DIVIDING LINES: RESIDENTIAL SEGREGATION AND THE USE OF ALTERNATIVE FINANCIAL SERVICES

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DIVIDING LINES: RESIDENTIAL SEGREGATION AND THE USE OF ALTERNATIVE FINANCIAL SERVICES

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ABSTRACT

Residential segregation remains a lasting scar on many urban centers. Past research has connected segregation to lower educational attainment, higher crime, and worse economic outcomes in black communities. However, many analyses on the effects of segregation suffer from omitted variable bias. In this paper, I use an instrumental variable approach to test the causality of residential segregation on the use of alternative financial services (AFS) by urban black households using the configuration of railroad tracks to isolate exogenous variation in segregation for cities outside of former slave states. Estimates using this instrumental approach demonstrate that residential segregation increases the use of AFS by black households.
The research and writing of this thesis is dedicated to everyone who helped along the way. A special thanks to Liz Ananat, Jeff Thompson, Dave and Christine Kindl, Robert Krahe, whose generosity made this all possible, and my amazing wife, Julia Louise Krahe

Many thanks,

CHRISTOPHER MATHEW KRAHE
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Introduction

Residential segregation on the basis of race is one of the most visible and pernicious reminders of America’s long and troubled history of race relations. From the plantations of the antebellum South through immigrant enclaves during the various waves of migration to modern day urban centers, segregated communities have been a mainstay of American life. In 2010, the average black person lived in a neighborhood that was only 35 percent white, even though whites comprised 72 percent of the overall U.S. population (Logan and Stults, 2011). Residential segregation has been linked to poor social outcomes like poverty, deteriorating neighborhoods, high crime, poor education, and other environmental and human capital outcomes (e.g., Massey and Denton, 1993; Wilson, 1996; Cutler and Glaeser, 1997; Card and Rothstein, 2007).

It seems apparent that residential segregation should have some effect on individual outcomes. Witness the divergent outcomes of a highly segregated city like Detroit, and a highly integrated city like San Francisco. However, it would be naïve to assign the differences between those two cities to segregation alone. Detroit is beset with a multitude of problems from decades of poor governance to a crumbling manufacturing center that produce sources of bias in any estimate.

We need a source of exogenous variation in segregation to be able to estimate its causal effects. In this paper, I will use a theory first deployed by Ananat (2001) to produce a source of exogenous variation in segregation for urban centers outside of the American South. This theory rests on three core principles:
1. Prior to 1910, the vast majority of the U.S. black population lived in former slave states.¹

2. Railroad tracks built during the mid- to late-19th century were configured without consideration to local social or economic factors, but rather in response to the orientation of nearby destinations and geographic features.

3. Divisions in urban centers caused by railroad tracks built during the 19th century acted as an enabler of residential segregation during the Great Migration of 1910-1970, as blacks moved from the South into northern and western urban centers.

Based on these principles, I can use differences in the divisions in cities caused by railroad track configuration as an instrument for segregation in non-southern urban centers.

An examination of the city of Hartford, CT, illustrates the relationship between railroad configurations and segregation. Figure 1 shows a map of present day Hartford, with railroad tracks shown as dotted lines, and dots representing individuals of various races. As can be seen from the map, the railroads create a sharp dividing line in the north between the white and black populations, and a softer demarcation in the south between whites and Latinos. In

---

¹ Slave states are defined for this paper as states where slave holding was legal at the onset of the Civil War. This definition includes Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, Texas, Virginia, West Virginia, and the District of Columbia. The analyses throughout this paper exclude MSAs in these states (See Appendix for full list of MSAs in sample).
many cities, it is evident that railroad tracks act as boundaries between neighborhoods; “the wrong side of the tracks” is a cliché for a reason. However, Ananat (2011) has formalized this phenomenon and shown that railroad divisions can act as a valid instrument for residential segregation.

I will exploit this instrument to allow us to examine the impact of segregation on a source of wealth disparity that has not been well examined in the academic literature to date: the use of alternative financial services (AFS) among blacks. While there has been increased interest in role of AFS providers and the impact that they have on the communities they serve (e.g., Edmiston, 2011; Prager, 2009), I am not aware of prior research specifically on the relationship between residential segregation in a city and the use of AFS by that city’s black residents.

For the past three decades, the AFS sector has been one of the fastest growing and dynamic parts of the financial services landscape. The current AFS market is estimated to bring in over $100 billion in fee revenue each year on $1.3 trillion in financial activity (Wolkowitz, 2014). Nearly 28 percent of American households partially or fully rely on AFS to meet their financial needs, and that number rises to 54 percent for black households (FDIC, 2014).

The next section provides an overview of my theoretical framework and evidence of its validity. Section II describes the key measures I will use for segregation and AFS use. Section III includes the main results. And Section IV provides some discussion of the policy implications of these findings, the limitations of this approach, and possible avenues for extending this research.
I. Past Research

A. Alternative Financial Services

Low-income households use a variety of informal and formal alternative financial services because they routinely lack access to traditional banking products (Barr, 2004). These providers can either be stand-alone storefronts that offer one or more of these AFS services, or they can be connected to other retail establishments, such as convenience stores (Wolkowitz, 2014). The informal AFS sector includes loans from friends and neighborhood savings clubs, while the formal AFS sector can be divided into two main service categories: transaction services and credit services.

**Transaction Services:**

Transaction services are those that enable consumers to move money from one medium to another, with check cashing being the most prevalent form. The fees for check cashing services vary widely by geography and the type of check being cashed, but are typically between 1.5 and 3.5 percent of the face value of the check. The typical check being cashed is either a payroll check or a government benefit check (Barr, 2004). Though the industry has seen consistent growth recently, the switch to electronic payments and debit cards for many government services threatens its long-term viability (Wolkowitz, 2014).

**Credit Services:**

Arguably the most controversial segment of the AFS market are the credit services. AFS credit providers typically provide small-dollar and short-term loans that are either unsecured (e.g., payday lending) or secured through some small amount of collateral (e.g., car title, pawn, or refund anticipation loans.) The annualized rates on these loans are often extraordinarily high; the
typical payday loan can approach 400 percent annualized interest (Edmiston, 2011). Critics of these services argue that they prey on highly susceptible populations with extortionary fees. For example, many low-income and English-language learners who receive the Earned Income Tax Credit (EITC) use professional tax preparation services and take out refund anticipation loans, which have fees that consume eight percent of the typical refund for an EITC recipient (Barr, 2004). Proponents point out that these loans are by nature short-term and so the high fees are necessary to overcome risks and operating costs (DeYoung et al., 2015).

Academic research into AFS has been mixed, with some finding that AFS imposes both direct costs, including fees and penalties, as well as indirect costs, including a restricted ability to save money and build their credit history, on users (Desmond & Sprenger, 2007). Research has also shown that communities with a high number of AFS providers have higher crime rates (Kubrin, et. al., 2011). While studies have found a disproportionate number of AFS providers are in counties with low- to medium-incomes and higher levels of minorities (Fowler, et. al., 2014), most of the studies to date on the location of AFS providers have either focused on specific regions (e.g., Burkey and Simkins, 2004) or geographic areas like counties (e.g., Prager, 2009) without looking specifically at metropolitan areas or at segregation.
B. History of Segregation

The history of black/white residential segregation in the United States can be divided into four eras as outlined in Figure 1.1.

**Pre-migration** – From the founding of the country through the turn of the 20th century, nearly the entire black population lived in the American South. Levels of segregation in 1890 were relatively low compared to modern standards, and almost entirely located in the American South and larger cities in the North and Midwest which had larger black populations (Cutler, Glaeser, and Vigdor, 1999).

**The Great Migration** – From 1910 to 1970 there was a massive exodus of black residents from the South to northern and western cities. Cities that had previously held a small population of black residents became highly segregated as their black populations grew (Cutler, Glaeser, and Vigdor, 1999). To put it in market terms, the greater flow of black migrants increased aggregate demand for segregation, which was then often implemented through deliberate government policies and collective action from white residents (Massey and Denton, 1993).

**Urban Decay and Renewal** – The civil rights movement of the 1960s brought with it a change in government policy towards segregation. The largest shift in official policy was the 1968 passage of the *Fair Housing Act*, which banned the most egregious discriminatory practices, such as
“redlining” entire minority neighborhoods as unfit for mortgages and other loans. However, despite this policy action, the suburbanization of American cities and “white flight” from urban centers crystallized segregated communities (Cutler, Glaeser, and Vigdor, 1999). Though segregation has declined over the past 30 years most of that has been blacks moving into previously all-white neighborhoods, leaving as many all-black urban communities as ever (Logan and Stults, 2011). Differences in the quality of housing, education, and other governmental services; crime rates; and other factors of the built environment between white and black neighborhoods have remained, especially in highly segregated cities (Massey and Denton, 1993).

As Ananat (2011) highlights the most relevant historical fact for the validity of the instrument is that the vast majority of railway in this country was built between 1830 and 1870. This was during a time when over 90% of the black population in this country lived in a former slave state. Thus, it is implausible that railroads were configured in cities in response to existing black populations.
II. Framework and Instrument

A. Causal Framework

These differences in the quality of neighborhoods and individual economic outcomes motivate the hypothetical causal framework. Figure II.1 illustrates how residential segregation may over time influence a household’s use of AFS. However, the rest of my analysis does not require this model to be true.

*Figure II.1. Causal Framework Between Residential Segregation and AFS Use*

As Figure II.1 shows, residential segregation influences household AFS use through both its impacts on the segregated neighborhoods, and on the attitudes and actions of the people in those neighborhoods.

To begin, previous research has demonstrated time and again the impacts that segregation can have on the income and wealth gaps between black and white residents of a city (e.g., Wilson, 1996; Cutler and Glaeser, 1997; Card and Rothstein, 2007). A lack of money is the number one
reason households do not have a traditional bank account (FDIC, 2013). Furthermore, these disparities in wealth and income would naturally make minority neighborhoods less attractive to traditional financial service providers. However, the residents of these neighborhoods still need access to financial services to transact their financial lives (accessing paychecks, getting credit, etc.), and the lack of traditional banks in the neighborhood creates an opportunity for AFS providers.

Over time, the lack of traditional banks could also negatively impact individual attitudes towards banks. As banks become less and less a part of segregated neighborhoods, individuals in these areas see banks as not being “for them,” and distrust increases. For example, 34 percent of all unbanked households cited a lack of trust in banks as a reason for remaining unbanked, second only to a lack of money as a contributing factor (FDIC, 2013). Additionally, researchers have found links between subprime lending practices and increased segregation in the run up to the financial crisis of 2007 (Bond and Williams, 2007), which further exacerbated racial inequalities as minority communities were generally more damaged by foreclosures, depressed housing prices, and unemployment (Hyra, et. al., 2011).

These factors are likely to compound over time through selective migration. As neighborhoods deteriorate, those households that are able to migrate would presumably do so, increasing economic segregation and creating a vicious cycle of selective migration and deterioration.

B. Instrumental Approach

Ideally, to test the effects of residential segregation on household use of AFS, I would randomly assign levels of segregation to cities and observe differences in the financial behaviors of black and white residents over time. It is plainly evident that this ideal approach is wildly impractical,
but I could exploit quasi-random assignment of segregation by providing a plausible source of exogenous variation in levels of segregation in cities outside of the American South.

For this exogenous variation I will use an instrument developed by Ananat (2011) which approximates the experimental ideal by leveraging differences in the configurations of railroad tracks laid in the 19th century that create divisions in cities’ historical centers, conditional on total track length in the city.

Ananat (2011) classifies each city’s Railroad Divisions Index (RDI), as such:

\[
RDI = 1 - \sum_{i=1}^{N} \left( \frac{area_i}{total\ area} \right)^2,
\]

where \(i=1…N\) is the array of “neighborhoods” created by railroad divisions. RDI gives us a measure of how the land of each city is divided into smaller sub units by railroads. If a city had no railroads, and thus was completely undivided, then there would be one neighborhood that would encompass the entire area of the city, and its RDI would be 0. If a city were infinitely subdivided by railroads, such that the area of any given neighborhood was 0, then it would have
an RDI of 1. As can be seen from Figure II.2, plotting RDI against black/white segregation shows a strong, positive relationship between the two.

*Figure II.2. Relationship between RDI and Segregation*

The next section provides definitions of my key measures for segregation, AFS use, and other key variables.

### III. Data and Measures

#### A. Measures of Segregation

Apart from the RDI from Ananat (2011), the major sources of data for this analysis are various years of Census Bureau reports on metropolitan demographics, census microdata from ipums.org (Ruggles et al., 2015), measures of residential segregation from Cutler, Glaeser, and Vigdor (1999) and Logan and Stults (2011), 2011 and 2013 survey data on individual banking behaviors
collected by the U.S. Census Bureau on behalf of the Federal Deposit Insurance Corporation (FDIC), and proximity of each city to a former slave state.

There are five major categories across which one can measure residential segregation: evenness, exposure, concentration, centralization, and clustering (Massey and Denton, 1988). All of these measures are highly correlated, but measure slightly different aspects of segregation. For this report I used the two most common of these measures in the literature—evenness (through the dissimilarity index) and exposure (through the exposure index)—to ensure that my analysis was not overly influenced by the idiosyncrasies of any one of these measures.

The dissimilarity index measures how different the racial composition of a portion of a larger area (e.g., a census tract within a metropolitan area) is compared to the overall racial composition. The dissimilarity index between blacks and whites for a city is defined as:

\[
(2) \quad \text{Index of Dissimilarity} = \frac{1}{2} \sum_{i=1}^{N} \left| \frac{\text{Black Population}_i}{\text{Black Population}_{total}} - \frac{\text{White Population}_i}{\text{White Population}_{total}} \right|
\]

where \( i = 1 \ldots N \) is the array of census tracts in the city. The dissimilarity index is similar to measures of income or wealth distribution (like the Gini coefficient) and can be thought of as answering the question, “What percentage of blacks (or whites) would have to move to a different census tract for the racial profile of each tract to equal that of the city overall?” By construction the index ranges from zero (each tract has the same racial profile) to one (each tract is completely one race).
The exposure index aims to understand the extent to which members of one race are exposed to those of another (Massey and Denton, 1988). The exposure index between blacks and whites\(^2\) for a city is defined as:

\[
(3) \quad \text{Index of Exposure} = \sum_{i=1}^{N} \left( \frac{\text{Black Population}_i}{\text{Total Population}_i} \right) \left( \frac{\text{White Population}_i}{\text{White Population}_{total}} \right)
\]

Where again \(i = 1\ldots N\) is the array of census tracts in the city. The exposure index can be thought of answering the question, “How much does the black population share common residential areas with the white population, and thus how much does the average black resident ‘experience’ segregation?” Though the indices of dissimilarity and exposure are correlated, they differ in two key ways:

1) As the exposure index increases, the black population becomes *more* exposed to the white population, and thus segregation goes down, whereas when the dissimilarity index increases, by definition segregation goes up.

2) The maximum value for the exposure index is the city-wide proportion of black residents, whereas the maximum value of the dissimilarity index is one.

For historical measures of segregation and other city demographics from past decennial censuses, I use data available online from Cutler, Glaeser, and Vigdor (http://web.archive.org/web/20030622134117/http://trinity.aas.duke.edu/~jvigdor/segregation/).

---

\(^2\) Note that though the dissimilarity index is the same when looking at black to white dissimilarity or white to black dissimilarity, the exposure index will differ depending on the order of the comparison groups.
For segregation data from the 2010 decennial census, I use data provided online by Logan and Stults (http://www.s4.brown.edu/us2010/Data/data.htm).

B. Additional Variables

In addition to RDI, I also control for total kilometers of railroad track per square kilometer in the historical city center. Using this control ensures that RDI is not simply capturing the total amount of railroad track in a given city\(^3\), but rather represents just the configuration of tracks conditional on the amount of track.

For my main outcome variable, I look at whether individual black households in each city are “unbanked” or “underbanked” in survey data collected by the U.S. Census Bureau on behalf of the FDIC. These data were collected as part of the 2010 and 2012 American Community Surveys, and asked households about a variety of financial and banking behaviors. The FDIC classifies a household as “unbanked” if it does not have an account at a traditional insured institution, and “underbanked” if it has a traditional account, but has also used AFS in the past 12 months. Households that have a traditional banking account and have not used AFS in the past 12 months are considered “fully banked.” Table III.1 shows the full sample breakdown of banking status by race\(^4\). For the purposes of this analysis I’ve coded my outcome as a binary variable with 1 for unbanked or underbanked households (which I’m calling “underbanked” for the sake of simplicity), and 0 for all other households.

\(^3\) The total amount of railroad track could affect AFS use for many reasons, including economic composition, access to public transportation, or even the physical attractiveness of neighborhoods.

\(^4\) Note that these numbers differ from the published FDIC rates because I am excluding households that do not live in a MSA in the North.
Table III.1. Banking Status by Race

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unbanked</td>
<td>Underbanked</td>
<td>Fully Banked</td>
<td>Status Unknown</td>
</tr>
<tr>
<td>Black, non-Latino</td>
<td>15.61%</td>
<td>25.53%</td>
<td>32.07%</td>
<td>26.80%</td>
</tr>
<tr>
<td>Latino</td>
<td>14.98%</td>
<td>22.19%</td>
<td>37.97%</td>
<td>24.87%</td>
</tr>
<tr>
<td>White, non-Latino</td>
<td>2.95%</td>
<td>12.71%</td>
<td>62.63%</td>
<td>21.70%</td>
</tr>
<tr>
<td>Other</td>
<td>4.89%</td>
<td>16.51%</td>
<td>53.02%</td>
<td>25.58%</td>
</tr>
<tr>
<td>Total</td>
<td>5.69%</td>
<td>15.34%</td>
<td>56.13%</td>
<td>22.84%</td>
</tr>
</tbody>
</table>

Table III.1 shows the banking status breakdown of households in the sample by race. The columns show the percent of households in each racial group that are unbanked, underbanked, fully banked, or have an unknown status.

I’ve restricted my analysis to only those households that are defined as “in the principal city” of each MSA. I’ve done this for two reasons: first, looking only at principal cities will more closely align with the historic city centers used to create RDI, and second, as seen in Table III.2, the average principal city has a significantly higher proportion of black residents than other metropolitan statuses, and from historical evidence segregation in an area goes up as the proportion of black residents rises (Massey and Denton, 1993).

Table III.2. Racial Breakdown by Metropolitan Status

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Metropolitan Area - Principal City</td>
<td>Metropolitan Area - Balance</td>
<td>Not in Metropolitan Area</td>
<td>Not Identified</td>
<td>Total</td>
</tr>
<tr>
<td>Black, non-Latino</td>
<td>22.04%</td>
<td>9.61%</td>
<td>5.45%</td>
<td>7.96%</td>
<td>11.42%</td>
</tr>
<tr>
<td>Latino</td>
<td>16.40%</td>
<td>9.63%</td>
<td>4.09%</td>
<td>6.04%</td>
<td>9.43%</td>
</tr>
<tr>
<td>White, non-Latino</td>
<td>52.69%</td>
<td>74.94%</td>
<td>85.79%</td>
<td>81.98%</td>
<td>73.15%</td>
</tr>
<tr>
<td>Other</td>
<td>8.87%</td>
<td>5.83%</td>
<td>4.67%</td>
<td>4.02%</td>
<td>6.00%</td>
</tr>
</tbody>
</table>

Table III.2 shows the racial breakdown of households in the sample across the four metropolitan statuses provided by the FDIC dataset. The rows show the percent of households in each metropolitan status that are in each racial group.
Table III.3 provides an overview of all of the key variables I will be using in my analysis.

**Table III.3. Key Variables**

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RDI</td>
<td>Index of how the land of each city is divided into smaller sub units by railroads.</td>
</tr>
<tr>
<td>Track length per square kilometer</td>
<td>Total kilometers of railroad track per square kilometer in the historical city center.</td>
</tr>
<tr>
<td>2010 Black/White Segregation – Dissimilarity</td>
<td>Present day black/white dissimilarity index for each MSA, based on 2010 decennial census data.</td>
</tr>
<tr>
<td>2010 Black/White Segregation – Exposure</td>
<td>Present day black/white exposure index for each MSA, based on 2010 decennial census data.</td>
</tr>
<tr>
<td>2010 Latino/White Segregation – Dissimilarity</td>
<td>Present day Latino/white dissimilarity index for each MSA, based on 2010 decennial census data.</td>
</tr>
<tr>
<td>2010 Latino/White Segregation – Exposure</td>
<td>Present day Latino/white exposure index for each MSA, based on 2010 decennial census data.</td>
</tr>
<tr>
<td>MSA percent black</td>
<td>Present day proportion of each MSA that is black, based on 2010 decennial census data.</td>
</tr>
<tr>
<td>MSA percent Latino</td>
<td>Present day proportion of each MSA that is Latino, based on 2010 decennial census data.</td>
</tr>
<tr>
<td>Distance to former slave state</td>
<td>The distance of each city to the closest state in which slavery was legal at the onset of the Civil War.</td>
</tr>
<tr>
<td>1910 Physical Area (square miles/1000)</td>
<td>The physical geographic area of the MSA in 1910.</td>
</tr>
<tr>
<td>1910 Population</td>
<td>The total population of each MSA just prior to the Great Migration, based on 1910 decennial census data.</td>
</tr>
<tr>
<td>1910 Dissimilarity Index</td>
<td>The black/white dissimilarity index for each MSA just prior to the Great Migration, based on 1910 decennial census data.</td>
</tr>
<tr>
<td>1910 Exposure Index</td>
<td>The black/white exposure index for each MSA just prior to the Great Migration, based on 1910 decennial census data.</td>
</tr>
<tr>
<td>1910 Percent Black</td>
<td>Proportion of each MSA that was black just prior to the Great Migration, based on 1910 decennial census data.</td>
</tr>
<tr>
<td>1920 Population</td>
<td>The total population of each MSA at the beginning of the Great Migration, based on 1920 decennial census data.</td>
</tr>
<tr>
<td>1920 Percent Black</td>
<td>Proportion of each MSA that was black at the beginning of the Great Migration, based on 1920 decennial census data.</td>
</tr>
</tbody>
</table>
Table III.3, continued

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1920 % employed in manufacturing</td>
<td>The percent of the population that was employed in manufacturing at the beginning of the Great Migration.</td>
</tr>
<tr>
<td>1920 % employed in railroads</td>
<td>The percent of the population that was employed in railroads at the beginning of the Great Migration.</td>
</tr>
<tr>
<td>Education</td>
<td>The educational attainment of the head of each household, collected as part of the American Community Survey.</td>
</tr>
<tr>
<td>Employment Status</td>
<td>The employment status of the head of each household, collected as part of the American Community Survey.</td>
</tr>
</tbody>
</table>

Table III.3 provides an overview of the key variables that will be used in this analysis.

The next section argues the validity of RDI as an instrument for segregation and reviews the key results of this analysis.

### IV. Results

#### A. First Stage

If the theory of railroad-induced segregation is true, then RDI provides a source of exogenous variation. Since there is a binary outcome variable and a continuous endogenous regressor, the effects of segregation on black AFS use should be estimated using the maximum likelihood estimator$^5$ (MLE) approach laid out by Wooldridge (2010).

Formally, our model can be stated as:

$$Seg_{MSA} = X\Pi_1 + RDl_{MSA}\Pi_2 + \nu_{MSA}$$

(4)

$$AFS_i^* = (Seg_{MSA} \star \beta + X\Theta + u_i > 0)$$

(5)

$^5$ Note that while I'm using the term “instruments” throughout, the maximum likelihood estimator approach is technically a control function estimator and not a true IV estimator.
where the right-hand side variable of interest in Equation 3, \( Seg \), is the current segregation level of the MSA, \( \mathbf{X} \) is a vector of control variables, and \( RDI \) is the railroad division instrument as described in the previous section.

The results from Figure II.2 show that the first condition required by my strategy—that the railroad division index must explain meaningful variation of current-day segregation—holds. Controlling for track per square kilometer in the historic city center, RDI strongly predicts present-day segregation levels. An increase of one standard deviation of RDI (0.141) predicts a significant increase in the present-day dissimilarity index of just over one-third of a standard deviation (5.09, 0.35 of a standard deviation).

**B. Validity of First Stage**

For my identification approach to be valid, it must be the case that RDI not only sufficiently predicts present-day segregation, but also that people and railroad configurations were assigned to cities quasi-randomly and not in ways that reflect underlying city characteristics (which would introduce bias into the estimates).

As Ananat (2011) demonstrates, railroad divisions, controlling for total track length, provide no predictive power to a sampling of city-wide characteristics like population, segregation levels, or physical size just prior to the Great Migration (1910). She also showed that RDI does not appear to influence any sorting of individuals into cities during the Great Migration by examining human capital characteristics of cities in 1920, which is after the start of the Great Migration, but before segregation could have significant impacts.

Though RDI has no predictive power on pre-Great Migration outcomes, it is still possible that railroad divisions could impact AFS use through some factor other than segregation in a way that
would not have shown up in Ananat’s tests on individual economic outcomes. To test this, I looked at the predictive power of railroad divisions at varying distances from the former Confederacy. The theory behind this is that we would expect RDI to have less effect on segregation in cities that would expect to see lower black inflows. This would include cities very close to southern states, as they would have already had relatively large black populations in 1910, and those very far from the south, as they would be the last to receive large inflows. Table IV.1 shows this exact relationship in the data, though the reduced sample size increases the standard errors.

Table IV.1. RDI Impacts by Distance from South

<table>
<thead>
<tr>
<th>Outcome</th>
<th>2010 Dissimilarity Index</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>Railroad divisions</td>
<td>Full Sample</td>
</tr>
<tr>
<td></td>
<td>36.02***</td>
</tr>
<tr>
<td></td>
<td>(9.643)</td>
</tr>
<tr>
<td>Track length per square kilometer</td>
<td>1,683**</td>
</tr>
<tr>
<td></td>
<td>(841.9)</td>
</tr>
<tr>
<td>Observations</td>
<td>86</td>
</tr>
</tbody>
</table>

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

Table IV.1 shows the predictive power of RDI on the 2010 dissimilarity index at varying distances from former slave states. Each of the columns shows the results of an OLS estimate of the relationship between RDI and the 2010 dissimilarity index for cities progressively further from a former slave state.

These results, taken together with Ananat’s defense, provide sufficient evidence to conclude that, outside of segregation, railroad divisions provide no relationship to current day city or population characteristics that could influence AFS use. RDI therefore meets the requirements for a valid instrument (Wooldridge, 2010) to be used in a MLE approach and will produce estimates of the
causal effect of segregation on AFS use. The next section looks at the results of the MLE estimation.

C. Probit and MLE Results

In this section, I examine the causal effects of RDI-induced segregation on black AFS use. Standard probit and MLE estimates of the relationship between segregation and AFS use are presented in Table IV.2. Columns 1 and 5 show the standard probit estimates of two measures of segregation on AFS use, controlling for total track length and the percent of the city that is black. Columns 2-4 and 6-8 show the MLE estimates of the two measures of segregation on black AFS use, with controls on total track length and percent black. Comparing the standard probit estimates with the MLE estimates shows that the standard approach would tend to underestimate the effects of segregation on AFS use, and that this difference is much stronger when looking at dissimilarity.
Table IV.2. Marginal Effects of Residential Segregation on Proportion of Black Households That Are Underbanked

<table>
<thead>
<tr>
<th></th>
<th>Probit</th>
<th>MLE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Black/white segregation – dissimilarity</td>
<td>0.00129 (0.00134)</td>
<td>-0.0107 (0.00981)</td>
</tr>
<tr>
<td>Track length per square kilometer</td>
<td>-3.526 (16.01)</td>
<td>-463.7*** (117.9)</td>
</tr>
<tr>
<td>MSA percent black</td>
<td>1,683** (841.9)</td>
<td>-4.914** (2.495)</td>
</tr>
<tr>
<td>Observations</td>
<td>1,543</td>
<td>1,543</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Probit</th>
<th>MLE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(5)</td>
<td>(6)</td>
</tr>
<tr>
<td>Black/white segregation – exposure</td>
<td>-0.0146* (0.000882)</td>
<td>0.0497* (0.0278)</td>
</tr>
<tr>
<td>Track length per square kilometer</td>
<td>0.571 (14.525)</td>
<td>-73.01 (45.97)</td>
</tr>
<tr>
<td>MSA percent black</td>
<td>1,683** (841.9)</td>
<td>-3.638** (1.715)</td>
</tr>
<tr>
<td>Observations</td>
<td>1,543</td>
<td>1,543</td>
</tr>
</tbody>
</table>

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

Table IV.2 shows the marginal effects of residential segregation on the probability that a black household is underbanked. Columns 1 and 5 show the results of a probit estimate of these effects, using the indices of dissimilarity and exposure, respectively. Both estimates control for total length of railroad track per square kilometer in the historic city center and the percent of the population of the MSA that is black. Columns 2-4 and 6-8 show MLE estimates using RDI as an instrument for segregation, controlling for total length of railroad track per square kilometer in the historic city center and percent of the population of the MSA that is black.

The MLE results show relatively consistent marginal effects between segregation and black AFS use, when controlling for total track length and the percent of the city that is black, of two to three percent⁶. These results are significant at the 10 percent level.

⁶ Recall that the dissimilarity and exposure indices are negatively correlated, so we would expect the signs to be reversed.
The relatively large decrease in effect when including the percent of the city’s population that is black is to be expected for two reasons: 1) as we’ve seen before, demand for segregation has been theorized to increase as the minority population increases, and 2) the percent of the city that is black could lead to even heavily segregated neighborhoods gaining access to traditional financial services due to the sheer volume of customers alone. The negative sign on the coefficient on percent black provides further credence to these theories.

Table IV.3 provides additional robustness checks that replicate the main MLE estimate of the effect of segregation on black AFS use controlling for a variety of additional past and present city and individual characteristics. The estimates of segregation on AFS use are generally robust to the inclusion of present data on city and individual characteristics. The total population in 1920 and the percent of the population that was black in 1920 do reduce the point estimates, however this is consistent with our theory of the instrument. Larger cities and/or cities with a higher proportion of black residents in the early stages of the Great Migration are likely to have seen a reduced impact on segregation from railroad configuration because these cities had relatively larger black populations before 1910, and thus may have already begun sorting before the end of the railroad building boom of the 19th century.
Table IV.3. Robustness Checks

<table>
<thead>
<tr>
<th></th>
<th>City Characteristics</th>
<th>Individual Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Controls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black/white segregation – dissimilarity</td>
<td>0.0864***</td>
<td>0.0253</td>
</tr>
<tr>
<td></td>
<td>(0.0303)</td>
<td>(0.0283)</td>
</tr>
<tr>
<td>Observations</td>
<td>1,543</td>
<td>1,543</td>
</tr>
</tbody>
</table>

Notes: All estimates control for total track length per square kilometer and a variety of other controls. Robust standard errors in parentheses.

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

Table IV.3 shows the MLE estimates of the marginal effects of residential segregation, using RDI as an instrument, on the probability that a black household is underbanked, controlling for total track length per square kilometer and a variety of other controls. The columns show the key result of the MLE estimate, controlling for various individual characteristic, as well as present day and historical city characteristics. Estimates for all other covariates have been suppressed in this table.

Taken together, the results from Table IV.2 and Table IV.3 imply that high levels of segregation within a city cause the black population in that city to have significantly higher use of AFS than it would in a similar city with lower levels of segregation.

The next section discusses the policy implications from these findings, limitations of this approach, and possible avenues for additional research.

V. Discussion

Like previous research on residential segregation, I have shown that segregation reduces opportunities for minority populations to participate in a basic institution that many take for granted. The costs of not having or using traditional bank-based transaction, saving, and borrowing products are high; the Pew Charitable Trusts estimates that fees from payday loans consume 36 percent of the typical borrower’s paycheck (Pew, 2012). Furthermore, reliance on AFS decreases a low-income household’s financial resilience to external medical or job shocks,
and reduces the household’s ability to improve skills, purchase a home, or pay for a college education (Barr, 2004).

Policy makers have paid considerable attention to the supply side of AFS use, especially for credit products (Edmiston, 2011; Glaeser and Scheinkman, 1998). As of 2013, 24 states and the District of Columbia had passed some form of regulation on small-dollar loans to restrict either fees and rates, storefronts, or loan terms. At the federal level, the main existing legislation related to financial access for minority populations is the Community Reinvestment Act, which obliges insured deposit-taking institutions (i.e., traditional banks) to support the credit needs of low-income and minority neighborhoods (Bernanke, 2007). More recently, the Consumer Financial Protection Bureau has released draft legislation to heavily regulate the payday lending industry nationally. Despite those efforts, the question remains of whether eliminating industries like payday lending will have a net positive or negative effect on users. For instance, studies performed by the same researchers have found that payday lenders have either a net positive (Zinman, 2008) or net negative (Carrell and Zinman, 2014) impact on borrowers.

While this paper does not aim to answer that larger question, it does provide an indirect point of view. If, as this paper shows, AFS providers appear to thrive in areas with high levels of segregation and segregation is connected to a host of negative individual and social outcomes, then these results lead credence to the idea that AFS providers like payday lenders are benefiting from institutions and conditions (e.g., segregation) that overall produce deleterious effects on communities. It is unclear, though, whether AFS providers are a cause or symptom of those negative conditions.
However, regulating the supply side of the equation without addressing underlying demand-side factors like residential segregation is unlikely to produce the desired results. Just as policymakers have evolved their focus in other areas—like prostitution and drug use—from purely supply-side regulation to a deeper understanding of the individual and societal factors driving demand, attempts to curb predatory AFS providers and promote non-exploitive banking relationships must not be driven solely by efforts to crack down on AFS providers’ worst behavior.

Understanding the relationship between segregation and AFS use is a first step toward helping build communities that offer residents the breadth of beneficial financial products that support their ability to manage their money, care for their families, and save for the future.

Although my analysis enables an identification of the causal effects of segregation on black AFS use, it does face several key limitations. First, since the theory of the instrument naturally excludes the entirety of the American South, it may not be generalizable in this area. Though it seems reasonable that segregation would have similar effects in former slave states, it is also quite possible that the centuries-long history of segregation in the South would produce different outcomes regarding AFS use. Given that 57 percent of the U.S. black population currently lives in the South (Logan and Stults, 2011) and Southern black households are unbanked at the same rate as black households in other regions (FDIC, 2013), this presents a significant limitation.

Second, the validity of the instrument hinges on the migration of the black population during the 20th century. This instrument excludes the Latino population, which is the racial group with the highest use of AFS (see Table III.1). The more recent Latino migration of the past 40 years is similar to the Great Migration in many ways, including its scale, so it is possible that railroads could have played a similar role in defining neighborhood boundaries and enabling segregation for Latino communities.
Table V.1 shows preliminary results of the marginal effects of segregation on Latino household use of AFS.

Table V.1. Marginal Effects of Residential Segregation on Proportion of Latino Households That Are Underbanked

<table>
<thead>
<tr>
<th></th>
<th>Probit 1</th>
<th>Probit 2</th>
<th>MLE 3</th>
<th>MLE 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black/Latino seg.</td>
<td>0.00193*</td>
<td>0.0504***</td>
<td>0.0237</td>
<td>0.0410*</td>
</tr>
<tr>
<td>dissimilarity</td>
<td>(0.00099)</td>
<td>(0.0157)</td>
<td>(0.0146)</td>
<td>(0.0239)</td>
</tr>
<tr>
<td>Track length per sq.</td>
<td>45.987**</td>
<td>138.3**</td>
<td>-13.18</td>
<td></td>
</tr>
<tr>
<td>kilometer</td>
<td>(22.256)</td>
<td>(54.67)</td>
<td>(113.1)</td>
<td></td>
</tr>
<tr>
<td>MSA percent Latino</td>
<td>-0.0404</td>
<td>-1.107</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0692)</td>
<td>(0.690)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Probit 5</th>
<th>Probit 6</th>
<th>MLE 7</th>
<th>MLE 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black/Latino seg.</td>
<td>-0.000075</td>
<td>0.0243***</td>
<td>-0.0310*</td>
<td>0.0309</td>
</tr>
<tr>
<td>exposure</td>
<td>(0.00107)</td>
<td>(0.00811)</td>
<td>(0.0171)</td>
<td>(0.0194)</td>
</tr>
<tr>
<td>Track length per sq.</td>
<td>52.667**</td>
<td>517.4**</td>
<td>112.8*</td>
<td></td>
</tr>
<tr>
<td>kilometer</td>
<td>(22.033)</td>
<td>(208.6)</td>
<td>(66.05)</td>
<td></td>
</tr>
<tr>
<td>MSA percent Latino</td>
<td>0.00631</td>
<td>2.773</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.114)</td>
<td>(1.715)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: Robust standard errors in parentheses.

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

Table V.1 shows the marginal effects of residential segregation on the probability that a Latino household is underbanked. Columns 1 and 5 show the results of a probit estimate of these effects, using the indices of dissimilarity and exposure, respectively. Both estimates control for the total length of railroad track per square kilometer in the historic city center and the percent of the population of the MSA that is Latino. Columns 2-4 and 6-8 show MLE estimates using RDI as an instrument for segregation, controlling for the total length of railroad track per square kilometer in the historic city center and the percent of the population of the MSA that is Latino.

As can be seen from Table V.1, there is a similar effect for Latino households as was found for black households when looking at the dissimilarity index, but the exposure index produces an effect that is not significant at conventional levels and of the opposite sign as would be expected.

However, given the limitation in the dataset available for RDI, this analysis is missing many urban centers in the South with high proportions of Latinos and relatively high AFS use (e.g.,...
Houston, TX, and Miami, FL). Further research on an expanded dataset of cities could provide additional insight into the population with the highest use of AFS—Latinos—and help policy makers make more informed decisions.

Additionally, the instrument is built on the development over time of urban centers. This means that these results have an unknown validity in areas outside of the urban center. As Table V.2 shows, black households in areas outside of metropolitan areas have the highest rates of AFS use among all groups. Additionally, though suburban residents are the least likely black households to be completely unbanked, with more than 10 percent of households not using any traditional banking services, black suburban households are five times more likely to be unbanked than white suburban households, which are only about two percent unbanked.

Table V.2. Banking Status for Black Households by Urban Status

<table>
<thead>
<tr>
<th></th>
<th>Unbanked</th>
<th>Underbanked</th>
<th>Fully Banked</th>
<th>Status Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSA – Principal city</td>
<td>17.74%</td>
<td>25.29%</td>
<td>29.95%</td>
<td>26.97%</td>
</tr>
<tr>
<td>MSA – Suburbs</td>
<td>10.74%</td>
<td>25.59%</td>
<td>36.27%</td>
<td>27.40%</td>
</tr>
<tr>
<td>Not in metropolitan area</td>
<td>21.86%</td>
<td>25.91%</td>
<td>31.17%</td>
<td>23.05%</td>
</tr>
<tr>
<td>Not identified</td>
<td>13.98%</td>
<td>25.82%</td>
<td>31.84%</td>
<td>28.36%</td>
</tr>
<tr>
<td>Total</td>
<td>15.57%</td>
<td>25.54%</td>
<td>32.04%</td>
<td>26.86%</td>
</tr>
</tbody>
</table>

Table V.2 shows the banking status breakdown of black households in the complete national sample by urban status. The columns show the percent of households in each group that are unbanked, underbanked, fully banked, or have an unknown status.

Whether this is the result of segregation or other factors is uncertain, and it presents avenues for additional research in both understanding suburban or rural segregation and in examining AFS use outside of urban centers, either separately or together.
### Appendix: Summary Statistics

Table A.1 Household Summary Statistics

<table>
<thead>
<tr>
<th></th>
<th>(1) Observations</th>
<th>(2) Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AFS Use (% of total by race)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black Households</td>
<td>2,881</td>
<td>0.366</td>
</tr>
<tr>
<td>Latino Households</td>
<td>3,175</td>
<td>0.345</td>
</tr>
<tr>
<td>White Households</td>
<td>17,132</td>
<td>0.129</td>
</tr>
<tr>
<td><strong>Education (% of total)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No high school degree</td>
<td>37,599</td>
<td>0.106</td>
</tr>
<tr>
<td>High school degree</td>
<td>37,599</td>
<td>0.266</td>
</tr>
<tr>
<td>Some college</td>
<td>37,599</td>
<td>0.274</td>
</tr>
<tr>
<td>College degree</td>
<td>37,599</td>
<td>0.354</td>
</tr>
<tr>
<td><strong>Race / Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>37,599</td>
<td>0.114</td>
</tr>
<tr>
<td>Latino</td>
<td>37,599</td>
<td>0.124</td>
</tr>
<tr>
<td>White Non-Latino</td>
<td>37,599</td>
<td>0.687</td>
</tr>
<tr>
<td>Other</td>
<td>37,599</td>
<td>0.074</td>
</tr>
<tr>
<td><strong>Employment Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>37,599</td>
<td>0.618</td>
</tr>
<tr>
<td>Unemployed</td>
<td>37,599</td>
<td>0.053</td>
</tr>
<tr>
<td>Not in labor force</td>
<td>37,599</td>
<td>0.329</td>
</tr>
<tr>
<td><strong>Age Group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 to 24 years</td>
<td>37,599</td>
<td>0.041</td>
</tr>
<tr>
<td>25 to 34 years</td>
<td>37,599</td>
<td>0.158</td>
</tr>
<tr>
<td>35 to 44 years</td>
<td>37,599</td>
<td>0.187</td>
</tr>
<tr>
<td>45 to 54 years</td>
<td>37,599</td>
<td>0.216</td>
</tr>
<tr>
<td>55 to 64 years</td>
<td>37,599</td>
<td>0.185</td>
</tr>
<tr>
<td>65 years or more</td>
<td>37,599</td>
<td>0.212</td>
</tr>
</tbody>
</table>

Table A.1 shows the overall household averages across various demographics of the survey respondents for cities in the North for which I had a calculation of RDI.
Table A.2. MSA Summary Statistics

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Observations</td>
<td>Mean</td>
<td>Standard Deviation</td>
<td>Min</td>
<td>Max</td>
</tr>
<tr>
<td>RDI</td>
<td>121</td>
<td>0.723</td>
<td>0.141</td>
<td>0.238</td>
<td>0.987</td>
</tr>
<tr>
<td>Track length per square kilometer</td>
<td>121</td>
<td>0.001</td>
<td>0.001</td>
<td>0.000</td>
<td>0.013</td>
</tr>
<tr>
<td>% Underbanked - White Households (a)</td>
<td>90</td>
<td>0.150</td>
<td>0.052</td>
<td>0.047</td>
<td>0.267</td>
</tr>
<tr>
<td>% Underbanked - Black Households (a)</td>
<td>69</td>
<td>0.383</td>
<td>0.145</td>
<td>0.071</td>
<td>0.750</td>
</tr>
<tr>
<td>% Underbanked - Latino Households (a)</td>
<td>62</td>
<td>0.383</td>
<td>0.143</td>
<td>0.083</td>
<td>0.704</td>
</tr>
<tr>
<td>2010 Black/White Segregation – Dissimilarity</td>
<td>86</td>
<td>49.7</td>
<td>14.2</td>
<td>16.7</td>
<td>76.9</td>
</tr>
<tr>
<td>2010 Latino/White Segregation – Dissimilarity</td>
<td>86</td>
<td>54.2</td>
<td>18.5</td>
<td>16.9</td>
<td>92.7</td>
</tr>
<tr>
<td>2010 Black/White Segregation – Exposure</td>
<td>86</td>
<td>39.9</td>
<td>12.4</td>
<td>17.8</td>
<td>68.7</td>
</tr>
<tr>
<td>2010 Latino/White Segregation – Exposure</td>
<td>86</td>
<td>59.6</td>
<td>19.2</td>
<td>17.7</td>
<td>94.3</td>
</tr>
<tr>
<td>2010 Total Population</td>
<td>86</td>
<td>1,308,459</td>
<td>2,769,920</td>
<td>110,122</td>
<td>19,200,000</td>
</tr>
<tr>
<td>MSA Percent Black</td>
<td>76</td>
<td>0.080</td>
<td>0.054</td>
<td>0.012</td>
<td>0.223</td>
</tr>
<tr>
<td>MSA Percent Latino</td>
<td>81</td>
<td>0.150</td>
<td>0.152</td>
<td>0.011</td>
<td>0.651</td>
</tr>
<tr>
<td>Distance to Nearest Slave State (miles)</td>
<td>121</td>
<td>362</td>
<td>332</td>
<td>1,164</td>
<td>13</td>
</tr>
<tr>
<td>1910 Physical Area (square miles/1000)(b)</td>
<td>58</td>
<td>14,626</td>
<td>14,834</td>
<td>2,165</td>
<td>83,340</td>
</tr>
<tr>
<td>1910 Population (c)</td>
<td>121</td>
<td>1,527</td>
<td>1,893</td>
<td>50</td>
<td>15,569</td>
</tr>
<tr>
<td>1910 Percent Black (c)</td>
<td>121</td>
<td>0.014</td>
<td>0.022</td>
<td>0.000</td>
<td>0.134</td>
</tr>
<tr>
<td>1910 Dissimilarity Index (b)</td>
<td>49</td>
<td>0.311</td>
<td>0.181</td>
<td>0.084</td>
<td>0.765</td>
</tr>
<tr>
<td>1910 Exposure Index (b)</td>
<td>49</td>
<td>0.075</td>
<td>0.070</td>
<td>0.010</td>
<td>0.332</td>
</tr>
<tr>
<td>1920 Population (c)</td>
<td>121</td>
<td>1,901</td>
<td>2,409</td>
<td>92</td>
<td>18,039</td>
</tr>
<tr>
<td>1920 Percent Black (c)</td>
<td>121</td>
<td>0.016</td>
<td>0.020</td>
<td>0.000</td>
<td>0.129</td>
</tr>
<tr>
<td>1920 % employed in trade (c)</td>
<td>121</td>
<td>0.058</td>
<td>0.112</td>
<td>0.000</td>
<td>0.702</td>
</tr>
<tr>
<td>1920 % employed in manufacturing (c)</td>
<td>121</td>
<td>0.462</td>
<td>0.196</td>
<td>0.054</td>
<td>0.904</td>
</tr>
<tr>
<td>1920 % employed in railroads (c)</td>
<td>121</td>
<td>0.003</td>
<td>0.032</td>
<td>0.000</td>
<td>0.350</td>
</tr>
</tbody>
</table>

\(a\) MSAs with fewer than three responses in a given race are suppressed in this table
\(b\) From Cutler, Glaeser, and Vigdor data; sample limited to what that dataset provides
\(c\) Calculated from ipums.org; full sample represented

Table A.2 provides summary statistics for the MSAs in the sample for variables used in this analysis.
<table>
<thead>
<tr>
<th>MSA Name</th>
<th>MSAs in Analysis Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akron, OH</td>
<td>Muskegon-Norton Shores, MI</td>
</tr>
<tr>
<td>Albany-Schenectady-Troy, NY</td>
<td>New Haven, CT</td>
</tr>
<tr>
<td>Altoona, PA</td>
<td>New York-Northern New Jersey-Long Island, NY-NJ-PA</td>
</tr>
<tr>
<td>Ann Arbor, MI</td>
<td>Norwich-New London, CT-RI</td>
</tr>
<tr>
<td>Atlantic City, NJ</td>
<td>Oklahoma City, OK</td>
</tr>
<tr>
<td>Binghamton, NY</td>
<td>Olympia, WA</td>
</tr>
<tr>
<td>Bloomington, IN</td>
<td>Omaha-Council Bluffs, NE-IA</td>
</tr>
<tr>
<td>Boise City-Nampa, ID</td>
<td>Peoria, IL</td>
</tr>
<tr>
<td>Boulder, CO</td>
<td>Philadelphia-Camden-Wilmington, PA-NJ-DE</td>
</tr>
<tr>
<td>Bridgeport-Stamford-Norwalk, CT</td>
<td>Phoenix-Mesa-Scottsdale, AZ</td>
</tr>
<tr>
<td>Buffalo-Niagara Falls, NY</td>
<td>Portland-South Portland, ME</td>
</tr>
<tr>
<td>Burlington-South Burlington, VT</td>
<td>Portland-Vancouver-Beaverton, OR-WA</td>
</tr>
<tr>
<td>Canton-Massillon, OH</td>
<td>Poughkeepsie-Newburgh-Middletown, NY</td>
</tr>
<tr>
<td>Champaign-Urbana, IL</td>
<td>Pueblo, CO</td>
</tr>
<tr>
<td>Chicago-Naperville-Joliet, IL-IN-WI</td>
<td>Reading, PA</td>
</tr>
<tr>
<td>Chico, CA</td>
<td>Reno-Sparks, NV</td>
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<tr>
<td>Cincinnati-Middletown, OH-KY-IN</td>
<td>Riverside-San Bernardino-Ontario, CA</td>
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<td>Dayton, OH</td>
<td>Rockford, IL</td>
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<tr>
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<td>Saginaw-Saginaw Township North, MI</td>
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<tr>
<td>Des Moines, IA</td>
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<tr>
<td>Detroit-Warren-Livonia, MI</td>
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<tr>
<td>Duluth, MN-WI</td>
<td>San Francisco-Oakland-Fremont, CA</td>
</tr>
<tr>
<td>Erie, PA</td>
<td>San Jose-Sunnyvale-Santa Clara, CA</td>
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<tr>
<td>Eugene-Springfield, OR</td>
<td>Santa Barbara-Santa Maria-Goleta, CA</td>
</tr>
<tr>
<td>Flint, MI</td>
<td>Santa Rosa-Petaluma, CA</td>
</tr>
<tr>
<td>Fort Collins-Loveland, CO</td>
<td>Scranton-Wilkes-Barre, PA</td>
</tr>
<tr>
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<td>Seattle-Tacoma-Bellevue, WA</td>
</tr>
<tr>
<td>Harrisburg-Carlisle, PA</td>
<td>Spokane, WA</td>
</tr>
<tr>
<td>Hartford-West Hartford-East Hartford, CT</td>
<td>Springfield, MA-CT</td>
</tr>
<tr>
<td>Iowa City, IA</td>
<td>Springfield, MO</td>
</tr>
<tr>
<td>Jackson, MI</td>
<td>Stockton, CA</td>
</tr>
<tr>
<td>Janesville, WI</td>
<td>Syracuse, NY</td>
</tr>
<tr>
<td>Johnstown, PA</td>
<td>Toledo, OH</td>
</tr>
<tr>
<td>Kalamazoo-Portage, MI</td>
<td>Trenton-Ewing, NJ</td>
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<tr>
<td>Kankakee-Bradley, IL</td>
<td>Tucson, AZ</td>
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<tr>
<td>Lancaster, PA</td>
<td>Utica-Rome, NY</td>
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<tr>
<td>Lansing-East Lansing, MI</td>
<td>Vineland-Millville-Bridgeton, NJ</td>
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<td>Visalia-Porterville, CA</td>
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<tr>
<td>Lawton, OK</td>
<td>Worcester, MA-CT</td>
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<tr>
<td>Los Angeles-Long Beach-Santa Ana, CA</td>
<td>Yakima, WA</td>
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<tr>
<td>Merced, CA</td>
<td>York-Hanover, PA</td>
</tr>
<tr>
<td>Minneapolis-St Paul-Bloomington, MN-WI</td>
<td>Youngstown-Warren-Boardman, OH-PA</td>
</tr>
</tbody>
</table>
References


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