

Landscapes of financial exclusion: Alternative financial service providers and the dual financial service delivery system

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Abstract

This research addresses equity in geographic access to financial services. As financial products and services continue to become more accessible and affordable, many low- to moderate-income Americans remain unbanked and underbanked, relying instead upon informal, alternative financial service providers, including check cashing outlets and payday lenders. While geographic access to affordable financial products and services assists in the successful asset building strategies of economically vulnerable households, concerns that access to financial services is uneven persist. This article uses geographic information systems and spatial binary logistic regression analysis to test the hypothesis that sociodemographic characteristics and mortgage lending variables have a predictive relationship on the presence of financial deserts—census tracts where check cashing outlets are more prevalent than banks—in southeastern Pennsylvania. Results of comparison of means and regression analysis reveal that these tracts are associated with higher than average population density, lower levels of median household income, a higher proportion of Black and Latinx residents, and higher levels of mortgage application denial. This article contributes to the ongoing debate over the emergence of a two-tiered or dual financial

service delivery system, whereby financial products and services are bifurcated based on socioeconomic status and geography.

1 | INTRODUCTION

There is a paradox in America that low-income consumers tend to pay more for basic financial products and services than their higher income counterparts (Baradaran, 2015; Squires, 2004). Put simply, it is expensive to be poor. A considerable number of low- to moderate-income (LMI) consumers operate outside of the mainstream banking system and instead rely on what are referred to as fringe banking or alternative financial services, including check cashing outlets and payday lenders (Barr, 2012). According to the U.S. Federal Deposit Insurance Corporation (FDIC), approximately nine million U.S. households are unbanked, which means they do not maintain a checking or savings account at an insured financial institution. Approximately 24.5 million U.S. households are underbanked, meaning they have a mainstream bank account, but also utilized an alternative financial service within the past year (U.S. Federal Deposit Insurance Corporation [FDIC], 2016).

The alternative financial service industry is controversial. Critics of alternative financial service providers (AFSPs) raise concerns about the ethical implications of industry practices (Mayer, 2013; Schwartz & Robinson, 2018; Stearns, Borna, & White, 2006) and offer warnings about the potential detrimental financial impacts to economically vulnerable consumers (Baradaran, 2015; Barr, 2012; Caskey, 1994, 2012; Karger, 2005; Servon, 2017). There is also concern that financial service offerings are bifurcated based on socioeconomic status (SES), and prior research observes the emergence of a two-tiered (Cover, Fuhrman, & Garshick, 2011; Squires & O'Connor, 1998) or dual (Berry, 2005) financial service delivery system. While middle- and upper income households routinely use mainstream financial services, many lower income households remain outside of the system and rely on AFSPs instead. Access to affordable financial products and services is a necessary condition for the successful asset building strategies of LMI households, while lack of access or reliance on alternative financial services compounds economic challenges (Barr, 2012; Barr & Blank, 2009).

The potential role that the geography of financial services plays in perpetuating the landscape of the dual financial service delivery system is a complex quandary. A lack of bank and credit union (BCU) branches may serve as an impediment to financial inclusion, and prior research addresses the absence of BCU branch locations in LMI neighborhoods (Avery, Bostic, Calem, & Canner, 1997; Dahl & Franke, 2017; Ergungor, 2010; Morgan, Pinkovskiy, & Yang, 2017). At the same time, the prevalence of AFSPs in LMI neighborhoods perpetuates ongoing questions about the potential targeting of LMI and minority consumers (Barr, Dokko, Borzekowski, & Kiser, 2012; Barth, Hilliard, & Jahera, 2015; Dunham & Foster, 2015; Graves, 2003; Prager, 2014). There is a concern that the presence of AFSPs poses a risk to the financial health of LMI consumers (Friedline & Kepple, 2017). Even as new technology innovations in the financial services sector, including mobile and online banking, become more ubiquitous, the brick-and-mortar geography of the financial services environment will remain relevant in understanding and promoting financial inclusion (Friedline, 2018).

The fundamental question addressed by this research is the issue of equity in geographic access to financial services. This article seeks to better understand the relationship between the geography of brick-and-mortar financial services and the characteristics of neighborhoods where AFSPs proliferate. It is hypothesized that sociodemographic and mortgage lending variables have a predictive relationship on the locations of banking deserts—census tracts where AFSPs are more prevalent than BCUs.

The study progresses as follows. Examining the five-county metropolitan region of Philadelphia, Pennsylvania (Bucks, Chester, Delaware, Montgomery, and Philadelphia Counties), geographic information systems (GIS) is used to geocode the locations of financial service providers. The characteristics of census tracts where check cashing outlets are more prevalent than banks are examined using a comparison of means. Binary logistic regression analysis is utilized to examine the sociodemographic predictors of these census tracts. The sociodemographic indicators included as independent variables in the analysis are chosen based on prior studies cited in the literature review and include household income, race, age, and educational attainment. In addition, this article investigates the connection between the financial services environment and mortgage lending activity by incorporating mortgage lending data aggregated at the census tract level. Two mortgage lending variables are included, the percentage of home purchase mortgage loans denied upon application and the percentage of mortgage home purchase loans classified as subprime. Within the relevant literature, a considerable amount of evidence exists that LMI communities have been the target of predatory and subprime mortgage loans (Belsky & Calder, 2005; Conley, 1999; Darden & Wyly, 2010; Taylor, Silver, & Berembaum, 2004). These measures are intended to serve as a proxy of credit availability within neighborhoods.

The results of the comparison of census tracts identified as those where check cashing outlets are more prevalent than banks with census tracts in the entire region reveal that banking desert neighborhoods have comparatively higher population density, lower median household income, a higher percentage of Black and Latinx residents, a lower percentage of Asian residents and residents age 65 or older, lower levels of educational attainment measured by high school diploma, and lower percentages of mortgage application denial and subprime mortgage lending. The binary logistic regression model results indicate that these neighborhoods are predicted by higher than average population density, lower levels of median household income, a higher proportion of Black and Latinx residents, and higher levels of mortgage application denial. Taken collectively, the results of the analyses serve as evidence of the existence of a dual financial service delivery system in the region. To the degree that discrepancies in financial service access are present in LMI communities, strategic opportunities exist for traditional BCUs, new financial technology companies, and nonprofit and government organizations to help redesign the financial services industry to be more inclusive and better serve unbanked and underbanked stakeholders.

2 | LITERATURE REVIEW

The United States has undergone several trends that have shaped the retail landscape of consumer finance over the past 70 years. The first trend is a vertical and horizontal expansion of firms and products for consumers to choose from. A second trend is increasing levels of, and reliance upon, debt. A third trend is the restructuring of the consumer marketplace that is reflected in the built environment. A fourth more recent trend is the rise in popularity of new technology innovations, including mobile and online banking, which carry the potential to expand functional access to safe and affordable financial services and bring more unbanked and underbanked consumers into the financial mainstream.

Since World War II, innovations in consumer finance have presented consumers with an ever-greater number of financial firms and products, accompanied by an increasing amount of information to navigate (Campbell, Jackson, Madrian, & Tufano, 2011). According to Ryan, Trumbull, and Tufano (2011), four themes characterize the postwar changes in the consumer finance sector: innovation that has created more available choices for consumers, enhanced access to and participation with financial planning activities, “do-it-yourself” consumer finance leading to consumers taking more responsibility for their financial decisions, and an increase in risk-taking (p. 461).

A second trend is that American households are taking on ever-greater amounts of debt. Student loans, car loans, and jumbo mortgages are increasingly seen as the norm rather than the exception (Warren & Tyagi, 2003; Williams, 2004). In 1949, mortgage debt for the average household was equal to 20 percent of total household income. This figure rose to 46 percent by 1979 and 73 percent by 2001 (Bernstein, Boushey, & Mishel, 2003). Since the 1990s, levels of private debt have risen, while wages for LMI households have declined (Barba & Pivetti, 2009; Montgomerie, 2009; Sullivan, Warren, & Westbrook, 2000). The long-term persistence of, and dependency upon, debt is the key difference between modern debt and the debt of the earlier postwar period (Hyman, 2008). The result is that households, communities, and entire metropolitan areas are experiencing increased economic vulnerability due to the increased levels of debt (Walks, 2013).

A third trend is the restructuring of the physical consumer marketplace that has potentially stratified consumers based on the availability and types of financial services available to them. Postwar suburban expansion was driven by a mass consumer society and inexpensive suburban housing (Duany, Plater-Zyberk, & Speck, 2010; Garreau, 1991; Jackson, 1985; Kunstler, 1993). This shift of suburbanization of residential life was accompanied by a postwar restructuring of consumer marketplaces. Mass consumption contributed to public space being restructured to be more commercialized, privatized, and segmented along lines of SES and race (Cohen, 1996). During the postwar period, when minorities and their supporters were making headway in courts and legislatures challenging segregation, real estate developers and retailers were creating new segregated spaces. Suburbanization contributed to segregation as central marketplaces, parks, streets, and public buildings of urban commercial districts lost popularity to suburban shopping malls that were differentiated based on SES and race (Cohen, 1996). Today, the legacy of postwar metropolitan development and restructuring is a retail landscape that varies based on SES and race variables of a neighborhood, with poorer neighborhoods more likely to be retail deserts (Schuetz, Kolko, & Meltzer, 2012).

A more recent trend in consumer finance is technology innovations in the financial services sector and the rise in popularity of mobile and online banking (Blanco, Bosque, & Wang, 2017; Friedline, 2018; Gorham & Dorrance, 2017; Hogarth & Anguelov, 2004). Digital financial services can lower costs, improve transparency, and provide convenience and control for LMI consumers. New fintech companies and incumbents in the banking industry are rapidly adopting new solutions that carry the potential to incentivize the unbanked to engage with mainstream financial services and enhance existing relationships between banks and consumers (Burhouse, Homer, Osaki, & Bachman, 2014; Christopher, 2015; Gorham & Dorrance, 2017). In particular, as smartphone usage among the unbanked expands, mobile financial services may play a greater role in increasing access to mainstream banking, particularly for consumers who primarily access the internet with a smartphone (Burhouse, Homer, Osaki, & Bachman, 2014).

2.1 | Unbanked and underbanked consumers

For most Americans who maintain a relationship with a mainstream financial institution, the *prima facie* benefits that these institutions provide include making basic financial transactions less expensive, facilitating savings, and offering deposit insurance, transparency, and other consumer protections (Barr, 2012; FDIC, 2017). In terms of the long-term benefits of being banked, savings rates may improve as consumers have the means and incentives to save. Responsible borrowing and the establishment of credit history assists in obtaining future credit to invest in education and housing on fair and affordable terms (FDIC, 2017).

Those operating outside of the financial mainstream typically rely upon cash, instead of credit cards or checks, and are more likely to use a range of AFSs, including automobile title lenders, check

cashing outlets, money transmitters, pawn shops, payday lenders, rent-to-own establishments, and tax refund anticipation lenders (Barr, 2012; Caskey, 1994; Friedline & Despard, 2016; Friedline & Kepple, 2017; Servon, 2017; Squires & O'Connor, 1998). Reliance upon AFSPs represents a financial burden to consumers (Cover et al., 2011). The existing literature on unbanked and underbanked populations in the United States suggests that these households have relatively lower levels of income, lower levels of educational attainment, are younger, more likely to be unemployed, and tend to be headed by minorities and/or single females (Berry, 2005; Bucks, Kennickell, & Moore, 2006; Dunham, 2001; Hogarth, Anguelov, & Lee, 2003, 2005; Paulson & Rhine, 2008). A possible explanation for the persistent popularity of the alternative financial service industry among these vulnerable populations is that the products and services that these firms offer meet the needs of LMI consumers in ways that mainstream BCUs do not. Notably, AFSPs may be seen as offering cultural sensitivity for immigrants, convenience in terms of operating hours and location, and a variety of product offerings (Andre Associates, 2001; Dove Consulting, 2000; Squires & O'Connor, 1998; Stegman & Faris, 2003). Other reasons may include not needing a checking account due to a lack of need to use checks, not having enough savings to justify having an account, and reluctance to utilize mainstream banking services (Bucks et al., 2006). While there is no central database of check cashing outlets, making count estimates difficult, Fellowes and Mabanta (2008) estimate that there were approximately 26,000 check cashing outlets in the United States as of 2007.

2.2 | Prior spatial analysis research

A growing number of academic studies examine the spatial distribution and composition of brick-and-mortar financial services, revealing four distinct questions about the geography of retail financial service locations. The first question is the potential absence of mainstream financial institutions in LMI and otherwise vulnerable communities. A second question is the potential disproportionate prevalence of AFSPs in LMI communities. A third question is the geographic relationship between BCUs and AFSPs. Fourth, the potential impact on consumers and communities where AFSPs are prevalent and BCUs are few is also a concern.

Several studies examine the availability or lack thereof of BCU locations in LMI neighborhoods. The term banking deserts refer to areas that have been abandoned by mainstream financial services (Dahl & Franke, 2017; Morgan et al., 2017; Thrift & Leyshon, 1997). Furthering an understanding of bank presence by neighborhood type, a number of studies conclude that banks are disproportionately underrepresented in minority and LMI neighborhoods (Hegerty, 2016; Oron, 2006; Sawyer & Temkin, 2004), though a specific definition of how to quantify the presence of a banking desert has not emerged.

The second body of relevant research attempts to understand the characteristics that are associated with the presence of AFSPs at the neighborhood (Burkey & Simkins, 2004; Damar, 2009; Dunham, Foster, Graves, & Masucci, 2018; Gallmeyer & Roberts, 2009; Squires & O'Connor, 1998), regional (Barth et al., 2015; Wheatley, 2010), and national (Prager, 2014) scales using varying methods and units of analysis. The question of whether LMI, minority, and otherwise vulnerable neighborhoods are potentially targeted by the AFSP industry is ongoing. In his landmark book *Fringe Banking: Check Cashing Outlets and the Poor*, Caskey (1994) introduces empirical methods to address the possible higher than average prevalence of AFSPs in low-income communities. Subsequent studies refine the methods used for geographic analysis. Graves (2003) examines AFSP location data in seven metropolitan areas and finds that AFSPs are significantly more likely to locate in LMI and minority (primarily Black) neighborhoods. Additional studies at the neighborhoods and regional level have found similar finding of significant economic and racial differences in areas where AFSPs are more numerous

(Cover et al., 2011; Dunham et al., 2018; Gallmeyer & Roberts, 2009; Oron, 2006; Wheatley, 2010). Prager (2014) examines the average number of AFSPs per population across the nation at the county level. The study finds that the number of AFSP outlets per capita is positively related to racial/ethnic minority composition, age, education level, and average credit score. Interestingly, AFSPs are found to avoid the poorest counties in the United States. Lower credit scores are found to be a strong predictor of AFSP concentration. The author notes that the highest concentrations of payday lending stores per capita are in the southern states of Alabama, South Carolina, Tennessee, Mississippi, and Louisiana (Prager, 2014).

The third body of research is concerned with understanding the relationship between BCU and AFSP location. The spatial void hypothesis posits that AFSPs fill a market niche and locate in areas where BCUs are few. In other words, AFPs are substitutes for BCUs (Sawyer & Temkin, 2004; Smith, Smith, & Wackes, 2008). The locations of AFSPs may be either supplementary, locating where BCUs are mostly absent, or complementary, locating near BCUs. In support of the spatial void hypothesis, Smith et al. (2008) examine the spatial clustering of AFSPs in southeastern Pennsylvania. Using Ripley's K function to test for the presence of spatial clustering, they find strong evidence of a spatial void. A follow-up study by Smith, Wackes, and Smith (2013) applies the same method as in the first study to examine the spatial void hypothesis in selected counties in New Jersey and Delaware. Both of these studies find support for the spatial void hypothesis.

Additional studies do not find evidence for the spatial void hypothesis (Barth et al., 2015; Burkey & Simkins, 2004; Damar, 2009; Fowler, Cover, & Kleit, 2014), and a consensus has not emerged. Sawyer and Temkin (2004) find that AFSPs locate in close proximity to BCUs. Burkey and Simkins (2004) find a similar pattern. A study by Fowler et al. (2014) examines the predictive power of a variety of sociodemographic factors on the presence of financial service providers. Examining the entire nation at the county level, they determine that fringe banks do not fill a spatial void in traditional services. In their analysis of all counties within states that allow payday lending, they find a disproportionate number of AFSPs of all types in low- to moderate-income counties, but they do not find evidence that AFSPs are more prevalent in counties where traditional banks are few, thus casting doubt on the spatial void hypothesis. Barth et al. (2015) examine payday lending and bank branch data at the state level for the entire United States. The authors note that financial services are bifurcated, but their analysis reveals no evidence that the number of payday lending stores per capita is correlated with the number of bank branches per capita. They do find that the number of payday lending storefronts is positively related to the percentage of the population that is Black, the percentage aged 15 and under, and the poverty rate. They find an inverse relationship with the number of payday lending storefronts and per capita income and educational attainment. Dunham and Foster (2015) investigate the likelihood of AFSPs and BCUs to locate in LMI and minority neighborhoods in southeastern Pennsylvania, and the spatial relationship between the two types of financial services. Using ordinary least squares (OLS) and spatial autoregressive modeling, the authors determine that AFSPs are disproportionately located in neighborhoods with comparatively lower levels of education and more subprime mortgage lending. The study finds that higher income and levels of educational attainment, along with lower percentages of Black residents are predictors of BCU location. These studies show mixed results and therefore present an opportunity for further study on the spatial void hypothesis.

Finally, several recent studies attempt to link individual behavior to the presence of AFSPs (e.g., does the presence of AFSPs influence consumer behavior and outcomes). Gallmeyer and Roberts (2009) argue that AFSP locations serve as an indicator of economic distress within a community, just as their presence functions as an exacerbating factor in that distress. Friedline and Kepple (2017) address this potential relationship between the concentration of alternative financial services within communities and residents' usage of these services from nationally representative samples of

unbanked and underbanked adults. The authors find that higher densities of AFSPs in zip codes are associated with more chronic use of these services among the lowest income individuals, as well as an increased probability that modest and highest income individuals have used these services. Analyzing a nationally representative sample of unbanked and underbanked individuals, Birkenmaier and Fu (2016) examine the relationship between financial access and AFSP usage using OLS regression. The authors find that financial knowledge, age, gender, marital status, education, household income, and homeownership are all factors associated with AFSP usage. Goodstein and Rhine (2017) examine the influence that geographic proximity to BCUs and AFSPs has on U.S. households' usage of these services using a nationally representative dataset. Utilizing a bivariate probit model of bank account ownership and nonbank transaction product use, the authors find that geographic access to bank branches is associated with having a bank account and being less likely to use AFSPs. However, household-level attributes, including income, education, and race are stronger predictors than geographic proximity to financial services. Additional studies examine the relationship between AFSP location and negative outcomes, for example, crime (Kubrin & Hipp, 2016; Lee, Gainey, & Triplett, 2014) and health outcomes (Hundley, Wilson, Chenault, & Smimble, 2017).

3 | METHODS

The aforementioned literature is integral to understanding the evolution of research on the spatial distribution of financial services, yet many questions about the appropriate methods to study financial exclusion as a geographic phenomenon persist. This article builds on the existing literature in the following ways. Southeastern Pennsylvania was chosen as a study area based on the findings of the studies by Smith et al. (2008) and Dunham and Foster (2015), which suggest evidence of banking deserts in the region. This article incorporates appropriate sociodemographic variables included in past studies as independent variables in the analysis and adds two mortgage lending variables. The analysis is carried out at the census tract level in order to provide a scale of analysis suitable for understanding potential inequality across a metropolitan region. In terms of advancing methodology, the study utilizes a binary logistic regression analysis to determine the characteristics associated with banking deserts. The addition of the mortgage lending variables, mortgage purchase denial, and subprime mortgage purchase, is included to provide a proxy for credit availability.

The Pennsylvania counties included in the Philadelphia metropolitan area are Bucks, Chester, Delaware, Montgomery, and Philadelphia. According to the U.S. Census Bureau (2014), the five counties have a combined population of 4,050,793. Philadelphia County has a population of 1,526,006. The population of Philadelphia increased by 0.6 percent between 2000 and 2010. The population of the entire Philadelphia MSA increased by an estimated 4.9 percent from 2000 to 2010 (U.S. Census Bureau [Census Bureau], 2011). As of 2010, 43 percent of the residents of Philadelphia County identify as Black, 41 percent identify as White, 12 percent identify as Hispanic or Latinx, and 6 percent identify as Asian (Census Bureau, 2013). Major sectors of the economy of the Philadelphia region include higher education, health care, biotechnology, manufacturing, oil refining, food processing, telecommunications, financial services, legal services, and tourism. The unemployment rate for the City of Philadelphia was an estimated 10.7 percent in 2012 (Pew Charitable Trusts, 2013). According to the U.S. Census Bureau, the Gini Index for Philadelphia County is 0.494. Of the 25 most populous counties in the nation, Philadelphia has the fourth highest level of income inequality (Census Bureau, 2012).

This article incorporates data from many sources. Check cashing locations were obtained from the Pennsylvania Department of Banking and Securities, which maintains a list of money services

businesses. According to the Department, a total of 881 check cashing locations were licensed and authorized in the State of Pennsylvania, including large retail chains such as Wal Mart and large chain grocery stores, as well as chain check cashing companies such as Ace Check Cashing and small locally owned and operated storefronts (Pennsylvania Department of Banking & Securities, 2014). The data were cleaned to exclude large chain stores and grocery stores, which results in only standalone storefronts being included in the analysis. State law prohibits payday lending in Pennsylvania. The FDIC Summary of Deposits is the source for the FDIC-insured bank branch location data (FDIC, 2013). Within the study area, there are 1,278 FDIC-insured BCU branches or 3.15 branches for every 10,000 people in the region. There are 114 check cashing outlets or 0.28 locations per 10,000 people.

Sociodemographic variables were obtained from the Census Bureau American Community Survey. The choice of census variables was informed by existing studies that address the spatial dimensions of retail financial markets. Data on rates of mortgage purchase denial and rates of subprime home purchases in 2006 were acquired from Home Mortgage Disclosure Act (HMDA) data that were made available by the Urban Institute. The descriptive statistics for the variables included in the study appear in Table 1.

In order to determine locations where check cashing outlets are more prevalent than banks, census tracts where the mean absolute Euclidean distance to the nearest brick-and-mortar check cashing outlet is less than the distance to a BCU are identified using ArcGIS software. Mean Euclidean distance is determined by transforming vector shapefiles of 2010 census tracts into a raster grid of 10 m² cells for the entire study area and calculating a mean distance for each raster cell within each individual census tract. The mean absolute distance to AFSPs and BCUs is then averaged for each census tract. If the average absolute distance to an AFSP is less than the average absolute distance to a BCU on average for all the raster grids within the census tract, the individual census tract is classified as a banking desert. Conceptually, any location within the census tract is, on average, closer to a check cashing outlet than a bank. This method is utilized in a study by Dunham and Foster (2015) and serves as an appropriate measure to define banking deserts at the metropolitan scale. Figure 1 is a map depicting the 2010 census tracts that are identified as banking deserts in southeastern Pennsylvania.

The first analysis conducted is a comparison of census tracts identified as banking deserts with census tracts in the entire region. Building on the comparative analysis, binary logistic regression is then carried out in order to examine the nature of the predictive relationship of the sociodemographic

TABLE 1 Descriptive statistics for southeastern Pennsylvania study area (Bucks, Chester, Delaware, Montgomery, and Philadelphia Counties)

Variable	Mean	SD	Min	Max
Population density	3,681.18	4,029.44	8.93	24,099.67
Median household income	65,210.42	33,688.02	8,980.00	201,537.00
Percent Black	23.10	30.87	0.00	100.00
Percent Latinx	6.96	11.99	0.00	88.86
Percent Asian	5.15	6.65	0.00	61.27
Percent age 65 plus	13.96	6.81	0.00	73.30
Percent 25 plus HS diploma	87.74	10.15	44.40	100.00
Percent mortgage purchase denial	15.65	11.32	0.00	97.49
Percent subprime mortgage purchase	7.45	7.36	0.00	57.14
Number of tracts (<i>N</i>)	998			

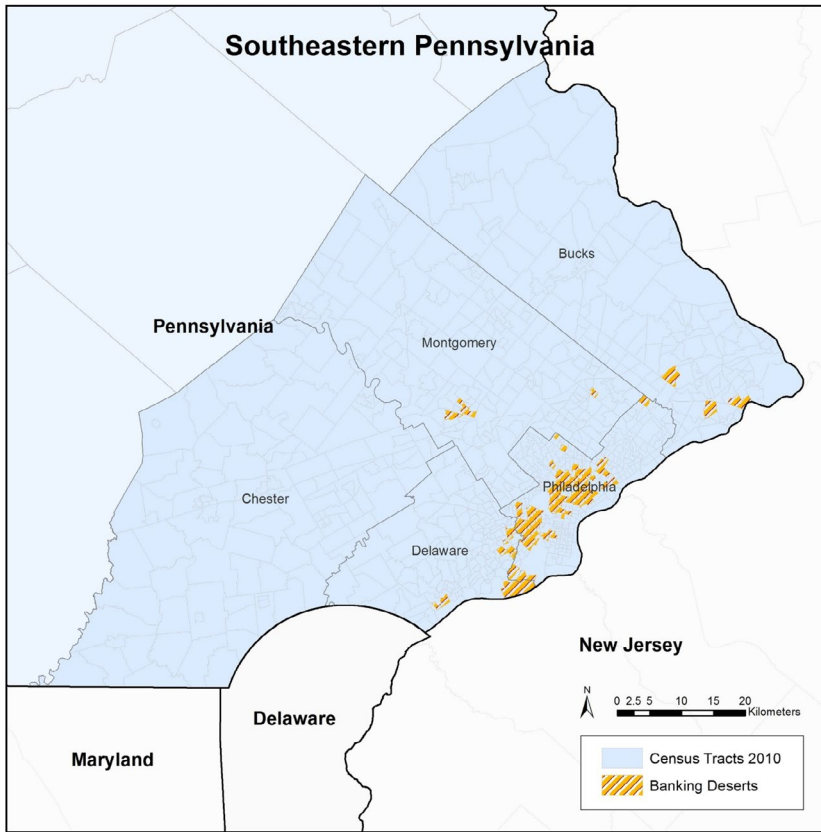


FIGURE 1 Southeastern Pennsylvania study area banking desert locations (Bucks, Chester, Delaware, Montgomery, and Philadelphia Counties) [Colour figure can be viewed at wileyonlinelibrary.com]

and mortgage lending variables on banking deserts. The binary logistic model may be represented as follows:

$$E(y) = P(y = 1) = \frac{e(\beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \dots \beta_kx_k)}{1 + e(\beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \dots \beta_kx_k)}$$

where y represents the presence of a banking desert census tract, x represents the independent predictive variables, and β_i represents the change in log-odds for every one-unit increase in x , holding all other x 's fixed. For each logit model, the presence of a banking desert is defined by a one, while banking desert census tracts are defined by a zero. The natural logarithm of the odds that a census tract is a banking desert is assumed to be a linear function of the relevant independent variables. The maximum likelihood method is used to estimate the model (Menard, 2002).

In line with prior research utilizing geographic spatial analysis, the model results include both the logit coefficients and the odds ratios (OR) from the multivariate binary logistic regression analysis (Basu & Chakraborty, 2008). The OR included in the results is the exponent of the regression coefficient produced by each logistic model and can be interpreted as a multiplier of the odds of a census tract in the study area being a banking desert. An OR greater than one represents an increase in the likelihood that a census tract is a banking desert. Specifically, the likelihood increases by the OR number for each unit of change in the independent variable. On the other hand, an OR less than one indicates that the likelihood decreases, again multiplied by that amount (Menard, 2002).

4 | RESULTS

Comparing census tracts identified as banking deserts with census tracts in the entire region, banking deserts have comparatively higher population density, lower median household income, a higher percentage of Black and Latinx residents, a lower percentage of Asian residents and residents age 65 or older, lower levels of educational attainment measured by high school diploma, and lower levels of mortgage application denial and subprime mortgage lending. Table 2 summarizes the comparison of means of socioeconomic indicators of census tracts identified as banking deserts and those that are not. Some takeaways from the analysis are as follows. While the average median household income for all census tracts in the southeastern Pennsylvania area is \$64,557, tracts identified as banking deserts have an average median household income of just \$28,848. The average percentage of Black

TABLE 2 Comparison of banking desert census tracts with all census tracts in study area

Variable	Census tracts total ($N = 989$)	Banking desert census tracts ($N = 130$)
Population density	3,644.30	7,337.17
Median household income	64,557	28,848
Percent Black	22.87	64.11
Percent Latinx	6.89	15.19
Percent Asian	5.10	2.65
Percent age 65 plus	13.92	10.23
Percent 25 plus HS diploma	86.96	73.90
Pct. mortgage purchase denial	15.77	7.39
Pct. subprime mortgage purchase	30.81	12.81

TABLE 3 Binary logistic regression predicting the presence of a banking desert

Variable	Southeastern Pennsylvania ($N = 989$)	
	Coefficient	OR
Population density	0.00008**	1.00008
Median household income	-0.00003**	0.99997
Percent Black	0.02725***	1.02763
Percent Latinx	0.03035**	1.03082
Percent Asian	-0.04805*	0.95309
Percent age 65 plus	-0.05805**	0.9436
Percent 25 plus HS diploma	-0.00114	0.99886
Percent mortgage purchase denial	0.03077**	1.03125
Percent subprime mortgage purchase	-0.00538	0.99463
Constant	-2.313	0.09899
Nagelkerke R^2	0.55	
-2 Log likelihood ratio	413.581	
Percent cases correctly classified ($n = 0.5$)	90.08	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

residents for census tracts in the region is 22.9 percent. Banking deserts census tracts have an average Black population of 64.1 percent. Mortgage purchase denial is found to be lower than average (7.4%). Subprime mortgage lending is also found to be lower (12.8%) than the regional average (30.8%).

Table 3 summarizes the binomial regression analysis results. The results indicate that most independent variables tested are statistically significant. Specifically, banking deserts are predicted by higher population density, lower median household income, higher percentages of Black and Latinx residents, lower percentages of Asian residents, lower percentages of residents age 65 or older, and higher levels of mortgage application denial.

5 | DISCUSSION

Financial inclusion is a prevailing goal for both private sector and policy actors. However, full participation with mainstream financial services remains an elusive objective, and a number of significant questions present themselves regarding defining the methods of analysis and scope of financial inclusion. The cumulative conclusion of this article is that there are significant differences between neighborhoods where banking deserts are present compared to the southeastern Pennsylvania region as a whole, thus serving as evidence of financial exclusion in LMI and minority communities.

The spatial approach employed in this article has both strengths and weaknesses. Financial exclusion is a form of social exclusion (Aalbers, 2011; Carbó, Gardener, & Molyneux, 2005). However, modeling the relationship between financial ecologies and individual behavior is challenging, and therefore assigning causality to particular factors is problematic (Clark, 2013). As the problem of ecological fallacy suggests, researchers must be careful not to draw conclusions about the habits of groups based on ecological analysis (Waller & Gotway, 2004). This also relates to the question of the relationship between the presence of an environmental amenity or disamenity and the actual usage by people in close proximity. Therefore, another limitation lies within the assumption that AFSPs represent an inherent risk to users. While a convenience aspect is present, derivative variables, such as measures of distance or concentration, are at best crude proxies for actual usage. Unlike environmental justice studies that have popularized distance as suitable dependent variable to determine risk, where nearness to a toxic facility is assumed to represent an acute risk to the entire population that is in proximity to be affected (Raddatz & Mennis, 2013), there is not a direct relationship between living near and using financial services. Instead, consumers may bank elsewhere, outside of their neighborhoods, if they live in a banking desert. Further developing an understanding of the users of AFSPs would be greatly enhanced by carrying additional independent-level analyses as data becomes available.

Another possible limitation is the potential overlap of AFSP location and sociodemographic variables. While existing academic studies overwhelmingly support the conclusion that AFSPs are more densely located in minority neighborhoods, the AFSP industry claims that AFSP location decisions are based on similar market-related factors that any business would consider, and not on income or race. These factors include appropriate zoning, visibility on arterial streets, a sizable population base, and other attributes that make them attractive to potential customers (Lehman, 2006). Furthermore, Lehman (2006) claims that if commercial zoning is correlated with the concentration of minority population, the positive association between AFSP location and minority residents may be spurious. In other words, incorrect assumptions about racial disparity in AFSP location may be made if minority populations are more likely to live in commercial areas than areas zoned residential. However, these claims have been addressed and refuted in a study by Cover et al. (2011) that includes market-related variables and still finds that AFSPs are located disproportionately in minority neighborhoods.

Contributing to this debate, this article examines both AFSP and BCU locations, finding disparities in an uneven landscape of financial services. If AFSPs are locating in commercial areas that also have a higher percentage of minority residents in the Philadelphia region, BCUs are also failing to locate in these areas. Further examining market-relating factors like zoning was not feasible for this article, as quantifying these variables is impractical. It would be nearly impossible to determine all the suitable locations for AFSPs and determine whether they target minorities. However, given that race is a strong predictor and banking deserts are found to be so concentrated in minority areas, it is unlikely that the alternative explanation offered by the AFSP industry holds much truth in the Philadelphia region.

The findings of this article raise considerable concern about the geographic nature of financial exclusion. The actual practice of spatial analysis in this realm, as well as the nature of the available data, has established some precedence, or best practices, that have been employed. Every attempt has been made to follow the guidance of the existing literature on financial inclusion to situate the theoretical understanding of the problem, justify the choice of methods used for the study, and following a set of best common methodological practices in gathering and analyzing the data and performing the statistical analysis.

Strategic opportunities exist for innovation in financial service delivery in markets potentially underserved by mainstream BCUs. Traditional BCUs, new financial technology companies, and non-profit and government organizations can innovate in order to help redesign the financial services industry to be more inclusive and better serve unbanked and underbanked stakeholders. Within mainstream consumer financial services, BCUs are making strides to improve financial inclusion, for example by offering low- and no-cost checking and savings accounts, that take into consideration the unique needs of LMI consumers. These efforts combat financial exclusion by helping to establish financial products and services that are more forgiving, inclusive, and appropriate to the needs of vulnerable populations.

As new technological innovations are gaining popularity, there is potential for fintech solutions to mitigate some of the negative effects that communities experience due to the lack of financial services. According to a 2016 Federal Reserve Board survey study, groups vulnerable to being unbanked, including younger adults, as well as Latinx, and Black respondents, reported greater use of mobile banking and mobile payments than overall survey averages (Dodini, Lopez-Fernandini, Merry, & Thomas, 2016). However, the effectiveness of these technology applications may be limited by in historically vulnerable populations. Research on the digital divide has long shown distinctions in information technology access based on income (Norris, 2001), race (Hoffman & Novak, 1998), and other factors leading to social and economic stratification (Warschauer, 2003). Inconsistent high-speed internet access and disruptions in phone and internet service may limit fintech adoption (Friedline, 2018).

Other barriers may be present that limit the adoption of fintech solutions among the unbanked. Technological literacy may be a barrier to financial literacy (Hogarth & Anguelov, 2004; Servon & Kaestner, 2008). Noting this barrier, efforts to improve financial inclusion may be paired with efforts to improve technological literacy. In addition, Gorham and Dorrance (2017) note a host of barriers to fintech adoption, including (1) concerns about the security of personal information, (2) lack of knowledge about the complex landscape of options available, (3) lack of guidance through the onboarding process, (4) lack of reliable access due to data plans and internet access, (5) the need for immediate access to paychecks, (6) lack of design for people with disabilities, and (7) that consumers may not perceive significant advantages to adopt digital financial services.

Although fintech services are a promising alternative, it is unclear whether technological solutions will ever serve as a complete substitute for traditional brick-and-mortar BCU branches. Mobile and online banking currently do not meet all the needs of consumers, for example, mortgage and small business lending (Burhouse, Homer, Osaki, & Bachman, 2014). In addition, many bank customers

prefer face-to-face interactions and value the branch banking experience. A recent survey by Accenture Consulting (2016) finds that 87 percent of bank customers surveyed anticipate visiting a bank branch in 2 years. Furthermore, 61 percent of customers that use branches prefer full-service branches. The top reasons for the preference for bank branches include trust, value, convenient location, comfort, and perception that better rates are obtained when negotiating face-to-face (Accenture Consulting, 2016). It is likely that fintech will continue to serve as an important tool to improve financial inclusion, but also that the geography of financial services will continue to be relevant.

Another potential solution in private-sector retail banking is the Community Development Financial Institution (CDFI) model. CDFIs are financial firms that have community development as their primary goal and are driven by a mission to fight financial and economic exclusion of low-income populations. Such organizations have been present in the United States since the late 1960s (Appleyard, 2011; CDFI Coalition, 2017). Other innovative solutions to help the unbanked establish a foothold come from the nonprofit sector, for example, the Lending Circles program offered by Mission Asset Fund (MAF) of San Francisco. Lending Circles are groups of 6–12 people that make small monthly payments of between \$50 and \$200 to create a collective pool of funds. Each month one member of the circle receives a loan of the full amount contributed by the members of the group for that month. The result is that unbanked and underbanked users have the means to save and to build credit. Successful payments are reported to credit bureaus to help establish a credit history (Reyes, López, Phillips, & Schroeder, 2013).

Policy initiatives can also play a role in improving financial inclusion. The Bank On San Francisco program, implemented by The San Francisco Office of Financial Empowerment in 2005 under then-mayor Gavin Newsom, helps unbanked locate and compare participating financial institutions that partner with Bank On to offer safe and affordable accounts specially designed to meet the needs of San Francisco's unbanked population (Feig, 2008; Fernholz, 2010). A coalition of 15 initial financial institutions—including Bank of America, Citibank, and Wells Fargo—offer reduced or no-fee starter bank accounts that have no overdraft or hidden fees, no required minimum balance, require low opening deposits of \$25 or less, and offer online and mobile banking with online bill pay. In addition, a California identification card or a social security number are not required to open an account (San Francisco Office of Financial Empowerment, 2019). In terms of federal government policy solutions, a potential alternative to AFSPs is post office location and the reimplementing of postal banking. Between 1911 and 1966 basic financial services were offered at post office locations, and there have been recent calls to reimplement this practice (Baradaran, 2015; Despard, Friedline, & Refior, 2017).

6 | CONCLUSION

This article seeks to address the question of equity in access to brick-and-mortar financial services. As options for consumer finance have expanded, and technology provides promising new solutions, financial products and services continue to become more accessible and affordable. However, LMI consumers continue to utilize alternative financial services, including check cashing outlets and payday lenders, raising concerns about functional and geographic access to the mainstream banking system. Overcoming these barriers will require a careful examination of the current situation in order to better understand the needs of LMI consumers.

Using GIS and spatial regression analysis, the sociodemographic characteristics of census tracts identified as banking deserts—geographic areas where AFSPs are more prevalent than traditional BCUs—in southeastern Pennsylvania is examined. It is hypothesized that sociodemographic and mortgage lending variables have a predictive relationship on the locations of banking deserts. The

independent variables tested in the binomial regression analysis predicting the presence of a banking desert include: population density, median household income, percentage Black, percentage Latinx, percentage Asian, percentage of population at or above age 65; percentage of the population aged 25 or more with a high school diploma; the percentage of home purchase mortgage applications that are denied, and the percentage of home purchase loans that are subprime. The results suggest strong evidence that banking deserts are present, and that these areas are distinct in their sociodemographic makeup as compared to the census tracts in the study area as a whole. The majority of the independent variables held the expected sign in the binomial regression. Banking deserts are predicted by higher than average population density, lower median household income, a higher percentage of Black and Latinx residents, a lower percentage of Asian residents, a lower percentage of residents age 65 or above, and a higher percentage of purchase mortgage application denial.

This article is intended to expand the current debate on the neighborhood level predictors of brick-and-mortar financial services and speak to the potential implications for financial inclusion in LMI neighborhoods. Spatial analysis provides the capability for in-depth quantitative analysis. While questions have long been raised about the absence of BCUs and prevalence of AFSPs in LMI neighborhoods, this article provides a unique perspective by identifying banking deserts and examining the characteristics that predict their presence. Operating under the assumption that the absence of BCUs and prevalence of AFSPs is an indicator of financial hazard and a signal of community economic distress, the findings raise considerable concerns about the sociodemographic makeup of, and mortgage lending activity within, areas identified as banking deserts. Thus, the findings of this research can be interpreted to show the geographic presence of what prior research has referred to as a dual financial service delivery system.

While improving geographic access is not in whole a remedy to functional access due to other forms of social exclusion and poverty, it remains an important factor in understanding the persistence unbanked and underbanked rates and democratizing access to mainstream financial products and services. Building a more inclusive financial service delivery system will require a multifaceted approach by private sector, nonprofit, and government organizations to create new solutions, including products and services that are accessible and suitable to the needs of LMI consumers.

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