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

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The views expressed in this article are those of the authors and do not necessarily reflect the views of the Federal Reserve Bank of Philadelphia or the Federal Reserve System.

Abstract

Considerable debate and controversy continue regarding the effects of gentrification on neighborhoods and the people residing in them. This article 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 (those with low credit scores, older residents, longer-term residents, or 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.

Introduction

Debates surrounding the consequences of gentrification have focused largely on the displacement of incumbent residents, though recent studies generally have not found evidence that less-advantaged residents in gentrifying neighborhoods move at a significantly higher rate than similar households in nongentrifying neighborhoods (Ding, Hwang, and Divringi, 2016; Ellen and O'Regan, 2011; Freeman, 2005; Freeman and Braconi, 2004; McKinnish, Walsh, and White, 2010; 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 article, 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 enables us to observe residents' mobility patterns and how their financial status changes in relation to the changing 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 help maintain or improve their financial health status. The rising housing and living costs that come with gentrification, however, could cause liquidity problems for many residents in gentrifying neighborhoods, especially those who are more financially vulnerable. Such liquidity problems could be manifested by increased levels of delinquencies on credit payments, tax foreclosures, evictions, and bankruptcies, all of which would negatively affect an individual's financial health. Further, financially vulnerable residents who 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 may be more likely than others to live in gentrifying neighborhoods, but individuals who anticipate large decreases in their financial health may be more likely 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 3 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—those with low risk scores, older residents, longer-term residents, or 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 with 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 metropolitan areas) 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 article proceeds as follows: The second section reviews relevant literature on gentrification and credit scores, and the third section provides a detailed description of the data sets and methodology used in the study. Using multiple regression analysis, the fourth section examines the relationship among gentrification and residents' financial well-being, and the final section summarizes the results and discusses their implications.

Background and Literature

This section reviews the literature on the consequences of gentrification and discusses the possible links, either direct or indirect, between gentrification and residents' financial health as measured by their credit scores.

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

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

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." Most research and debate on the consequences of gentrification have focused on residential displacement. The empirical evidence in these studies on residential displacement in U.S. cities, however, generally does not observe consistent and statistically significant differences in mobility rates between less-advantaged residents, such as less-educated, renting, minority, low-credit score, and lower-income households, in gentrifying neighborhoods and those in nongentrifying neighborhoods (Ding, Hwang, and Divringi, 2016; 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 and also the fact that residents in these comparable neighborhoods, in general, 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, may "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 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) found that income gains were greatest among Black high school graduates, who made 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 Black households entering the neighborhood. Using a different data set, Ellen and O'Regan (2011) found 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 were unable to examine residents who move. Lester and Hartley (2014) documented 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 in nongentrifying neighborhoods. Meltzer and Ghorbani (2015) found 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 did not find consistent and 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) used data that are similar to the data used in our study and examined changes in Equifax risk scores from 2001 to 2007 in gentrifying and nongentrifying neighborhoods across the

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[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 (for example, Hyra, 2014; Martin, 2007; Zukin, 2010).

United States. He documented 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 found 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 distinctions are important 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, 2016).

Gentrification and Residents' Financial Health

We use a credit score, the Equifax risk score, to measure a resident's financial health. What does a credit score[3] like the risk score represent? Why 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 to 24 months. A higher risk score represents a lower level of estimated credit risk for a consumer, and a lower risk score indicates that the likelihood that the individual will default on his or her debt is higher. No score indicates a thin 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.

Although credit scores have been widely used in the United States, 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)

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[3] Among the 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 generic credit history scores.

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] Although credit scores reflect important aspects of an individual's 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 (for example, bankruptcy or foreclosure), in general, have greater effects on credit scores than other factors (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, which likely is because the impact of negative or positive events an individual experiences on his or her credit score decreases over time (that is, time decay of information), and the score differences between borrowers with good credit and those with bad credit tend to revert toward the population average (Anderson, 2007).

The Equal Credit Opportunity Act 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] When focusing on the outcomes from the credit scoring models, however, several studies documented sizeable differences in mean credit scores across income and racial/ethnic groups; homeowners and renters; and individuals with different education levels, ages, and health conditions (Bostic, Calem, and Wachter, 2005; Federal Reserve Board, 2007; Newman and Newman, 2013). Bostic, Calem, and Wachter (2005) found that low-score individuals are disproportionately more likely to have low incomes and be of a minority group, and they found that the magnitude of the differences across different subpopulations increased between 1989 and 2001. Although 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 incorporate only debt—not income, asset holdings, or employment status. The Federal Reserve Board (2007) attributed these differences in credit scores to differences in the documented payment histories and outstanding debts of low-income and minority individuals. Spader (2010) further suggested that credit scores create a "feedback loop": People with low scores have limited choices in credit products because of their scores, and these products (for example, subprime mortgages), by their nature, usually have higher default risk, which could further hurt low-score borrowers' credit scores when they default.

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.

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

[5] The only exception is that Federal Reserve Board (2007) found that a consumer's length of credit history correlates with the consumer's age.

Several possible mechanisms exist, however, 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 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, automatic teller machines, 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 relevant only 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.

The increase in rents and property taxes and rising costs of living that come with gentrification, however, 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, and job search costs, not to mention the cost of 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 downpayment 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 individual's 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 their lack of a financial cushion. 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 who 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 improvements 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 because they were more vulnerable to economic insecurity during the Great Recession.

Data and Methodology

This section first discusses the measures we developed for identifying gentrification in the city of Philadelphia. Then, the section describes the consumer credit panel data we used to track the mobility of residents and changes in their credit scores over time. The final part of the section explains our methodology for examining the relationship between gentrification and the financial health of residents.

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.

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.[6] 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) 5-year estimates from 2009 to 2013. 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. We additionally 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).[7] Exhibit 1 (left) provides a map of gentrifying neighborhoods based on our measure.

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[6] Some studies used the median household income for metropolitan areas as the threshold, but the median household income for the Philadelphia metropolitan area is much higher than the median household income of most of the census tracts within the city of Philadelphia. Thus, we consider only lower-income tracts relative to the city as gentrifiable tracts in this study.

[7] Of all the gentrifiable tracts, 99 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.

Exhibit 1

Gentrifying Neighborhoods in the City of Philadelphia (left: binary measure; right: categorical measure)
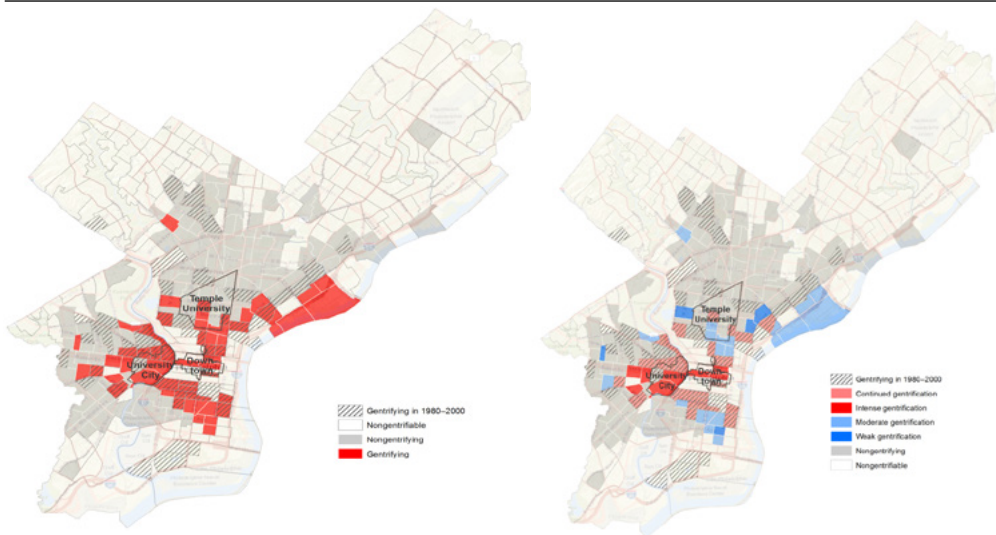
Sources: Authors' definition is based on 2000 U.S. census and 2009–2013 American Community Survey 5-year data and on the U.S. Census Bureau TIGER/Line Shapefiles

Of Philadelphia's 365 tracts with substantial population sizes, we categorized 56 of its 184 gentrifiable tracts as gentrifying from 2000 to 2013.[8] The remaining 128 tracts are *nongentrifying*; that is, they were gentrifiable in 2000 but did not meet the criteria listed previously.

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 before 2000, either during the 1990-to-2000 decade or during the 20-year period of 1980 to 2000, using the same criteria listed previously. 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, in general, are 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 that we categorized as weak gentrification had both median rent prices and home values in the bottom quartile among these gentrifying tracts, according to the 2009-to-2013 5-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. Exhibit 2 provides a detailed description of these categories, and exhibit 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 exhibit A-1.

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[8] 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.

Exhibit 2

Gentrification Measure (categorical, by stage of gentrification)

Categories	Number of Tracts	Explanation
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 2009–2013

Sources: Authors' calculations, using 1980, 1990, and 2000 U.S. census and 2009–2013 American Community Survey 5-year data

Most of the gentrifying neighborhoods in the city of Philadelphia are either close to the downtown or adjacent to major anchor institutions (for example, University of Pennsylvania and Temple University). Gentrifying tracts can be grouped into five clusters. (1) 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. (2) The South Philadelphia cluster comprises a diverse array of neighborhoods spanning the southern section of the city; a large proportion of the tracts in this cluster were gentrifying before 2000. (3) The Lower North cluster contains areas just north of the CBD, including areas by Temple University and areas adjacent to the city's major park—Fairmount Park. (4) 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. (5) The West Philadelphia cluster primarily includes tracts surrounding the University of Pennsylvania and Drexel University (University City), where nearly one-half of tracts had been gentrifying since before 2000.

Data: Federal Reserve Bank of New York Consumer Credit Panel/Equifax

This study primarily relies on the CCP data, which consist of an anonymized 5 percent 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)[9] (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, quarterly, beginning in 1999, for individuals in the sample. 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

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[9] 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.

individual has moved across neighborhoods and to track the origin and destination neighborhood of a mover. We use 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 ACS sample in Philadelphia, especially for individuals 25 years of age or older (see details in Ding, Hwang, and Divringi, 2016). We further compare the mobility rates derived from the CCP data with those derived from the ACS data and find that the interstate and intercounty mobility rates in general, are similar. The ACS data report slightly higher overall mobility rates than our study does, but this discrepancy is likely due to intraneighborhood moves that we do not count in our study.

A few caveats with the CCP data are worth mentioning. First, the CCP data set samples only individuals with a credit history and an SSN, so individuals who have never applied for or qualified for a loan are not included.[10] 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 and also individuals whose credit files consist of only a collection or public record item (such as bankruptcy) or contain only 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 difference is because younger adults are less likely to have a credit history than are older individuals.[11] The data also have a slightly higher proportion of older individuals (ages 65 years and older), 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 percent of consumers in the original CCP sample were dropped, but a similar share of consumers was added to the panel each year.[12] Therefore, we do not use a longitudinal panel design and instead construct our data set as individual annual cohorts whom we track for 3-year periods.

Keeping these caveats in mind, the CCP data provide a unique sample at the individual level for investigating the relationship between gentrification and financial health for financially independent adults, which has been largely unexplored before now. Our analysis includes individuals whom we initially observe in 2002 and 2003 and from 2005 to 2011, and for whom we have geographic data and risk scores for the initial year and 3 years later in the data set.[13] About 11.5 percent of

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[10] The Consumer Financial Protection Bureau estimated that, as of 2015, 26 million Americans (1 in 10 adults) do not have any credit history with a nationwide consumer reporting agency (Brevoort, Grimm, and Kambara, 2016). Brown et al. (2011) estimated that about 8.3 percent of households do not include a member with a credit report.

[11] Although the younger population (18 to 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.

[12] The CCP data continue to add new individuals who develop a credit history or immigrate to the United States 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.

[13] Our study period begins in the second quarter of 2002 because the geographic information in the data before then is less precise (Wardrip and Hunt, 2013). 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.

individuals had no risk scores (that is, thin files) and another 2 percent of individuals had missing values on other demographic variables, all of whom were excluded from the final sample. Exhibit 3 shows the mean risk scores for each year during the study period of all residents, inmovers, and outmovers in gentrifying neighborhoods and nongentrifying neighborhoods in Philadelphia. As the exhibit 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.

Exhibit 3

Mean Risk Score of Movers in Gentrifying and Nongentrifying Neighborhoods, Philadelphia, 2003 Through 2014
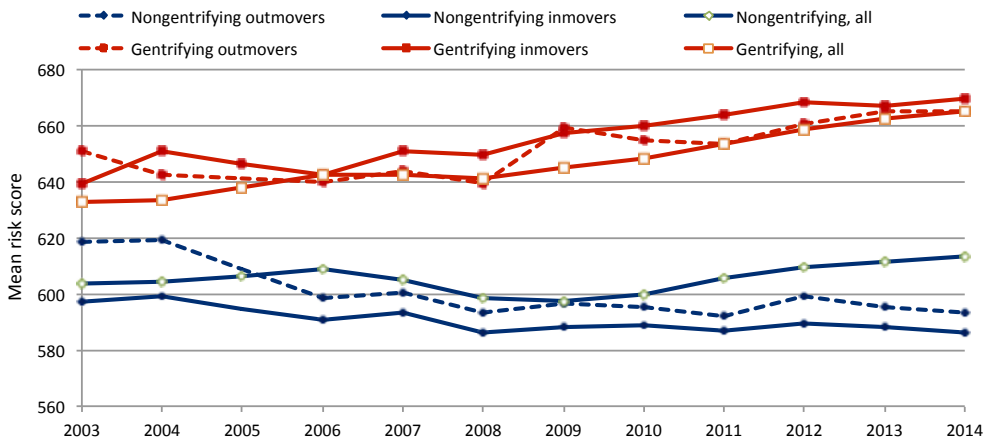
Notes: A mover is defined as one who lives in a census tract that is different from the census tract where he or she lived 1 year ago. Includes individuals 18 to 84 years old only.
Source: Authors' calculations, using data from the Federal Reserve Bank of New York Consumer Credit Panel/Equifax

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 in 3 years after when we first observe them by the yearly cohorts that we constructed. We focus on an interval of 3 years to balance the need for an adequate followup 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.

$$\Delta SCORE_{i,t+3} = \alpha + \beta \times GENTRIFY_{i,t} + \gamma \times SCORE_{i,t} + \delta \times X_{i,t} + \zeta \times YEAR_{i,t}, \tag{1}$$

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,[14] 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[15] (categorical).

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

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 enable 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,[16] and we examine the differences between individuals in gentrifying and nongentrifying neighborhoods with different levels 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 differences in financial health changes exist between residents who stay in 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.

$$\Delta SCORE_{i,t+3} = \alpha + \beta \times MOVE_{i,t} + \gamma \times SCORE_{i,t} + \delta \times X_{i,t} + \zeta \times YEAR_{i,t} \tag{2}$$

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 after the initial observation year. Other controls in X are the same as in equation (1) except it includes a new control for frequent movers (those who also moved in the second or third year).[17] The coefficient β indicates the relationship between moving and the change in risk scores.

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[14] According to the ACS, about 50 to 60 percent of households in Philadelphia are homeowners, and about 40 percent 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.

[15] Length of residency applies only to cohorts after 2005.

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

[17] 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).

For both models, we further include interaction terms for individuals' initial risk scores (categorical),[18] 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 changes in risk scores between residents in gentrifying neighborhoods and those in nongentrifying neighborhoods and also between movers and stayers in gentrifying neighborhoods. The empirical results enable us to document shifts in the financial health of residents in the context of gentrification, but they preclude causal claims. First, selection issues may exist for which 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. 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.

Exhibit 4 shows descriptive statistics of the study sample (1) for all residents in gentrifiable neighborhoods (second column) and (2) split by the type of neighborhood in which they are living in their cohort year (third and fourth columns). 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, are more likely to have mortgages, are 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 were only slightly higher for residents in gentrifying neighborhoods than for those in nongentrifying tracts (an average increase of 12.2 points versus 11.6 points). Some important differences exist, however, between residents within these neighborhoods. For example, residents in nongentrifying neighborhoods have lower risk scores, on average, than those in gentrifying neighborhoods, and individuals with lower scores are more likely to experience increases in their credit scores. Residents in gentrifying neighborhoods also have higher mobility rates on average.

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[18] We use the categorical risk score variables only 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.

Exhibit 4

Descriptive Statistics

Variable	Gentrifiable Tracts (nongentrifying and gentrifying)	Nongentrifying Tracts	Gentrifying Tracts
Moved in 3 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 3 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

Sources: Authors' calculations, using 2000 U.S. census, 2009–2013 American Community Survey 5-year, and Federal Reserve Bank of New York Consumer Credit Panel/Equifax data

Empirical Results

This section discusses the empirical results on the relationship between gentrification and the financial health of stayers, movers, and different subgroups of less-advantaged residents. These results are summarized in exhibits 5 through 8.

Exhibit 5

Estimated Equifax Risk Score Change in 3 Years for Individuals Who Stay in Gentrifying Neighborhoods, Relative to Individuals Who Stay 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 squared	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 27,934	92,751 92,751	41,356 41,356	77,271 77,271	87,731 87,731

Significance: *** = 0.01. ** = 0.05. * = 0.1 level.

Notes: From ordinary least square regressions using pooled data. Different regressions are used for binary and categorical gentrification. 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.

Sources: Estimation is based on 2000 U.S. census, 2009–2013 American Community Survey 5-year, and Federal Reserve Bank of New York Consumer Credit Panel/Equifax data

Exhibit 6

Estimated Equifax Risk Score Change in 3 Years for Individuals Who Stay in Gentrifying Neighborhoods, Relative to Individuals Who Stay in Nongentrifying Neighborhoods by Subpopulations

	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
Gentrification and 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 and score 650–749	4.494***	1.807						
Gentrify and score 580–649	0.698	1.997						
Gentrify and score <580	– 5.742**	1.331						
Gentrification and mortgage status								
Gentrify			17.641***	2.664				
No mortgage			– 0.156	0.828				
Gentrify and no mortgage			– 8.150***	2.030				
Gentrification and 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 and 2–4 years in the tract					– 6.565***	1.973		
Gentrify and 5+ years in the tract					– 9.981***	2.410		
Gentrification and 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 and age 25–44							2.132	2.907
Gentrify and age 45–64							– 3.249	2.865
Gentrify and age ≥65							– 7.568**	3.133
Other controls	yes		yes		yes		yes	
R squared	0.196		0.156		0.188		0.195	
Number of observations	120,685		120,685		94,263		119,357	

*Significance: *** = 0.01. ** = 0.05. * = 0.1 level.*

Notes: From ordinary least squares 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.

Sources: Estimation is based on 2000 U.S. census, 2009–2013 American Community Survey 5-year, and Federal Reserve Bank of New York Consumer Credit Panel/Equifax data

Exhibit 7

Estimated Equifax Risk Score Change in 3 Years for Individuals Who Move Out of Gentrifying Neighborhoods, Relative to Individuals Who Stay In Gentrifying Neighborhoods

	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
Any move	– 2.986*	1.779						
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 a 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 and moderate gentrification							2.596	4.845
Mover and intense gentrification							13.100***	4.838
Mover and continued gentrification							11.891**	5.072
Other controls	yes		yes		yes		yes	
R squared	0.144		0.146		0.144		0.120	
Number of observations	48,296		48,296		48,296		48,296	

Significance: *** = 0.01. ** = 0.05. * = 0.1 level.

Notes: From ordinary least squares 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.

Sources: Estimation is based on 2000 U.S. census, 2009–2013 American Community Survey 5-year, and Federal Reserve Bank of New York Consumer Credit Panel/Equifax data

Exhibit 8

Estimated Equifax Risk Score Change in 3 Years for Individuals Who Move Out of Gentrifying Neighborhoods, Relative to Individuals Who Stay In Gentrifying Neighborhoods by Subpopulations

	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 and score 650–749	5.473*	2.812						
Mover and score 580–649	– 4.284	2.853						
Mover and score < 580	– 5.692***	1.981						
Mover and mortgage status								
Mover			– 1.800	2.383				
No mortgage			– 4.900***	1.416				
Mover and no mortgage			– 1.561	2.237				
Mover and 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 and 2–4 years in the tract					– 1.255	2.682		
Mover and 5+ years in the tract					–14.706***	2.781		
Mover and 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 and age 25–44							– 5.244	3.556
Mover and age 45–64							– 17.078***	3.866
Mover and age ≥ 65							– 20.108***	5.084
Other controls	yes		yes		yes		yes	
R squared	0.144		0.120		0.134		0.144	
Number of observations	48,296		48,296		37,552		47,961	

Significance: *** = 0.01. ** = 0.05. * = 0.1 level.

Notes: From ordinary least squares 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.

Sources: Estimation is based on 2000 U.S. census, 2009–2013 American Community Survey 5-year, and Federal Reserve Bank of New York Consumer Credit Panel/Equifax data

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 exhibit 5 indicate that staying in a gentrifying neighborhood is associated with an increase of 11.3 points in a resident's risk score over 3 years relative to staying in a nongentrifying neighborhood. This increase is slightly higher than Hartley's (2013) findings—an increase of 8 points during the period of 2001 to 2007. Gentrification is associated with a slightly larger increase in risk scores for mortgage holders than for residents without mortgages (14.7 points versus 10.2 points; see exhibit 5). It is notable that non-mortgage holders experience greater increases than mortgage holders in intensely gentrifying neighborhoods (24.4 points vs. 19.0 points; see exhibit 5). 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.

Nonetheless, significant heterogeneity exists in the effect of gentrification on the risk score changes for stayers, depending on the stage of gentrification of the neighborhood (see exhibit 5). Intense gentrification is associated with a larger increase in stayers' risk scores compared with other gentrifying neighborhoods and nongentrifying ones. For example, those staying in neighborhoods undergoing intense gentrification see a 22.6-point 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 in 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). Exhibit 5 also contains results from various models to test the robustness of our findings, which we describe in more detail in the following paragraphs.

An 11.3-point improvement in individuals' risk scores, on average, may not seem big (about 1.8 percent of the mean score), but even a small improvement in a consumer's risk score can increase the chance of success for mortgage, credit card, apartment, 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 (Agarwal et al., 2015). For example, an interest rate of a Fannie Mae loan with an 80 to 85 percent 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);[19] 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.

Exhibit 6 shows that residents with lower risk scores, those without mortgages, long-term residents, and older residents in gentrifying neighborhoods all experience greater positive changes in

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

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 3 years (8.7 + 62.6 − 5.7)[20] 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 residents (below 580) 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. Although the score changes of low-score stayers in gentrifying neighborhoods, on average, are 65.5 points higher than those of the reference group, the changes for stayers with higher risk scores are 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 of more than 750). This finding 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 are less than those of their more advantaged counterparts in gentrifying neighborhoods. The relative improvement in the risk score for a stayer in a gentrifying neighborhood with no mortgage is about 9.3 points (17.6 − 0.2 − 8.2), which is lower than the 17.6-point change for a resident with at least one mortgage in a gentrifying neighborhood.

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 those 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 higher than 750). In other words, the positive association between gentrification and risk scores is less for low-score stayers relative to their more advantaged counterparts. In a similar way, residents without mortgages, long-term residents (5 or more years), or older residents in gentrifying neighborhoods experience less improvement than their more advantaged counterparts in gentrifying neighborhoods. Older stayers (65 or more years old) in a gentrifying neighborhood, for example, experience a positive change that is 5.6 points higher than the change for similar

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[20] We used F-tests to test whether the sum of two or more coefficients is significantly different from 0. All the sums of coefficients mentioned hereafter are significant at the 0.05 level or higher.

[21] The model predicts an average high-score stayer (with a risk score of 750 or higher and mean values for other characteristics) in a nongentrifying neighborhood would experience a decline of 26.1 points in 3 years (and a decline of 17.4 points in a gentrifying neighborhood). By 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, in general, are positive for other subgroups (classified by mortgage status, age, and length in residence).

stayers in a nongentrifying neighborhood, which is lower than the 9.9 points for those between the ages of 45 to 64 years, the 15.2 points for those between the ages of 25 to 44 years, and the 13.1 points for those under the age of 25 years.

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, in general, do not have significantly higher moving rates (Ding, Hwang, and Divringi, 2016). When we focus on residents in gentrifying neighborhoods only, 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 exhibit 7). Although the magnitude of the change is relatively small and only marginally significant (at 0.1 level), this result 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 cohorts from the early 2000s 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.

Although we have limited information on movers' resources, the types of neighborhoods to which movers move reveal distinct results that provide insight into the selection of residents moving from gentrifying neighborhoods. Relative to stayers in gentrifying neighborhoods, movers who move 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 who move to neighborhoods outside the city, which, in general, are 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 exhibit 7. We also observe a similar pattern for movers who move from gentrifying neighborhoods to areas with different income levels: Movers who move to lower-income neighborhoods (based on deciles) relative to their neighborhood of origin experience a negative change in risk scores compared with those who stay in the gentrifying neighborhoods (12.1 points lower). By contrast, those who move to higher-income neighborhoods experience similar risk score changes relative to those who stay (the difference is close to zero and insignificant). These divergent outcomes for residents moving to neighborhoods with a different socioeconomic status likely reflect the differential effects that come for movers who move because of affordability issues and those who move by choice to neighborhoods with a 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 with 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 those neighborhoods. Residents moving out of neighborhoods undergoing intense gentrification or that are in the advanced stages of gentrification ("continued gentrification"), however, experience insignificant changes in their scores relative to stayers (evidenced by the sums of the coefficients of the relevant gentrification category variable and corresponding interaction variables in exhibit 7).

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 exhibit 8). Because the risk scores exhibit a pattern of mean reversion, in which 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 those 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. By contrast, the average change in risk scores for movers with relatively high risk scores (650 to 749) is 4.2 points greater than that of stayers with similar scores, though the difference for movers and stayers with scores of 750 or higher is insignificant. In other words, moving is negatively associated with risk score changes for lower-score residents, but 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 ages 65 years and older, almost no difference for those ages 25 to 44 years, and a slightly greater change for those ages 24 years and younger. Movers who were previously long-term residents experience a change that is 10.6 points (4.1 - 14.7) lower than do long-term residents who stay, but 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 that is 3.4 points lower (and significant at the 0.1 level) 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 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 in less-advantaged residents in gentrifying neighborhoods (relative to those who stay), at least for a 3-year period. Although 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

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

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 those nongentrifying neighborhoods may be less comparable with residents in gentrifying neighborhoods because of unobserved characteristics. When we restrict the analysis to residents in nongentrifying neighborhoods within one-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 exhibit 5). 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 exhibit 5), with similar magnitudes of the gentrification coefficients. These results suggest that this concern at least does not bias our estimation upward. Finally, when the younger population (those 24 years old and younger) and the older population (those 65 years old and older) who are underrepresented and overrepresented, respectively, in our sample 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, in general, are consistent with those in the original model.[23]

Summary

Despite the increasing concern about 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 residents who have high or low risk scores, have lived in the neighborhood long or short term, are older or younger, or are with or without mortgages, all experience positive changes on average 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 advanced stages of gentrification. The magnitude of the overall positive association between gentrification and risk score change for those who do not move from their neighborhoods, however, 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 to the suburbs or other metropolitan areas, experience a negative change in their risk scores relative to stayers.

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[23] We also conducted two additional robustness tests but did not include the results in the article. 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 percent) of households has multiple householders in the CCP sample. The empirical results are almost the same when we excluded these individuals from the analysis.

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 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 those residents can realize benefits to their 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 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. Also, although 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 and limited supply, such as San Francisco or New York City, in many important ways. Thus, the findings may not necessarily be generalized for the whole nation or cities that have significantly different market conditions. Finally, unobserved differences between residents in gentrifying and those in nongentrifying neighborhoods and also 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 enable 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.

Appendix A

Exhibit A-1

Neighborhood Characteristics by Gentrification Category

	Nongentrifying	Gentrifying	Nongentrifiable
Initial neighborhood condition, 2000			
Non-Hispanic White in 2000 (%)	16.00	33.80	64.80
Non-Hispanic Black in 2000 (%)	65.40	50.20	24.90
Average median household income in 2000 ($)	21,895	21,042	43,366
College educated (%)	8.40	16.50	27.80
Average median rent in 2000 ($)	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

Notes: Excludes 16 tracts because of no population or extremely small populations. Dollar values are in 2000 real dollars.
Sources: Authors' calculations, using 2000 U.S. census and 2009–2013 American Community Survey 5-year data

Acknowledgments

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