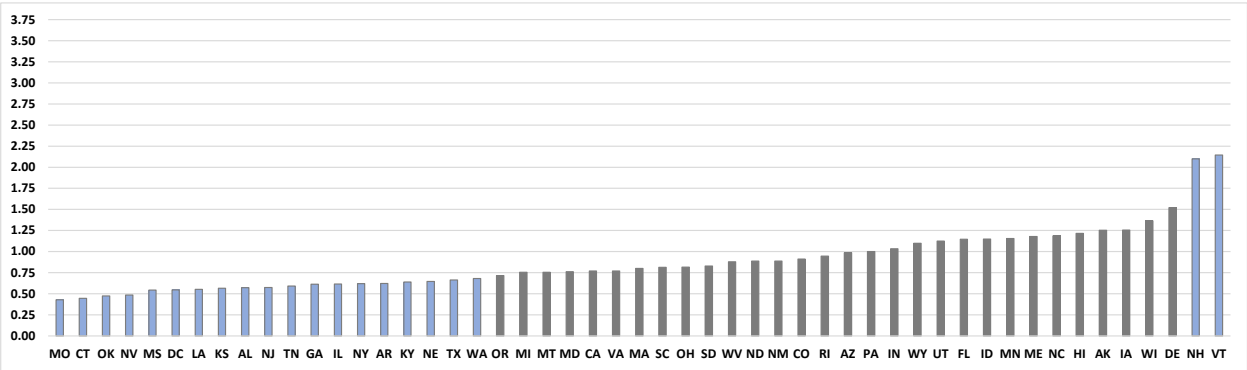
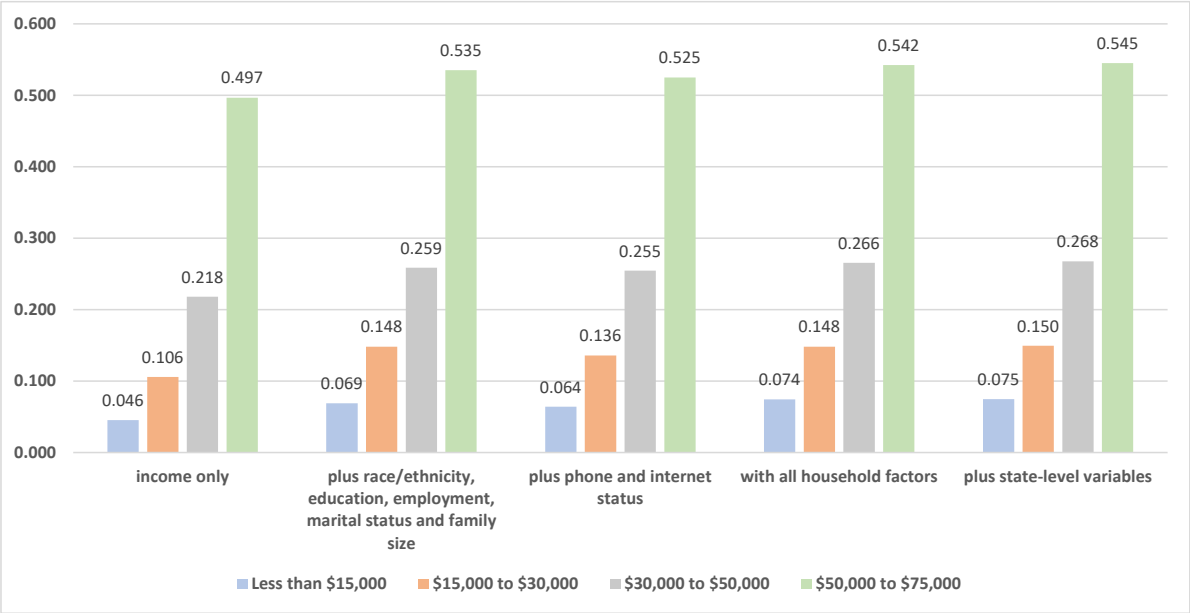
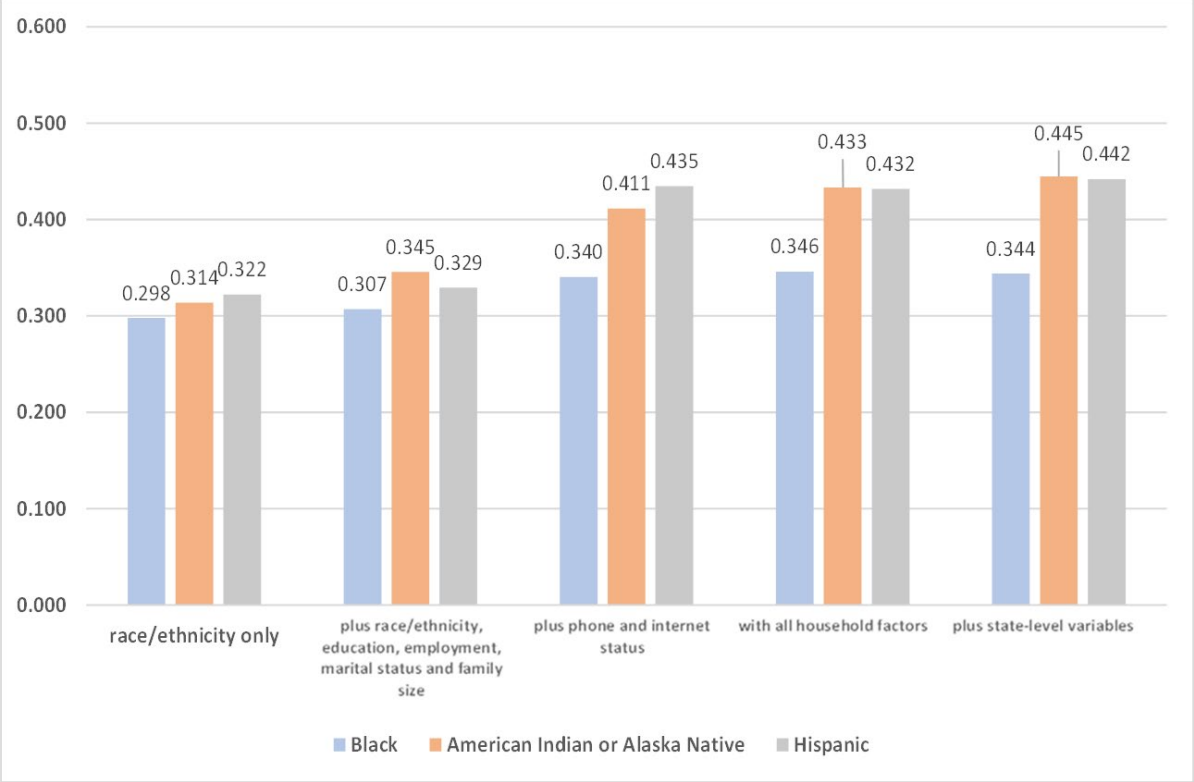


Figure 3: Sequential Estimations with Gradual Inclusion of Additional Factors

Panel A: Effects on Estimated Odds Ratios for the Income Variables



Panel B: Effects on Estimated Odds Ratios for the Race/Ethnicity Variables



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