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THE CONSEQUENCES OF GENTRIFICATION: A FOCUS ON RESIDENTS' FINANCIAL HEALTH IN PHILADELPHIA

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The Consequences of Gentrification: A Focus on Residents' Financial Health in Philadelphia

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Abstract

There have been considerable debate and controversy about the effects of gentrification on neighborhoods and the people residing in them. This paper draws on a unique large-scale consumer credit database to examine the relationship between gentrification and the credit scores of residents in the City of Philadelphia from 2002 to 2014. We find that gentrification is positively associated with changes in residents' credit scores on average for those who stay, and this relationship is stronger for residents in neighborhoods in the more advanced stages of gentrification. Gentrification is also positively associated with credit score changes for less advantaged residents (low credit score, older, or longer term residents, and those without mortgages) if they do not move, though the magnitude of this positive association is smaller than for their more advantaged counterparts. Nonetheless, moving from gentrifying neighborhoods is negatively associated with credit score changes for less advantaged residents, residents who move to lower-income neighborhoods, and residents who move to any other neighborhoods within the city (instead of outside the city) relative to those who stay. The results demonstrate how the association between gentrification and residents' financial health is uneven, especially for less advantaged residents.

Keywords: gentrification, credit scores, residential mobility

JEL Codes: D14, J11, J6, R23

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1. Introduction

Debates surrounding the consequences of gentrification have largely focused on the displacement of incumbent residents, though recent studies generally do not find evidence that less advantaged residents in gentrifying neighborhoods move at a significantly higher rate than similar households in nongentrifying neighborhoods (Ding, Hwang, and Divringi, 2015; Ellen and O'Regan, 2011; Freeman, 2005; Freeman and Braconi 2004; McKinnish, Walsh, and White, 2010; and Vigdor, 2002). Gentrification, the socioeconomic upgrading of a previously low-income central city neighborhood, however, may affect the social and economic welfare of the residents in gentrifying neighborhoods in ways beyond just residential displacement.

In this paper, we contribute to this body of research by examining the relationship between gentrification and the financial health among residents, measured by individuals' credit scores, in Philadelphia from 2002 to 2014. We use a unique individual-level data set, the Federal Reserve Bank of New York Consumer Credit Panel/Equifax (hereafter noted as CCP), and more precise gentrification measures in the City of Philadelphia. The CCP data provide extensive information on residential location and consumer financial health and credit use, which allows us to observe residents' mobility patterns and how their financial status changes in relation to the characteristics of the neighborhood where they live, including gentrification.

Gentrification could affect residents' financial health indirectly in many ways, though existing studies do not suggest a direct link between gentrification and residents' credit scores. With the inflow of new lending institutions and improved access to financial services that can accompany gentrification, existing residents in gentrifying neighborhoods could gain improved access to mainstream financial products. Furthermore, gentrification could lead to increased labor market opportunities if the local economy improves, which could also help people make debt payments on time and improve their credit scores. Given the rising home values and the resulting increased home equity that often come with gentrification, existing mortgage borrowers may have greater incentive to keep current with their mortgage, which would maintain or improve their financial health status. However, the rising housing and living costs that come with gentrification could also cause liquidity problems for many residents in gentrifying neighborhoods, especially residents who are more financially vulnerable. Such liquidity

problems could be manifested by increased levels of delinquencies on credit payments, tax foreclosures, evictions, as well as bankruptcies, all of which would negatively affect an individual's financial health. Further, financially vulnerable residents that move from gentrifying neighborhoods as a result of the rising costs accrue additional financial burdens from moving and may also face additional financial burdens from broader declines in affordability as neighborhoods gentrify throughout the city. Nonetheless, individuals who expect to experience larger improvements in financial health may select to live in gentrifying neighborhoods, while individuals who anticipate large decreases in their financial health may select to move from gentrifying neighborhoods. Despite reasons to believe that gentrification is associated with residents' financial health outcomes, few studies have examined this relationship.

In this study, we examine the relationship between gentrification and residents' financial health in general and across different subpopulations based on a random sample of adult residents in Philadelphia from 2002 to 2014. We find that residents who do not move from gentrifying neighborhoods experience an average increase of 11.3 points in their Equifax risk scores, a widely used credit score and our measure of individuals' financial health (higher scores indicate better financial health), over three years. Stayers in neighborhoods undergoing intense gentrification experience an average increase of 22.6 points, doubling the average increase across all gentrifying neighborhoods. The improvement in risk scores of residents in neighborhoods experiencing moderate or weak gentrification is much smaller.

We also find that gentrification is positively associated with the financial health of less advantaged residents in gentrifying neighborhoods if they are able to stay. Less advantaged residents in gentrifying neighborhoods—low risk score, older, or longer-term residents, and those without mortgages—who are likely more vulnerable to financial instability resulting from gentrification but who do not move experience some improvement on average in their risk scores, but the magnitude of their positive association with risk score changes is smaller compared to their more advantaged counterparts in gentrifying neighborhoods.

Relative to staying in the neighborhood, moving out of gentrifying neighborhoods is negatively associated with changes in the financial health of less advantaged residents. In other

words, their financial health would have been better off if they were able to remain in the gentrifying neighborhood. Changes in movers' financial health vary significantly depending on the quality of the destination neighborhoods: Moving to neighborhoods with lower income than their origin neighborhoods or to other neighborhoods within the city (instead of the suburbs or other metros) is negatively associated with the changes in movers' risk scores. Altogether, the results demonstrate how the association between gentrification and residents' financial health is uneven, particularly for less advantaged residents.

This paper proceeds as follows: Section 2 reviews relevant literature on gentrification and credit scores, and Section 3 provides a detailed description of the data sets and methodology used in the study. Using multiple regression analysis, Section 4 examines the relationship among gentrification and residents' financial well-being, and the final section concludes.

2. Background and Literature

Economic and Financial Consequences of Gentrification

The term *gentrification* describes neighborhood changes that are characterized by the influx of new residents of a higher socioeconomic status relative to incumbent residents and rising housing values and rents into low-income, central city neighborhoods.[1] Given the rising housing and living costs that characterize gentrification, many argue that gentrification imposes increasing pressures of affordability on existing residents. As housing and living costs rise, less financially advantaged residents may become increasingly unable to afford to live in the neighborhood and may have to move out. This process is often called "residential displacement." The majority of research and debate on the consequences of gentrification has focused on residential displacement. The empirical evidence in these studies on residential displacement in U.S. cities, however, generally do not observe consistent and statistically significant differences

[1] This definition is generally consistent with the existing literature. Definitional debates involve whether to include neighborhoods beyond the central city, the socioeconomic upgrading of already well-off neighborhoods ("super-gentrification"), and if displacement and racial turnover are essential (Brown-Saracino, 2010). For the purposes of the study, we focus on characteristics in which there is broad agreement in the field.

in mobility rates between less advantaged residents, like less-educated, renting, minority, low-credit score, and lower-income households, in gentrifying and nongentrifying neighborhoods (Ding, Hwang, and Divringi, 2015; Ellen and O'Regan, 2011; Freeman, 2005; McKinnish, Walsh, and White, 2010).[2] These findings may be a result of the fact that gentrification can take place through infill development or in areas with high vacancy rates, as well as the fact that residents in these comparable neighborhoods generally have high mobility rates because they more often face financial instability and eviction (Newman and Wyly, 2006; Slater, 2009). Further, incumbent residents may incur financial burdens or "double-up" in their housing arrangements to afford the increased housing and living costs that come with gentrification or may be protected from moving through policies like rent control and subsidized housing (Freeman, 2005; Newman and Wyly, 2006). Therefore, less advantaged residents may face financial struggles as their neighborhoods gentrify, but they may not necessarily move out of the neighborhood in the limited time periods that these studies have examined (Freeman, 2005).

Only a handful of researchers have examined the financial and economic consequences, such as income and job opportunities, of gentrification. McKinnish, Walsh, and White (2010) find that income gains were greatest among black high school graduates, who make up a substantial proportion of the population of the neighborhoods identified as gentrifying at the beginning of their study, but they are unable to distinguish between whether these gains were among incumbent residents or higher-income blacks entering the neighborhood. Using a different data set, Ellen and O'Regan (2011) find that residents who remain in gentrifying neighborhoods experience greater income gains compared with residents who remain in nongentrifying neighborhoods. Due to data limitations, however, they are unable to examine residents who move. Lester and Hartley (2014) document more rapid employment growth and more rapid industrial restructuring (the replacement of goods-producing industries by jobs in the service sector, like restaurants and retail services) in gentrifying neighborhoods than nongentrifying neighborhoods. Meltzer and Ghorbani (2015) find that, at the zip code level, the number of jobs going to local residents increases significantly and that these jobs are primarily in the service sector and going to low- and moderate-income earners, but they do not find consistent and

[2] Many ethnographic accounts of gentrifying neighborhoods also document the political and cultural displacement that occurs as neighborhoods gentrify, alienating many of a neighborhood's less advantaged residents (e.g., Hyra, 2014; Martin, 2007; Zukin, 2010).

meaningful gentrification effects on local employment at the census tract level. These latter two studies suggest that gentrification may provide economic opportunities to local residents, but they do not examine the trajectories of individual residents.

Hartley (2013) uses similar data to our study and examines changes in Equifax risk scores from 2001 to 2007 in gentrifying and nongentrifying neighborhoods across the U.S. He documents increases in financial well-being among residents who remain in or move from gentrifying tracts: Living in a neighborhood that gentrified between 2001 and 2007 is associated with an 8-point higher increase in risk scores compared with living in a nongentrifying neighborhood. Hartley (2013) also finds that gentrification is negatively correlated with the existence of delinquent accounts among residents. Our study extends from Hartley's (2013) work by examining a period beyond the Great Recession. We also examine heterogeneity across additional subpopulations that Hartley (2013) does not consider, such as those in neighborhoods in various stages of gentrification and those who move to neighborhoods with a higher or lower level of income. These are important distinctions to consider when studying the effects of gentrification because previous research shows that mobility from gentrifying neighborhoods is largely due to higher-score residents moving to wealthier neighborhoods and that gentrification can impose different burdens depending on the stage and pace of gentrification in a neighborhood (Ding, Hwang, and Divringi, 2015).

Gentrification and Residents' Financial Health

We use a credit score, the Equifax risk score, to measure of a resident's financial health. What does a credit score,[3] like the risk score, represent? And, how do we expect it to be associated with gentrification? A credit score is indicative of the probability that an individual will repay his or her debts without defaulting. It reflects the likelihood that a borrower will become seriously delinquent on any open credit account within 18–24 months. A higher risk score represents a lower level of estimated credit risk for a consumer, while a lower risk score indicates that the likelihood of the individual defaulting on his or her debt is higher. No score indicates a thin

[3] There are various types of credit scores, such as lender-specific scores used to underwrite individual financial products and *generic credit history scores* developed by major credit bureaus—Experian, Equifax, and TransUnion (Mester, 1997). Our study focuses on the latter.

file—too little information is available for a score to be estimated. In short, a credit score provides a summary measure of a person's financial health and creditworthiness, which often determines credit access and pricing. Since their introduction in the 1970s, credit scores have played a central role in consumers' economic lives and have become an important determinant of individuals' financial and economic opportunities. In addition to serving as a key determinant for access to credit for individual consumers, credit scores have been increasingly used in the evaluation of individuals' applications for insurance, rental housing, utilities, and employment (Mester, 1997; Newman and Newman, 2013). Credit scores also represent an important and understudied dimension of financial health that can capture more than traditional measures of financial health, like income or wealth. Individuals rely not only on income but also on other resources, such as savings, assets, family contributions, or financial knowledge, for financial stability. Overall, credit scores provide a more comprehensive measure of the financial health of residents that directly reflects financial consequences that can come with the rising costs and shifting economy associated with gentrification.

While credit scores have been widely used in the U.S., almost no research has examined the determinants of credit scores or what triggers changes in credit scores. Credit bureaus may use many credit characteristics that relate to loan performance to compute credit scores, but they have not disclosed to the public their precise credit scoring models (Board of Governors of the Federal Reserve System [Federal Reserve Board], 2007). The Federal Reserve Board (2007) disclosed a list of 312 credit characteristics compiled by TransUnion in borrower credit records that could be used in its credit scoring models. An industry report states that the factors used to compute individuals' credit scores fall into the following categories, weighted in the model in this order: previous payment history, outstanding debts, length of credit history, new accounts opened, and types of credit used (Fair Isaac Corporation, 2005).[4] While credit scores reflect important aspects of an individuals' financial health, they only directly reflect debt levels and debt payment behavior and do not incorporate income and asset holdings. Credit scoring models constantly update with new information (Poon, 2009), and particular events, such as delinquency, very large changes to one's debt, and events of public record (e.g., bankruptcy or

[4] The credit bureau provides some information about the weight given to different sets of predictors: previous payment history (35%), outstanding debts (30%), length of credit history (15%), new accounts opened (10%), and types of credit used (10%) (Fair Isaac Corporation, 2005).

foreclosure), generally have greater effects on credit scores (Anderson, 2007). Studies also show that the change in a consumer's credit score over time is negatively correlated with his or her initial score, exhibiting a pattern of "mean-reversion" (Musto, 2004). Put differently, individuals with lower scores are expected to experience larger increases in their risk scores. This is likely because the impact of negative or positive events an individual experiences on his or her credit score decreases over time (i.e., time decay of information), and the score differences between borrowers with good credit and bad credit tend to revert towards the population average (Anderson, 2007).

The Equal Credit Opportunity Act **(**ECOA**)** prohibits discrimination in computing credit scores on the basis of race, ethnicity, religion, national origin, gender, marital status, and age (Federal Reserve Board, 2007). The Federal Reserve Board (2007) confirms that none of the credit characteristics included in a credit scoring model serves as a proxy for race, ethnicity, gender, or income.[5] However, when focusing on the outcomes from the credit scoring models, several studies have documented sizeable differences in mean credit scores across income and racial/ethnic groups, homeowners and renters, as well as individuals with different education levels, age, and health (Bostic, Calem, and Wachter, 2005; Federal Reserve Board, 2007; Newman and Newman, 2013). Bostic, Calem, and Wachter (2005) find that low-score individuals are disproportionately more likely to have low incomes and be of a minority group, and they find that the magnitude of the differences across different subpopulations increased between 1989 and 2001. While income often correlates with financial indicators associated with one's ability to repay his or her debt, reasons for such differences are still unclear for researchers because the scoring models only incorporate debt—not income, asset holdings, or employment status. The Federal Reserve Board (2007) attribute this gap in credit scores to differences in the documented payment histories and outstanding debts of low-income and minority individuals. Spader (2010) further suggests that credit scores create a "feedback loop": People with low scores have limited choices in credit products because of their scores, and these products (e.g., subprime mortgages) by their nature usually have higher default risk, which could further hurt low-score borrowers' credit scores when they default.

[5] The only exception is that they find a consumer's length of credit history correlates with the consumer's age.

Credit scoring models do not use very fine geographic information, so existing studies generally do not suggest a direct link between neighborhood characteristics and individuals' credit scores. There are, however, several possible mechanisms in which gentrification could have differential impacts on residents' credit scores indirectly. On the one hand, gentrification not only attracts residents with higher socioeconomic status, but it also ushers in services that were previously absent in those neighborhoods (Meltzer and Schuetz, 2012). The inflow of new investment and improved access to mainstream financial services that typically come with gentrification can have direct or indirect positive effects on residents' financial health. For example, the influx of new bank branches, ATMs, and financial service firms that come with gentrification makes it easier for existing residents to access safer and more affordable financial products. Further, the increase in job opportunities in gentrifying neighborhoods as the local economy improves could also increase residents' incomes and help them make timely payments on various credit accounts. In addition, the increase in housing values in gentrifying neighborhoods could help improve consumers' credit performance. Existing studies generally agree that the most important predictor of mortgage default is the level of equity in the property: the higher the level of equity in the property, the less likely the mortgage borrower will default on the mortgage (for a review, see Quercia and Stegman, 1992). Thus, rising housing prices increase the level of equity in a property, which can improve the mortgage performance of existing borrowers, though this channel is only relevant for homeowners with mortgages. We expect that the likely improved credit access and credit performance for existing residents in gentrifying neighborhoods will improve their credit scores.

However, the increase in rents and property taxes and rising costs of living that come with gentrification could make gentrifying neighborhoods increasingly unaffordable for many existing residents. They may have difficulty in paying rents, property taxes, or other credit accounts, thus hurting their financial health. Further, if they cannot afford to stay in gentrifying neighborhoods and have to move, the move itself could incur various costs, including but not limited to transportation costs, storage costs, replacement costs, job search costs, not to mention the psychological and social challenges associated with the move. Housing searches also require time and resources that can have negative consequences on individuals' credit scores. In particular, putting together a down payment for a house or a deposit for rental housing, going

through additional credit checks for mortgage and rental applications, or taking on new debt with a mortgage can have negative consequences for an individuals' financial health, particularly for those who are residentially displaced from a gentrifying neighborhood. All these factors could have significant negative effects on the financial health of residents in gentrifying neighborhoods, and we expect them to hit vulnerable movers even harder because of the lack of a financial cushion they have. In sum, gentrification can affect residents' credit scores as a result of the various changes that come with gentrification, which could influence individuals' payment histories and access to credit. We expect that credit scores will be negatively associated with moving from gentrifying neighborhoods for less advantaged residents, relative to those that are able to stay, but the credit scores of less advantaged stayers could either be positively or negatively associated with gentrification.

Of course, residents who experience greater improvement in their credit scores could self-select into gentrifying neighborhoods in the first place. For example, young recent college graduates, who are more likely to experience larger improvement in their credit scores as they build credit, may be more likely to live in gentrifying neighborhoods. At the same time, less advantaged residents living in gentrifying neighborhoods, who are more likely to have lower credit scores and are more likely to be older or longer term residents, may be less likely to experience improvements in their credit scores as they were more vulnerable to economic insecurity during the Great Recession.

3. Data and Methodology

Data: Gentrification Measures

Gentrification is broadly the socioeconomic upgrading of a previously low-income neighborhood characterized by the influx of higher socioeconomic status residents and an increase in housing prices. Therefore, we measure gentrification by specifically concentrating on shifts in the socioeconomic status of residents and neighborhood housing prices. We focus on the City of

Philadelphia in this study to isolate effects in a single housing market and to draw from local knowledge and alternative data sources to verify our measures of gentrification.[6]

By definition, for tracts to gentrify, they have to have been lower-income tracts at the beginning of the period. Because the CCP data used in this study track individuals from 2002 to 2014, we consider tracts to be *gentrifiable* if their median household income was below the citywide median household income in the year 2000 using estimates from the 2000 U.S. Census.[7] We consider a tract to be *gentrifying* if it was gentrifiable in 2000 and experienced both a percentage increase above the citywide median increase in either its median gross rent or median home value *and* an increase above the citywide median increase in its share of college-educated residents from 2000 to 2013 based on data from the 2000 U.S. Census and the American Community Survey (ACS) five-year estimates from 2009 to 2013 (denoted as 2013, hereafter).We rely on housing values and rents because they reflect the demand for various amenities and investment in the neighborhood. We include changes in *either* rents or home values because these changes do not necessarily occur in step with each other but nonetheless indicate changing affordability in a previously low-income neighborhood. Additionally, we include criteria for demographic changes to deal with issues with past strategies of misidentifying gentrification in neighborhoods experiencing housing price spillovers without demographic changes. We rely on increases in the share of college-educated residents rather than incomes to capture young professionals who may have relatively lower incomes and to better distinguish an influx of new residents from incumbent upgrading (Clay, 1979; Freeman, 2005; Ley, 1996).[8] Figure 1 (Left) provides a map of gentrifying neighborhoods based on our measure. Of Philadelphia's 365 tracts with substantial population sizes, we categorized 56 of its 184 gentrifiable tracts as gentrifying from 2000 to 2013.[9] The remaining 128 tracts are *nongentrifying*: they were gentrifiable in 2000 but did not meet the criteria listed previously.

[6] For additional information on construct validity and issues with other census-based measures, see the Appendix of Ding, Hwang, and Divringi (2015).

[7] Some studies used metropolitan area median household incomes as the threshold, but, Philadelphia's metropolitan area median income is much higher than most of the tracts within the city. Thus, we only focus on lower-income tracts relative to the city to identify gentrification in this study.

[8] Ninety-nine tracts had above-citywide median increases in either home values or rents, but 43 of these tracts did not have above-citywide median increases in their shares of college-educated residents.

[9] The data exclude 16 census tracts that had fewer than 50 residents or had zero housing units during the entire period of analysis. This exclusion results in a sample of 365 census tracts.

Gentrification is a dynamic process that occurs at varying paces. Therefore, we also constructed more refined categories of gentrification to assess if the financial health of residents varies by the pace or stage of gentrification a neighborhood is experiencing. We constructed a separate category for census tracts that experienced gentrification prior to 2000 either during the 1990 to 2000 decade or during the 20-year period of 1980 to 2000 using the same criteria listed above. Among the tracts that were gentrifying before 2000 and were still gentrifiable in 2000, we categorized those that continued to gentrify from 2000 to 2013 as *continued gentrification*. These tracts are generally in the more advanced stages of gentrification. We classified the tracts that were gentrifying from 2000 to 2013 but were not gentrifying before 2000 into three categories—*weak gentrification, moderate gentrification,* and *intense gentrification*—to indicate the pace of gentrification in these areas. Tracts experiencing weak gentrification had both median rent prices and home values in the bottom quartile among these gentrifying tracts according to the 2009 to 2013 five-year ACS estimates. Tracts that we categorized as intense gentrification had either median rent prices or median home values in the top quartile of these gentrifying tracts. We categorized the remaining tracts as moderate gentrification. Table 1 provides a detailed description of these categories, and Figure 1 (Right) displays a map of Philadelphia's tracts based on these categories. Average demographic and socioeconomic characteristics of these tracts are displayed in Appendix Table A1.

Most of the gentrifying neighborhoods in the city of Philadelphia are either close to the downtown or adjacent to major anchor institutions (e.g., University of Pennsylvania and Temple University). Ding, Hwang, and Divringi (2015) classify the gentrifying tracts into five clusters. The Center City cluster contains tracts in the central business district (CBD) and residential neighborhoods adjacent to it, and most of the other tracts in the cluster are wealthy, nongentrifiable tracts. The South Philadelphia cluster comprises a diverse array of neighborhoods spanning the southern section of the city, and a large proportion of the tracts in this area were gentrifying prior to 2000. The Lower North cluster contains areas just north of the CBD, including areas by Temple University and areas adjacent to City's major park—Fairmount Park. The River Wards cluster encompasses a number of neighborhoods that have strong historical ties to Philadelphia's industrial economy along the Delaware River, expanding from

neighborhoods that had gentrified during 1980s and 1990s. Lastly, the West Philadelphia cluster primarily includes tracts surrounding the University of Pennsylvania and Drexel University (University City), where nearly half had been gentrifying since prior to 2000.

Data: CCP

This study primarily relies on the CCP data, which consist of an anonymized 5% random sample of U.S. consumers with credit bureau records. The sample is constructed by selecting consumers with at least one public record or one credit account currently reported and with one of five numbers in the last two digits of their Social Security numbers (SSNs)[10] (see details in Lee and van der Klaauw, 2010). The CCP data report the credit characteristics, including extensive information on consumer credit use and credit performance, for individuals in the sample quarterly beginning in 1999. The CCP data also include the census geography identifiers (block, tract, county, and state) associated with each consumer's credit file, so we are able to identify whether an individual has moved across neighborhoods and to track the origin and destination neighborhood of a mover. We used data from the second quarter in each year during the study period for this study.

We carefully evaluated the representativeness of the CCP data and find that the age distribution and population estimates of the CCP sample are quite similar to those based on the American Community Survey (ACS) sample in Philadelphia, especially for individuals 25 years of age or older (see details in Ding, Hwang, and Divringi, 2015). We further compared the mobility rates derived from the CCP data with those derived from the ACS data and find that the interstate and intercounty mobility rates are generally similar. The ACS data report slightly higher overall mobility rates than our study, but this is likely due to intra-neighborhood moves that we do not count in our study.

There are a few caveats with the CCP data worth mentioning. First, the CCP data set only samples individuals with a credit history and an SSN, so individuals who have never applied for

[10] The CCP data do not include actual SSNs. Equifax uses SSNs to assemble the data set, but the SSNs are not shared with researchers. In addition, the data set does not include any names, full addresses, demographics (other than age), or other codes that could identify specific consumers or creditors.

or qualified for a loan are not included.[11] Thus, the results may not represent the behavior of individuals without credit records or SSNs, such as those who do not use credit at all or young individuals or new immigrants who have no credit history. The CCP data set, however, does include individuals with thin files—those with too little information for scores to be estimated, as well as individuals whose credit file only consists of a collection or public record item (such as bankruptcy) or only contains authorized user accounts or closed accounts. Second, the CCP data have a significantly lower proportion of individuals aged 18 to 24 years old compared with ACS estimates; this is because younger adults are less likely to have a credit history than older individuals.[12] The data also have a slightly higher proportion of older individuals (65+ years old) likely because of the delay in the removal of deceased individuals' records from the CCP data (Lee and van der Klaauw, 2010). Finally, the sample design of the CCP data prevents us from tracking the change in financial health for a very small share of consumers newly added to or dropped from the panel. We estimate that 1% to 3% of consumers in the original CCP sample were dropped, while a similar share of consumers was added to the panel each year.[13] Because of this, we do not use a longitudinal panel design and instead construct our dataset as individual annual cohorts who we track over three year periods.

Keeping these caveats in mind, the CCP data provide a unique sample at the individual level for the investigation of the relationship between gentrification and financial health for financially independent adults, which has been largely unexplored before now. Our analysis includes individuals who we initially observe in 2002 to 2003 and from 2005 to 2011, for whom we have geographic data and risk scores for the initial year and three years later in the data set.[14] About

[11] According to a report by the Consumer Financial Protection Bureau (CFPB), as of 2015, 26 million Americans (one in 10 adults) do not have any credit history with a nationwide consumer reporting agency (CFPB, 2015). Brown, Haughwout, Lee, and van der Klaauw (2011) estimate that about 8.3% of households do not include a member with a credit report.

[12] Although the younger population (18−24 years old) is slightly underrepresented in the CCP data, we keep them in the analysis because Millennials may contribute to the gentrification process. We have conducted additional analyses excluding these young adults, and the results are similar.

[13] The CCP data continue to add new individuals who develop a credit history or immigrate to the U.S. over time and drop consumers when they die, emigrate, or "age off," following a prolonged period of inactivity and no new items of public record appearing.

[14] Our study period begins in the second quarter of 2002 because the geographic information in the data prior to 2002 is less precise (Wardrip and Hunt, 2014). Also, the 2004 cohort was excluded from the analysis because the mobility rate in 2005 was abnormally high, likely due to a change in the geocoding system in that year.

11.5% of individuals had no risk scores (i.e., thin files) and another 2% of individuals had missing values on other demographic variables, all of whom were excluded from the final sample. Figure 2 shows the mean risk scores for each year over the study period of all residents, inmovers, and outmovers in gentrifying neighborhoods and nongentrifying neighborhoods in Philadelphia. As the figure shows, the average scores for inmovers and outmovers in gentrifying neighborhoods increase over time, though inmovers have higher scores on average. In nongentrifying neighborhoods, the average scores for inmovers and outmovers decrease over time, with outmovers having slightly higher scores on average.

Methodology: Gentrification and Financial Health of Residents

To examine the relationship between gentrification and changes in the financial health of residents, we first track the changes in the risk scores of residents who stay in gentrifying or nongentrifying neighborhoods in Philadelphia over three-year periods by the yearly cohorts that we constructed. We focus on an interval of three years to balance the need for an adequate follow-up time and the potential bias introduced by the attrition and adjustment of the study sample over time. We use the following linear model to estimate the relationship between gentrification and changes in residents' risk scores:

$$\Delta SCORE_{i,t+3} = \alpha + \beta * GENTRIFY_{i,t} + \gamma * SCORE_{i,t} + \delta * X_{i,t} + \zeta * YEAR_{i,t} \quad (1)$$

where:

- $\Delta SCORE_{i,t+3}$ is the change in the risk score for the same stayer *i* from year *t* to year *t+3*, or ($SCORE_{i,t+3}$ - $SCORE_{i,t}$).
- $GENTRIFY_{i,t}$ is the gentrification measure (binary or categorical) for the census tract where *i* lives in year *t*.
- $SCORE_{i,t}$ is stayer *i*'s initial risk score in year t.
- $X_{i,t}$ includes a set of individual and household characteristics for stayer *i* in year *t*: *i*'s age (categorical), the number of individuals with credit in *i*'s household (categorical), a dummy if *i* or anyone in *i*'s household has at least one mortgage as

a rough proxy for homeownership,[15] a dummy of whether *i* has any accounts in serious delinquency (90+days), a measure of the distance from *i*'s census tract centroid to the city center (City Hall), and *i*'s length of residency[16] (categorical).

- $YEAR_{i,t}$ is a dummy to indicate stayer *i*'s cohort in the dataset.

In this pooled model, the same individual can appear in the sample multiple times in different cohorts because of how we constructed the sample. We include the cohort dummy variables, which allow us to estimate within-cohort differences, to deal with this issue. In addition, according to the notion of "mean-reversion," the change in a consumer's risk score decreases with his or her initial score and the score differences between high-score and low-score groups tend to decrease over time and cluster around the mean risk score (Musto, 2004). We include a resident's initial risk score in the model to adjust for baseline differences,[17] and we examine the differences between individuals in gentrifying and nongentrifying neighborhoods with different level of initial risk scores and compare these differences across initial risk score levels.

In a separate analysis, we focus only on residents who start off in gentrifying neighborhoods to examine if there are differences in financial health changes between residents who stay or move from gentrifying neighborhoods. We use the following linear model to estimate the risk score change for movers relative to stayers from gentrifying neighborhoods:

$$\Delta SCORE_{i,t+3} = \alpha + \beta * MOVE_{i,t} + \gamma * SCORE_{i,t} + \delta * X_{i,t} + \zeta * YEAR_{i,t} \qquad (2)$$

As Equation 2 shows, we replaced the gentrification measure in Equation (1) with the *MOVE* variable, a dummy indicator for whether the individual has moved or not after the initial observation year. Other controls in *X* are the same as Equation (1) except it includes a new

[15] According to the ACS, about 50%–60% of households in Philadelphia are homeowners, and about 40% of owner-occupied units do not have a mortgage. Thus, approximately only two-thirds of the individuals without mortgages in our sample are likely renters.

[16] This only applies to cohorts after 2005.

[17] The results may still reflect mean reversion because we cannot fully adjust for the trajectory of baseline differences with the available data.

control for frequent movers (those who also moved in the second or third year).[18] The coefficient β indicates the relationship between moving and the change in risk scores.

For both models, we further include interaction terms for individuals' initial risk scores (categorical),[19] ages (categorical), lengths of residency (categorical), and mortgage statuses with the variable of interest (gentrification status or mobility status) to test whether less advantaged groups in the context of gentrification experience the same level of improvement as other subpopulations. Standard errors are clustered at the census tract level to allow for unobserved characteristics of individuals to correlate within individual neighborhoods.

In summary, our analytic strategy is to compare the change in risk scores between residents in gentrifying neighborhoods and nongentrifying neighborhoods as well as between movers and stayers in gentrifying neighborhoods. The empirical results allow us to document shifts in the financial health of residents in the context of gentrification, but they preclude causal claims. First, there may be selection issues that we do not have the data to control: Individuals who expect to see larger improvements in risk scores may select to live in gentrifying neighborhoods. For example, recent "gentrifiers" tend to be young college graduates (Hwang and Lin, 2016), and these residents are likely to see greater increases in their credit scores as they establish credit. Second, stayers who experience larger improvements in financial health may also have unobserved characteristics that enable them to stay in gentrifying neighborhoods rather than move as well. Finally, the gentrification of a neighborhood is a process that is unfolding as we observe changes in residents' financial health, and the precise timing between gentrification and risk score changes is difficult to disentangle with the data that we use in the study.

Table 2 shows descriptive statistics of the study sample for all residents in gentrifiable neighborhoods and split by the type of neighborhood in which they are living in their cohort

[18] This control better captures the consequences of moving: For movers who moved multiple times in the observation period, β may capture both the gentrification effect and the moving effects. In a separate analysis excluding frequent movers from the sample, the results are consistent (with the magnitude of the estimates of β slightly smaller).

[19] We only use the categorical risk score variables when interacting the risk score variable with the variable of interest to make it easier to interpret interaction terms. In other models, we control for the continuous variable of an individual's initial risk score.

year. The mean risk score for individuals in gentrifying tracts is higher than for individuals in nongentrifying neighborhoods (645 and 604, respectively). Individuals in gentrifying tracts are also slightly younger, more likely to have mortgages, less likely to have delinquent accounts, and have fewer adults in the household on average. The risk score changes, however, were positive on average and only slightly higher for residents in gentrifying neighborhoods than those in nongentrifying tracts (an average increase of 12.2 points versus 11.6 points). However, there are some important differences between residents within these neighborhoods. For example, residents in nongentrifying neighborhoods have lower risk scores on average, and individuals with lower scores are more likely to experience increases in their credit scores. Residents in gentrifying neighborhoods have higher mobility rates as well.

4. Empirical Results

This section discusses the empirical results on the relationship between gentrification and the financial health of stayers, movers, as well as different subgroups of less advantaged residents. These results are summarized in Tables 3 through 6.

Financial Health of Stayers in Gentrifying Neighborhoods

We find that the change in risk scores of residents who remain in their neighborhoods is positively associated with gentrification. The results summarized in Table 3 indicate that staying in a gentrifying neighborhood is associated with an increase of 11.3 points in a resident's risk score over three years, relative to staying in a nongentrifying neighborhood. This is slightly higher than Hartley's (2013) findings—an increase of 8 points over the period of 2001 to 2007. Gentrification is associated with a slightly larger increase in risk scores for mortgage holders than residents without mortgages (14.7 points versus 10.2 points; see Table 3). Notably, non-mortgage holders experience greater increases than mortgage holders in intensely gentrifying neighborhoods (24.4 points vs. 19.0 points; see Table 3). The positive association for both mortgage holders and non-mortgage holders and the larger increase for non-mortgage holders in intensely gentrifying neighborhoods suggest that increases in home equity may not be the

primary mechanism through which gentrification impacts residents' credit scores, but we cannot be certain because many homeowners in Philadelphia do not have mortgages.

Nonetheless, there is significant heterogeneity in the effect of gentrification on the risk score changes for stayers depending on the stage of gentrification of the neighborhood (see Table 3). Intense gentrification is associated with a larger increase in stayers' risk scores compared to other gentrifying neighborhoods and nongentrifying ones. For example, those staying in neighborhoods undergoing intense gentrification see a 22.6 points higher increase in their risk scores than stayers in nongentrifying neighborhoods, doubling the average increase across all gentrifying neighborhoods of 11.3 points. The risk score change for residents in neighborhoods with moderate gentrification or neighborhoods that have been gentrifying for many years (continued gentrification) is about 11 points higher, similar to the average increase. The association of risk score changes for residents in neighborhoods with weak gentrification is insignificant and the magnitude is much smaller (3.1 points). Table 3 also contains results from various models to test the robustness of our findings, which we describe in more detail below.

An 11.3 point improvement in individuals' risk scores on average may not seem big (about 1.8% of the mean score), but even a small improvement in a consumer's risk score can increase the chance of success for mortgage applications, credit card applications, apartment applications, and job applications, especially for those around cutoff points often used by creditors to determine whether individuals qualify for particular products (Quercia, Ding, and Reid, 2012). Credit score levels also impact pricing on mortgages, credit cards, and other debts, in addition to access to particular products (e.g. Agarwal et al., 2015). For example, an interest rate of a Fannie Mae loan with an 80%–85% loan-to-value ratio would be 125 basis points lower for a borrower with a credit score between 680 and 699 compared with one with a credit score between 660 and 679 (as of March 2016);[20] if a borrower has a credit score below 620, the chance that the borrower can get a Fannie Mae loan would be extremely low. Therefore, even seemingly small increases in credit scores can significantly improve credit availability and/or lower the financing costs for many consumers, especially those less advantaged ones.

[20] See more details about the loan-level price adjustments for Fannie Mae mortgages at: https://www.fanniemae.com/content/pricing/llpa-matrix.pdf. Different lenders, however, may use different credit scores and different thresholds in their underwriting.

Table 4 shows that residents with lower risk scores, without mortgages, long-term residents, and older residents in gentrifying neighborhoods all experience greater positive changes in their risk scores relative to similar residents who do not move from nongentrifying neighborhoods. For example, low-score stayers in gentrifying neighborhoods see an average score change of 65.5 points in three years (8.7+62.6-5.7) relative to the reference group (high-score (750+) stayers in nongentrifying neighborhoods), which is slightly higher than the average score change for a low-score stayer in a nongentrifying neighborhood (62.5 points higher than the reference group). Because not all stayers experience an absolute positive change in their risk scores, we discuss the score changes relative to the average estimated score changes for the reference groups.[21]

Results also suggest that low-score (<580) residents and older residents (65 years or older) in gentrifying neighborhoods experience larger positive changes in risk scores than higher score residents or younger residents in gentrifying neighborhoods. While the score changes of low-score stayers in gentrifying neighborhoods are on average 65.5 points higher than the reference group, the changes for stayers with higher risk scores is lower (19.5 points for someone with a risk score between 580 and 649; 17.4 points for someone with a risk score between 650 and 749; and 8.7 points for someone with a score over 750). This is consistent with the pattern of mean reversion that others have found in credit scores: Consumers' credit score changes are negatively associated with their initial credit scores (Musto, 2004). The relative gains for long-term residents and those without mortgages is less than that of their more advantaged counterparts in gentrifying neighborhoods. The relative improvement in the risk score for a stayer in a gentrifying neighborhood with no mortgages is about 9.3 points (17.6-0.2-8.2), and this is lower than the 17.6 points change for a resident with at least one mortgage in a gentrifying neighborhood.

[21] The model predicts an average high-score stayer (with risk score >=750 and mean values for other characteristics) in a nongentrifying neighborhood would experience a decline of 26.1 points in three years (and a decline of 17.4 points in a gentrifying neighborhood). In contrast, a low-score resident is expected to experience a positive increase in either gentrifying neighborhoods (39.4 points) or nongentrifying neighborhoods (36.4 points). The changes are generally positive for other subgroups (classified by mortgage status, age, and length in residence).

When we consider the difference in the risk score changes between similar stayers in gentrifying versus nongentrifying neighborhoods, the changes in risk scores for less advantaged residents in gentrifying neighborhoods are still positive but are lower than that for their more advantaged counterparts in gentrifying neighborhoods. For example, as mentioned earlier, the score changes of a low-score stayer in a gentrifying neighborhood is only about 3.0 points higher than that of a similar low-score stayer in a nongentrifying neighborhood (65.5 points versus 62.5 points higher compared with stayers in the reference group). This difference in risk score changes between low-score residents in gentrifying versus those in nongentrifying neighborhoods is less than that experienced by those with higher scores (9.4 points for residents with a risk score between 580 and 649; 13.2 points for residents with a risk score between 650 and 749 and 8.7 points for residents scoring over 750). In other words, the positive effect of gentrification on risk scores is less for low-score stayers relative to their more advantaged counterparts. Similarly, residents without mortgages, long-term residents (5+ years), or older residents in gentrifying neighborhoods experience less improvement than their more advantaged counterparts in gentrifying neighborhoods. Older stayers (65+ years old) in a gentrifying neighborhood, for example, experience a positive change that is 5.6 points higher than for similar stayers in a nongentrifying neighborhood, and this is lower than the 9.9 points for those aged between 45 and 64 years, the 15.2 points for those aged between 25 and 44 years, and the 13.1 points for those under 25 years old.

Overall, results suggest that change in financial health for less advantaged residents is positively associated with gentrification if they can stay, though the magnitude of the positive association is smaller for them compared with what other more advantaged counterparts in gentrifying neighborhoods experience.

Financial Health of Movers from Gentrifying Neighborhoods

In Philadelphia, residents in neighborhoods that have been gentrifying for many years or have rapidly gentrified in recent years have slightly higher mobility rates than those in nongentrifying neighborhoods, but vulnerable residents in gentrifying neighborhoods generally do not have significantly higher moving rates (Ding, Hwang, and Divringi, 2015). When we focus only on

residents in gentrifying neighborhoods, we find that moving is negatively associated with risk score changes. The average change in risk scores for movers after moving from gentrifying neighborhoods is about 3.0 points lower than that of stayers (see Table 5). Though the magnitude of the change is relatively small and only marginally significant (at 0.1 level), this is different from Hartley's (2013) finding that movers from gentrifying neighborhoods had a larger increase in risk scores than stayers (an additional 1.5 points). Our main results are consistent when we use a similar measure of gentrification as Hartley (2013), focusing on an early 2000s cohort and a longer study period. Thus, the differences here are likely due to average differences nationwide and the additional control variables that we use in our models.

While we have limited information on movers' resources, the types of neighborhoods to which they move reveal distinct results that provide insight into the selection of residents moving from gentrifying neighborhoods. Relative to stayers in gentrifying neighborhoods, movers from gentrifying neighborhoods to other neighborhoods within the city experience a negative change relative to stayers (8.2 points lower) in risk scores, but movers to neighborhoods outside the city, which are generally much more socioeconomically advantaged than neighborhoods within the city, experience a positive change relative to stayers (an additional 4.0 points), as shown in the second set of columns in Table 5. We also observe a similar pattern for movers from gentrifying neighborhoods to areas with different income levels: Movers who move to lower income neighborhoods (based on deciles) relative to their origin neighborhood experience a negative change in risk scores compared with those who stay in the gentrifying neighborhoods (12.1 points lower). In contrast, those who move to higher-income neighborhoods experience similar risk score changes relative to stayers (the difference is close to zero and insignificant). These divergent outcomes for residents moving to neighborhoods with different socioeconomic status likely reflect the differential effects that come for movers who move due to affordability issues and those who move by choice to neighborhoods with higher socioeconomic status.

The magnitude of the changes in movers' risk scores is also sensitive to the types and stages of the gentrification from which movers are moving. Movers out of neighborhoods with weak gentrification experience a negative change in their risk scores compared to stayers in gentrifying neighborhoods in similar stages: movers from tracts with weak gentrification have score changes

11.2 points lower on average than stayers in these neighborhoods. However, residents moving out of neighborhoods undergoing intense gentrification experience greater positive changes in their scores relative to stayers (last set of columns in Table 5).

The changes in risk scores for movers are uneven across different subpopulations as well. Moving from gentrifying neighborhoods is negatively associated with risk score changes for vulnerable residents (see results in Table 6). Because the risk scores exhibit a pattern of mean reversion, where high-score residents are more likely to experience declines in their scores and low-score residents are more likely to experience larger increases in their scores, it is more useful to compare the differences between movers and stayers for each subpopulation and then compare these differences across subpopulations.[22] The average change in risk scores for lower score movers is 7.0 points lower (-1.3- 5.7=-7.0 points) than that of stayers with similar risk scores. In contrast, the average change in risk scores for movers with relatively high risk scores (650–749) is 4.2 points greater than that of stayers with similar scores, though the difference for movers and stayers with scores 750 or above is insignificant. In other words, moving is negatively associated with risk score changes for lower-score residents, while it is positively associated with risk score changes for those with higher risk scores. The average risk score change for older movers is significantly lower than their counterparts who are able to stay: 14.6 points lower for those aged 65 years or older, almost no difference for those 25−44 years old, and a slightly greater change for those 24 years old or younger. Movers who were previously long-term residents experience a change 10.6 points (4.1-14.7) lower than long-term residents who stay, while the differences between the changes of short-term residents who move and those who stay are insignificant. Finally, movers with no mortgage experience a change in their risk scores 3.4 points lower than stayers with no mortgages. These results indicate relatively worse financial outcomes associated with moving from (compared with staying in) a gentrifying neighborhood for less advantaged residents.

In summary, moving out of gentrifying neighborhoods is negatively associated with change in residents' credit scores. Moving is negatively associated with risk score changes for movers

[22] The absolute changes for an average mover in other subgroups (classified by mortgage status, age, and length in residence) are generally positive.

from neighborhoods in early stages of gentrification (relative to later stages of gentrification) and for those who move to lower-income neighborhoods or to other neighborhoods within the city (instead of outside the city). Moving is also negatively associated with risk score changes for less advantaged residents in gentrifying neighborhoods (relative to those who stay), at least over three years. While moving as a result of the rising financial costs associated with gentrification may explain these findings, individuals may also move as a result of declining financial health.

Robustness Checks

We conducted additional analyses using different subsamples and control groups to discern how sensitive the relationship between gentrification and residents' financial health is to some of our analytical decisions. Using all nongentrifying neighborhoods as the control group may also raise concerns with selection bias: Because some nongentrifying neighborhoods may have fewer amenities or may be farther from other amenities, residents in these nongentrifying neighborhoods may be less comparable with residents in gentrifying neighborhoods due to unobserved characteristics. When we restrict the analysis to residents in nongentrifying neighborhoods within a half-mile from the nearest gentrifying neighborhoods as the control group, the magnitude of the coefficients becomes smaller (4.4 points) and insignificant, but the sign of the coefficients remains the same (see Table 3). Nonetheless, the risk score changes are greater and statistically significant for residents in tracts experiencing intense gentrification.

We also replicated the analysis using a sample of individuals who have at least two credit accounts. Addresses of these individuals are more likely to be updated in a timely manner, which reduces the potential bias related to tracking individuals' mobility. The results are quite consistent (see Table 3), with similar magnitudes of the gentrification coefficients. This suggests that this concern at least does not bias our estimation upward. Finally, when the younger population and the older population who are under- and over-represented in our sample, respectively—those 24 years old or younger or 65 years old or older—are dropped from the sample, the results are similar (with a slightly larger coefficient of 12.2 for the *gentrify* variable).

Overall, the results from the various robustness tests are generally consistent with those in the original model.[23]

5. Summary

Despite the increasing concern over the consequences of gentrification, existing studies on gentrification largely focus on the residential displacement of existing residents. The financial and economic consequences of gentrification have received less attention. This study provides new evidence contributing to understanding the consequences of gentrification on residents' financial health. Residents who stay in gentrifying neighborhoods, no matter whether they are high-score or low-score residents, long-term or short-term, older or younger, or with or without mortgages, all experience positive changes in their risk scores relative to similar residents in nongentrifying neighborhoods. Residents who stay in neighborhoods in the more advanced stages of gentrification experience even greater positive changes in their risk scores than those in less advantaged stages of gentrification. However, the magnitude of the overall positive association between gentrification and risk score change for those who do not move from their neighborhoods is smaller for less advantaged residents compared with their more advantaged counterparts. Moreover, among residents who start off in gentrifying neighborhoods, moving is negatively associated with risk score changes for less advantaged residents. Further, residents who move to lower-income neighborhoods or other neighborhoods within the city, rather than the suburbs or other metro areas, experience a negative change in their risk scores relative to stayers.

Credit scores play a central role in determining consumers' access to credit, housing, and economic opportunity. The empirical results of this study are consistent with the notion that gentrification directly or indirectly improves the financial well-being of existing residents, though the distribution of the benefits is uneven. Less advantaged residents appear to gain less

[23] We also conducted two additional robustness tests but did not include the results in the paper. First, we ran the risk score change model by cohort instead of using the pooled data. The results are consistent with those using the pooled data with the coefficients of the *gentrify* variable being significant for all cohorts and slight variations in the magnitude of the coefficients across cohorts. Second, a small share (about 5%) of households has multiple householders in the CCP sample. The empirical results are almost the same when we excluded these individuals from the analysis.

from gentrification, and, for less advantaged residents in gentrifying neighborhoods, moving is negatively associated with their risk score changes. The results demonstrate how the positive and negative consequences of gentrification on individuals' financial health may be unevenly distributed. For example, the evidence suggests that having to move from gentrifying neighborhoods could have negative costs on residents' financial health.

Policymakers should anticipate these unequal consequences and develop strategies to amplify the potential benefits and mitigate the possible negative effects for the less advantaged population. In particular, the results suggest that moving is negatively associated with credit score changes for less advantaged residents in gentrifying neighborhoods and that there are benefits to these residents' financial health if they are able to stay. Therefore, policies that prevent these residents from displacement can potentially provide these individuals with additional financial benefits that can result from gentrification. Policy interventions that keep housing affordable for these residents and keep the neighborhoods as desirable places to live for them can prevent their displacement. At the same time, services that connect these residents to the incoming financial resources and opportunities can help increase the potential benefits that can come with gentrification.

Of course, the study is not without limitations. The data set used in this study does not include some extremely low-income residents and new immigrants who do not have any credit accounts or credit history, and we excluded individuals with no scores. Thus, future research should investigate the relationship between gentrification and the financial health of those residents who are likely the most financially vulnerable. And while the gentrification process in Philadelphia is similar to that in many other central cities across the country, particularly Rustbelt cities with similar economic histories, it may differ from other markets, like those with rapidly rising demand such as San Francisco, in many important ways. Thus, the findings may not be generalized for the whole nation or cities that have significantly different market conditions. Finally, unobserved differences between residents in gentrifying and nongentrifying neighborhoods, as well as between stayers and movers, likely exist that limit the extent to which residents in nongentrifying neighborhoods or stayers in gentrifying neighborhoods can serve as a control group that allow us to make causal claims. Nevertheless, as a case study, the timely

empirical work helps shed new light on the uneven distribution of the financial consequences of gentrification.

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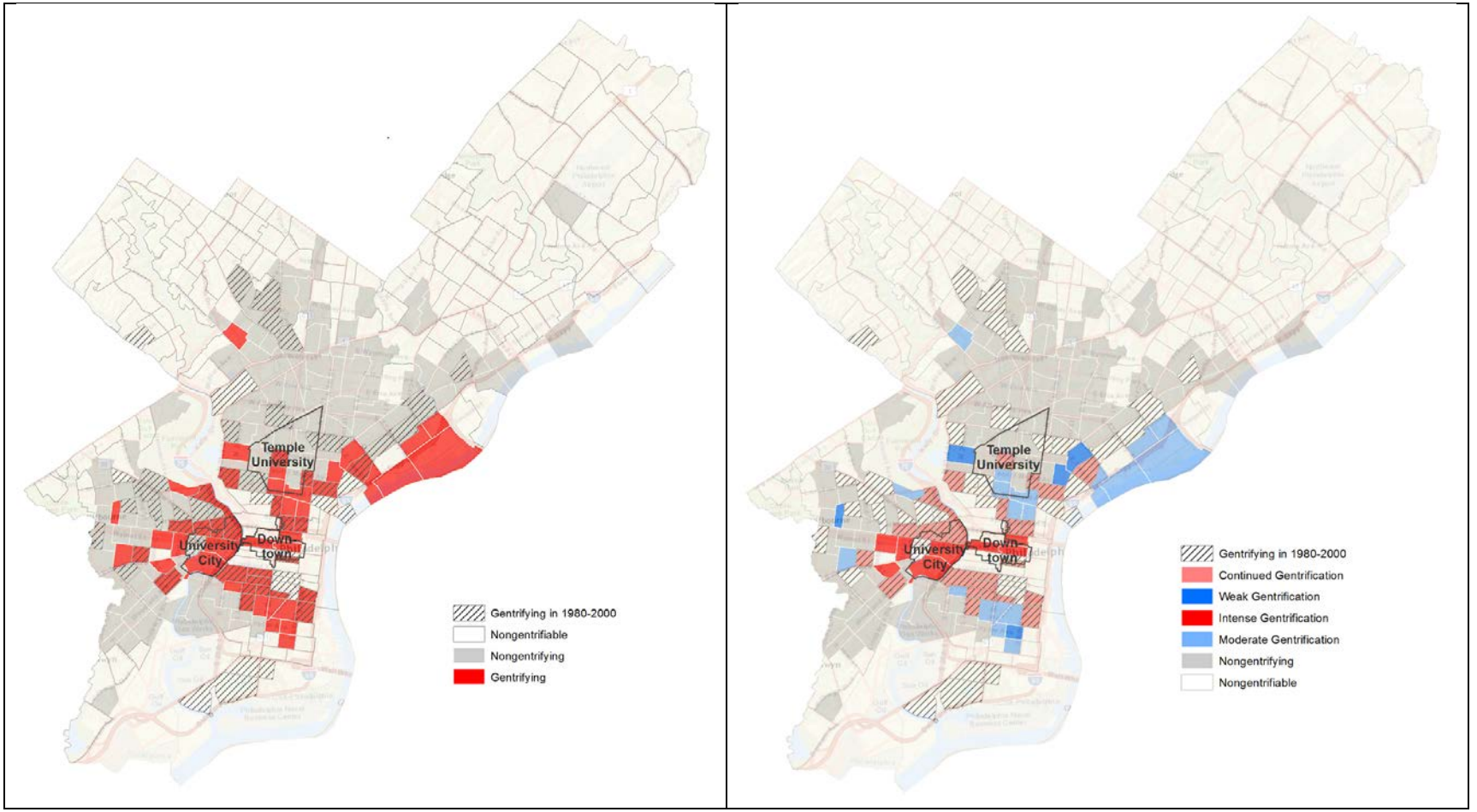

Figure 1. Gentrifying Neighborhoods in the City of Philadelphia (Left: Binary Measure; Right: Categorical Measure)
Source: Authors' definition based on 2000 Census and 2009–2013 ACS data; and U.S. Census TIGER/Line Shapefiles.

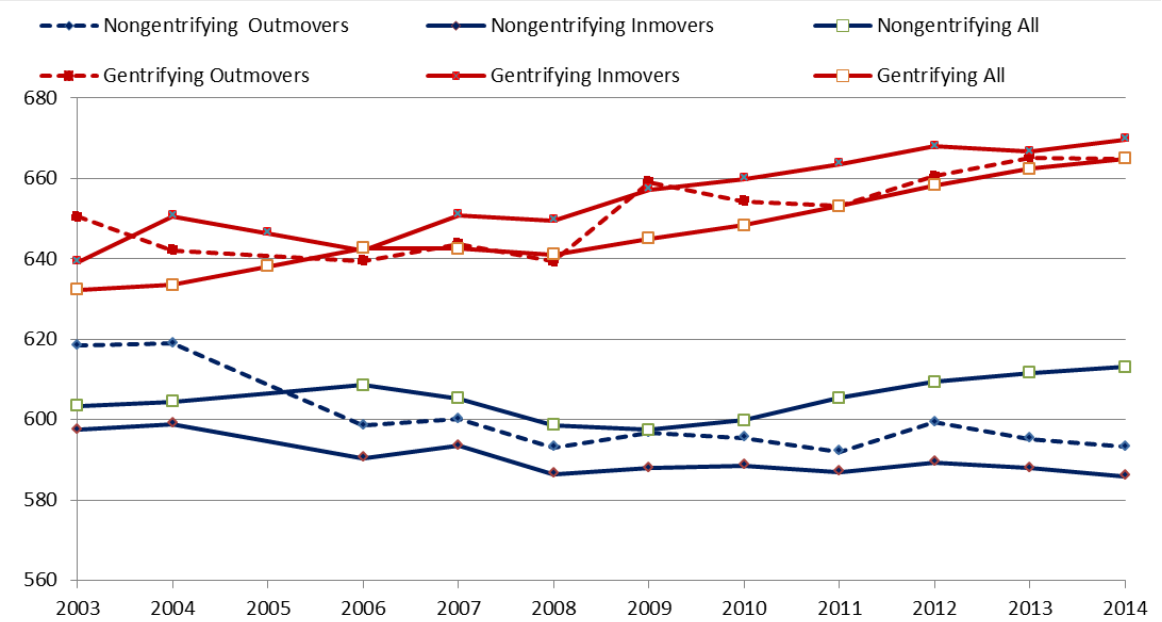

Figure 2 Mean Risk Score of Movers in Gentrifying and Nongentrifying Neighborhoods, Philadelphia

Note: A *mover* is defined as one who lives in a census tract different from where he or she lived one year ago; individuals 18–84 years old only; authors' calculations using data from the FRBNY Consumer Credit Panel/Equifax.

Table 1 Gentrification Measure (Categorical, by Stage of Gentrification)

	Categories	# of Tracts	Explanation
Nongentrifiable	Nongentrifiable	181	Nongentrifiable in 2000
Nongentrifying	Nongentrifying	105	Nongentrifying, pre-2000 and 2000–2013
	Stalled gentrification	23	Pre-2000 gentrification and not gentrifying 2000–2013
Gentrifying	Continued gentrification	24	Pre-2000 gentrification and gentrifying 2000–2013
	Weak gentrification	5	Gentrifying 2000-2013 but in the bottom quartile of gentrifying tracts for rent and value in 2009–2013
	Moderate gentrification	19	Gentrifying 2000-2013 and in the second or third quartile for either rent or value in 2009–2013
	Intense gentrification	8	Gentrifying 2000-2013 and in the top quartile for rent or value in

Source: Authors' calculations use data from 1980, 1990, and 2000 Censuses and 2009–2013 American Community Survey.

Table 2 Descriptive Statistics

Variable	Gentrifiable Tracts (Nongentrifying and Gentrifying)	Nongentrifying Tracts	Gentrifying Tracts
Moved in three years	26.0%	24.3%	30.4%
Moved within city	16.2%	16.0%	16.6%
Moved out of city	9.9%	8.3%	13.8%
Moved to a similar-income tract (same decile)	11.4%	12.0%	10.0%
Moved to a lower-income tract (lower decile)	3.7%	4.1%	2.9%
Moved to a higher-income tract (higher decile)	10.9%	8.2%	17.4%
Equifax risk score			
290–579	41.3%	45.5%	31.0%
580–649	21.5%	22.6%	19.1%
650–749	22.4%	20.3%	27.3%
750+	14.8%	11.6%	22.6%
Mean Equifax risk score	615.9	603.7	645.3
Risk score change in three years	11.8	11.6	12.2
Age			
18–24	10.8%	11.0%	10.4%
25–34	22.0%	20.5%	25.6%
35–44	19.4%	19.5%	19.0%
45–54	19.0%	19.7%	17.1%
55–64	13.8%	14.1%	12.9%
≥65	14.3%	14.3%	14.3%
Household size (number of householders with credit info)			
1	20.8%	19.2%	24.7%
2	26.5%	25.7%	28.5%
3	22.4%	23.2%	20.4%
4	14.7%	15.5%	12.8%
5+	15.6%	16.4%	13.6%
Having 1+ mortgages (household)	22.3%	21.3%	24.8%
Having 1+ 90+day delinquent accounts (household)	27.4%	30.0%	21.2%
Length in the tract (2005-2011 cohorts)			
<2 years in the tract	13.6%	12.1%	17.2%
2–4 years in the tract	16.6%	15.8%	18.6%
5+ years in the tract	69.8%	72.1%	64.2%
Distance to City Hall (miles)	3.6	4.2	2.1
Person years (2002–2003; 2005–2011)	165,160	116,805	48,355

Note: Authors' calculations using data from Census 2000, 2009–2013 American Community Survey, and data from the FRBNY Consumer Credit Panel/Equifax.

Table 3 Equifax Risk Score Change in Three Years for Individuals Staying in Gentrifying Neighborhoods (Summary of Coefficients from Different Regressions for Binary and Categorical Gentrification, Relative to Stayers in Nongentrifying Neighborhoods)

	All Individuals		Individuals with Mortgages		Individuals Without Mortgages		Tracts within 0.5 Mile as the Control		Consumers with 2+ Accounts		Consumers 25–64 Years Old	
Gentrify	11.303***		14.710***		10.156***		4.354		11.757***		12.234***	
Weak Gentrification		3.100		1.549		3.388		-0.060		2.092		3.204
Moderate Gentrification		11.020***		15.426***		9.494***		5.686		11.711***		12.544***
Intense Gentrification		22.589***		19.004***		24.379***		14.213***		21.896***		22.436***
Continued Gentrification		11.599***		15.987***		9.690***		4.430		12.289***		12.517***
R square	0.196	0.197	0.170	0.170	0.205	0.206	0.174	0.176	0.206	0.207	0.191	0.192
Number of observations	120,685	120,685	27,934	24,553	92,751	92,751	41,356	41,356	77,271	77,271	87,731	87,731

*** ** * , , represent significant at 0.01, 0.05, or 0.1 level, respectively.

Note: From OLS regressions using pooled data; reference group is stayers in nongentrifying tracts; standard errors are clustered at the tract level; control variables include initial Equifax risk score (continuous), household size, age, mortgage status, serious delinquency, distance to City Hall, and year dummies; estimation is based on data from Census 2000, 2009–2013 American Community Survey, and the FRBNY Consumer Credit Panel/Equifax.

Table 4 Equifax Risk Score Change in Three Years for Individuals Staying in Gentrifying Neighborhoods (Relative to Stayers in Nongentrifying Neighborhoods)

	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
Gentrification & Equifax risk score								
Gentrify	8.722***	1.513						
Risk score 650-749	4.249***	0.919						
Risk score 580-649	10.125***	1.078						
Risk score <580	62.560***	0.983						
Gentrify & score 650-749	4.494***	1.807						
Gentrify & score 580-649	0.698	1.997						
Gentrify & score <580	-5.742**	1.331						
Gentrification & mortgage status								
Gentrify			17.641***	2.664				
No mortgage			-0.156	0.828				
Gentrify & No mortgage			-8.150***	2.030				
Gentrification & length of residency (2005–2011 cohorts)								
Gentrify					19.322***	3.311		
2-4 years in the tract					1.921	1.291		
5+ years in the tract					0.373	1.332		
Gentrify & 2-4 years in the tract					-6.565***	1.973		
Gentrify & 5+ years in the tract					-9.981***	2.410		
Gentrification & age								
Gentrify							13.124***	3.425
Age 25–44							19.275***	1.377
Age 45–64							32.175***	1.355
Age ≥65							46.481***	1.685
Gentrify & age 25–44							2.132	2.907
Gentrify & age 45–64							-3.249	2.865
Gentrify & age ≥65							-7.568**	3.133
Other controls	yes		yes		yes		yes	
R Square	0.196		0.156		0.188		0.195	
Number of observations	120,685		120,685		94,263		119,357	

***, **, * represent significant at 0.01, 0.05, or 0.1 level, respectively.

Note: From OLS regressions using pooled data; reference group is stayers in nongentrifying tracts; standard errors are clustered at the tract level; control variables include Equifax risk score (continuous), household size, age, mortgage status, serious delinquency, distance to City Hall, and year dummies; estimation is based on data from Census 2000, 2009–2013 American Community Survey, and the FRBNY Consumer Credit Panel/Equifax.

Table 5 Equifax Risk Score Change in Three Years for Individuals Who Move Out of Gentrifying Neighborhoods (Relative to Stayers)

	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
Any move	-2.986*	1.779						
Move and destination neighborhood type								
Move within city or not								
Move within City			-8.158***	1.638				
Move out of City			4.012*	2.166				
Move downward or not								
Move to similar-income tract					-5.747**	2.624		
Move to a lower-income tract					-12.162***	2.995		
Move to a higher-income tract					0.033	1.039		
Move and origin neighborhood type								
Mover							-11.224**	4.426
Moderate gentrification							3.962	3.035
Intense gentrification							8.606***	3.225
Continued gentrification							2.663	2.803
Mover & moderate gentrification							2.596	4.845
Mover & intense gentrification							13.100***	4.838
Mover & continued gentrification							11.891**	5.072
Other controls	yes		yes		yes		yes	
R Square	0.144		0.146		0.144		0.120	
Number of observations	48,296		48,296		48,296		48,296	

***, **, * represent significant at 0.01, 0.05, or 0.1 level, respectively.

Note: From OLS regressions using pooled data; reference group is stayers in nongentrifying tracts; standard errors are clustered at the tract level; control variables include Equifax risk score (continuous), household size, age, mortgage status, serious delinquency, a dummy for frequent moves, and distance to City Hall; estimation is based on data from Census 2000, 2009–2013 American Community Survey, and the FRBNY Consumer Credit Panel/Equifax.

Table 6 Equifax Risk Score Change in Three Years for Movers from Gentrifying Neighborhoods (Relative to Stayers in Gentrifying Neighborhoods)

	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
Mover and Equifax risk score								
Mover	-1.296	1.416						
Risk score 650–749	6.165***	1.518						
Risk score 580–649	9.429***	1.761						
Risk score <580	54.781***	1.426						
Mover & score 650–749	5.473*	2.812						
Mover & score 580–649	-4.284	2.853						
Mover & score <580	-5.692***	1.981						
Mover and Mortgage Status								
Mover			-1.800	2.383				
No mortgage			-4.900***	1.416				
Mover & No mortgage			-1.561	2.237				
Mover & length of residency (2005–2011 cohorts)								
Mover					4.136	2.816		
2–4 years in the tract					-3.596**	1.526		
5+ years in the tract					-5.376***	1.896		
Mover & 2–4 years in the tract					-1.255	2.682		
Mover & 5+ years in the tract					-14.706***	2.781		
Mover & age								
Mover							5.466	4.002
Age 25–44							22.879***	2.533
Age 45–64							29.421***	2.659
Age ≥65							36.228***	2.820
Mover & age25–44							-5.244	3.556
Mover & age45–64							-17.078***	3.866
Mover & age≥65							-20.108***	5.084
Other controls	yes		yes		yes		yes	
R Square	0.144		0.120		0.134		0.144	
Number of observations	48,296		48,296		37,552		47,961	

*** ** * , , represent significant at 0.01, 0.05, or 0.1 level, respectively.

Note: From OLS regressions using pooled data; reference group is stayers in nongentrifying tracts; standard errors are clustered at the tract level; control variables include Equifax risk score (continuous), household size, age, mortgage status, serious delinquency, a dummy for frequent moves, and distance to City Hall; estimation is based on data from Census 2000, 2009–2013 American Community Survey, and the FRBNY Consumer Credit Panel/Equifax.

Appendix

Table A1 Neighborhood Characteristics by Gentrification Category

	Nongentrifying	Gentrifying	Nongentrifiable
Initial Neighborhood Condition, 2000			
% of Non-Hispanic white in 2000	16.00%	33.80%	64.80%
% of Non-Hispanic black in 2000	65.40%	50.20%	24.90%
Average median household income in 2000	$21,895	$21,042	$43,366
% of college-educated	8.40%	16.50%	27.80%
Average median rent in 2000	$400	$412	$578
Average median value in 2000	$40,560	$58,530	$103,300
Change in Neighborhood Indicators, 2000–2013			
% change in Non-Hispanic white	-31.70%	22.80%	-14.50%
% change in Non-Hispanic black	-4.70%	-26.50%	17.70%
Average % change in median household income	-18.20%	41.90%	-7.20%
Average change in % college-educated	1.50%	16.40%	6.30%
Average change in median home value	65.80%	163.30%	61.00%
Average change in median rent	5.50%	42.60%	12.90%
Number of tracts	128	56	181

Note: A total of 16 tracts were excluded because of no or extremely small population. Dollar values are in 2000 real dollars. Authors' calculations using data from 2000 Census and 2009–2013 American Community Survey.