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An Empirical Examination of Residential Mobility in Gentrifying Neighborhoods During the COVID-19 Crisis

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Abstract

This paper examines whether neighborhoods that had been gentrifying lost their appeal during the pandemic because of COVID-induced health risks and increased work-from-home arrangements. By following the mobility pattern of residents in gentrifying neighborhoods in 39 major U.S. cities, we note a larger increase of 1.2 percentage points in the outmigration rate from gentrifying neighborhoods by the end of 2021, relative to nongentrifying ones, with out-of-city moves accounting for over 71 percent of the increased flight. The share of out-of-city moves into gentrifying neighborhoods also decreased significantly during the pandemic. Residents with high credit scores, younger residents, and probable homeowners were more likely to leave gentrifying neighborhoods and their respective cities. Gentrifying neighborhoods closer to city centers, with higher density or higher housing costs, or in cities that are more vulnerable to the pandemic were hit harder by COVID-induced adjustments. The results are consistent with the contention that the pandemic has slowed the pace of gentrification in many major U.S. cities. This slowed gentrification has important policy implications for local government public finance, as well as the long-term future of cities.

Keywords:
Gentrification, Mobility, COVID-19, Work-from-home, Spatial Dynamics

JEL classifications:
R11, I18, H11

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1. Introduction

Between 2000 and the onset of the COVID-19 pandemic, many neighborhoods in large U.S. cities had experienced significant population growth and gentrification.[1] These gentrifying areas are often close to the downtown and have better access to job centers, amenities, and public transportation, although they are also increasingly in a wider range of areas (e.g., Baum-Snow and Hartley, 2016; Brown-Saracino, 2017; Couture and Handbury, 2016; Hackworth, 2007; Hwang and Lin, 2016). They are often characterized by high turnover rates, with residents of higher socioeconomic status (SES) increasingly moving into (and out of) these once-underinvested and predominantly low-income communities, and significant increases in property values (Ding, Hwang, and Divringi, 2016). Literature suggests the driving factors behind the renewed interest in urban living include demographic and economic shifts, as well as increases in access value and amenity value, among others (Hwang and Lin, 2016). The central debate around gentrification has been whether the inflow of higher-SES residents and new investment leads to the residential displacement of existing older, low-income, minority, and long-term residents (Zuk et al., 2018).

The COVID-19 crisis, however, may have potentially slowed and even reversed the trend of gentrification in many cities by dramatically changing households' preferences surrounding residential neighborhoods. The unique features of typical gentrifying neighborhoods that distinguish them from other communities — such as higher density and their proximity to city centers and urban amenities — became less desirable during the pandemic. The density of many of these neighborhoods increased perceptions that these areas were more vulnerable to contagious diseases, as social distancing was more difficult. Even as COVID-induced health risks subside, increased working from home is likely to continue to affect the utility of access to job centers, urban amenities, and proximity to public transportation in important ways (Handbury, 2022). These changes could make living in gentrifying communities a less attractive option for many. Indeed, many accounts, including U.S. Census Bureau data, document how many residents left denser areas in central cities like New York City and San Francisco during the pandemic for more spacious homes in the suburbs or in other states.[2] Low-income neighborhoods that did not gentrify, by contrast, may have been relatively stable in terms of resident turnover, as these nongentrifying neighborhoods' lack of amenities and access may have mattered less during the pandemic, while their residents may also have lacked the resources that could allow them to move to remote areas. Thus, COVID-19, together with policies adopted in response to the pandemic, calls into question the continued willingness and ability of individuals to stay in or choose gentrifying neighborhoods. As waves of the coronavirus continue and work-from-home arrangements persist, these may be long-lasting trends.

[1] As Hwang and Lin (2016) documented, in 1970, only one in four large cities and virtually no small cities had at least one gentrifying downtown neighborhood. By 2010, more than one-half of all large cities and 15 percent of smaller metropolitan areas had seen such changes.

[2] Census data suggest that from July 2020 to July 2021, the number of people moving away from several major cities, like New York, San Francisco, Chicago, and Philadelphia, outnumbered those moving to these cities; see www.census.gov/newsroom/press-releases/2022/population-estimates-counties-decrease.html. A *Bloomberg* article documented that 82 percent of urban centers saw more people moving out than in during the pandemic, while 91 percent of suburban counties saw more people moving in than out from March 2020 to February 2021; see www.bloomberg.com/graphics/2021-citylab-how-americans-moved/.

This study quantifies the implications of the observed urban flight in response to COVID-19 for gentrifying neighborhoods across major cities in the U.S., providing new and more comprehensive quantitative evidence of the consequences of COVID-19. We use updated gentrification measures for 39 major U.S. cities by defining gentrifying neighborhoods as census tracts that had lower incomes initially (below the citywide median) but experienced larger increases in property values (rents or home values) and in the share of college-educated residents from 2009 to 2019.[3] We also take advantage of a unique individual-level data set, the Federal Reserve Bank of New York Consumer Credit Panel/Equifax (FRBNY Consumer Credit Panel/Equifax or CCP hereafter) to follow the residential mobility of an anonymized representative sample of 1.5 million individuals in these cities over the December 2015 to December 2021 period. The individual-level CCP data improve upon recent studies that rely on mobile phone data to track residential mobility by more reliably identifying individuals' interneighborhood residential moves, using a more representative sample of the adult population (instead of convenience samples), and adding information on individuals' ages (based on year of birth), household, and financial health. Moreover, our analysis examines the longer-term implications of the COVID-19 pandemic on mobility patterns as the economy, including offices, reopened, instead of short-term responses to the outbreak.

The results suggest that, compared with lower-income neighborhoods that were not gentrifying, gentrifying neighborhoods generally saw more people moving out than moving in during the pandemic. The results, based on a set of difference-in-differences (DID) models, indicate that nearly two years into the pandemic, 1.2 percentage points more (4.6 percent of the pre-COVID level) residents in gentrifying neighborhoods moved out in response to COVID-19, and most (71 percent) of the increased moves were moves out of residents' respective cities.[4] By December 2021, there was also a significant decline of 0.5 percentage point (about 3.6 percent of the pre-COVID level) in the probability of people moving into gentrifying neighborhoods from areas outside of their respective cities, but the decline in out-of-city in-migration was largely offset by moves into these neighborhoods from other areas within the respective city.

Furthermore, the results suggest that a significant share of younger and high-SES individuals, who would otherwise have stayed in these gentrifying neighborhoods in recent years, left these neighborhoods and became unwilling or unable to move into them in the post-COVID period. Residents with higher credit scores (measured by Equifax Risk Scores, or Risk Scores afterward), younger residents, and homeowners (proxied by residents with mortgages) were more likely to leave gentrifying neighborhoods and their cities in general. The increased flight and decreased inflow of younger and high-SES residents to gentrifying neighborhoods is consistent with the contention that COVID-19 made previously gentrifying neighborhoods less attractive in general.

In additional analyses, we try to better understand the drivers of these patterns. Specifically, we examined if certain types of gentrifying neighborhoods were more vulnerable to the COVID

[3] Neighborhoods with higher initial incomes (above the citywide median) are considered *nongentrifiable* neighborhoods, while those gentrifiable neighborhoods that did not experience significant gentrification are considered *nongentrifying*. See more details for these definitions in the Data section.

[4] An *out-of-city move* is defined as a move to areas outside of the city in which the gentrifying neighborhood is located, instead of only a move to rural or suburban areas.

crisis. Results confirm that gentrifying neighborhoods closer to city centers, with higher housing or population density, or in cities with a higher share of remotable jobs, higher housing costs, or a greater reliance on rail/subway transportation were hit harder than others. They generally experienced more significant losses of existing residents and larger reductions in the inflow of out-of-city movers. Of course, gentrifying neighborhoods still have higher degrees of in- and out-migration than other neighborhoods in their respective cities. Our results suggest that these neighborhoods remain attractive to movers who desire to remain within the city, likely ushering in a different type of gentrifier. But their attractiveness to younger and high-SES residents from outside the respective cities weakened in the post-COVID period as these residents became more attracted to areas with lower density and more spacious and affordable housing.

Overall, the results suggest that younger and more advantaged individuals were leaving and avoiding denser and more expensive gentrifying neighborhoods in major U.S. cities in general during the pandemic. The unique features of typical gentrifying neighborhoods, such as higher density and better access to urban centers and amenities, made them more susceptible to the trend of urban flight. First, this study contributes to several lines of research. Recent research on gentrification has focused on the displacement — including residential, cultural, political, and social forms — of long-term, low-SES, and minority residents, but the outmigration or decreased demand from gentrifiers in response to economic shocks and the pandemic has received little attention. While neighborhood-level demographic shifts occur in gentrifying neighborhoods, the empirical evidence on the relationship between gentrification and residential displacement is far from conclusive. Recent studies generally do not find evidence that less educated, renting, minority, and lower-income households are more likely to be displaced in gentrifying neighborhoods than nongentrifying ones, suggesting that most of the demographic change reflects the changing demographics of who is moving into neighborhoods rather than out of them (Ding, et al., 2016; Ellen and O'Regan, 2011; Freeman, 2005; McKinnish et al., 2010; and Vigdor, 2002). Different from existing literature focusing on displacement of vulnerable populations, however, mobility in this post-COVID context may be largely triggered by reasons related to the pandemic and changing preferences among high-SES residents, instead of the displacement of vulnerable populations from these neighborhoods.

The study also contributes to an emerging literature on individual mobility patterns and the spread of the coronavirus (e.g., Coven et al., 2020; Coven and Gupta, 2020; Engle et al., 2020; Glaeser et al., 2022). Desmet and Wacziag (2022) show higher COVID cases and deaths in dense urban areas and areas relying more on public transportation. Ellen, Howland, and Glied (2022), instead, find crowded living quarters, not necessarily density itself, increase the risk of COVID hospitalization in New York. Coven et al. (2020) use mobile phone data to quantify the extent of urban flight in response to COVID-19 in its initial stage in the U.S. and show that migration out of urban areas drove the spread of the outbreak. Whitaker (2021) documents both declines in in-migration and increases in outmigration in urban areas in the U.S. Our study, however, is distinct from these recent studies by its focus on residential mobility over a relatively longer period, instead of the immediate or temporary reaction to the outbreak of the COVID-19 pandemic, as well as its focus on the heterogeneity in COVID's impact across urban neighborhoods instead of the overall effects on cities.

Finally, this study contributes to the broader topic of the impacts of COVID-19 on cities more generally. Gupta et al. (2021) finds that the COVID-19 pandemic resulted in rent declines in city centers and increases in sales prices and rents in areas farther away from downtown areas, thereby flattening the rent-gradient curve within most U.S. metropolitan areas. Similar results were found in commercial rent gradients, where Rosenthal et al. (2022) estimates the impact of COVID-19 on the value firms place on access to city centers and finds that the commercial rent gradient fell significantly in denser and transit-oriented cities. Ramani and Bloom (2021) find that households, businesses, and real estate demand have moved from dense central business districts (CBDs) toward lower-density suburban zip codes near large U.S. cities. They also notice that the observed reallocation occurs primarily within metros instead of across metros. They label this movement of activity out of city centers to the suburban ring the *donut effect*. Handbury (2022) argues that work-from-home arrangements will continue to weaken cities and neighborhoods close to city centers, even as the health risks from COVID-19 become less of a concern. Althoff et al. (2022) demonstrate how the transition to remote work is likely to hurt consumer service workers in big cities. While these studies are relevant to gentrification, none have empirically examined the consequences of COVID-19 on residential mobility by neighborhoods' gentrification status.

Results from this study have important implications for local government public finance, as well as the long-term future of cities. The results indicate a moderate effect of COVID on gentrifying neighborhoods at the aggregate level (e.g., a relative increase in outmigration by 5–7 percent), but the effects vary across neighborhoods and cities, with the effects being larger in denser, more expensive, and closer-to-city center neighborhoods and in certain major cities (but less significant in others). Increased flight from and the reduced appeal of previously gentrifying neighborhoods and select cities in general, if permanent, could contribute to declines in populations and employment, fiscal shortfalls, and community disinvestment in such cities. If the population that left was disproportionately of higher SES, their flight could have a larger impact on cities' tax revenue. To the extent that the observed urban migration remains persistent, cities may also face challenges around budget shortfalls and population losses. At the same time, such changes may relieve affordability pressures for lower- and middle-SES residents, enabling high-cost cities to become more equitable. The rest of the paper details our data, methods, and empirical results.

2. COVID's Impact on Gentrification: Potential Mechanisms

Various push-and-pull factors influence households to select a particular neighborhood. In the context of gentrification, households may be more attracted to a specific neighborhood because of (1) increases in access value, (2) increases in amenity value, or (3) declines in the prices of houses relative to other neighborhoods (Hwang and Lin, 2016). In theory, the COVID-19 crisis, together with COVID-induced adjustments such as increased work-from-home, could affect gentrifying neighborhoods differently by changing the value of these factors.

What changes during the COVID-19 crisis could have a disparate impact on gentrifying neighborhoods? The pandemic initially forced businesses and individuals to reduce human

physical interaction and to develop new action lines and routines, which could affect gentrifying neighborhoods differently. Even as the health risks of the virus decrease over time, fear of future contagious diseases and increased work-from-home arrangements may continue to stick, at least to a certain degree (Davis et al. 2020; Dingel and Neiman, 2020). Here, we describe a few potential mechanisms through which those changes could affect previously gentrifying neighborhoods differently than other urban neighborhoods.

First, the value of urban amenities likely decreased during the pandemic because of the health concerns associated with COVID-19 and increased working from home. Such amenities include retail and cultural establishments, such as theaters, museums, restaurants, grocery and retail stores, and personal service establishments, as well as transportation infrastructure and networks (Couture and Handbury, 2016).[5] Various social distancing policies and lower foot traffic in city centers reduced demand for many amenities, and some of them, such as restaurants or stores, were closed or reduced their hours. The reduced demand, especially from high-SES customers, could have reduced the quality and quantity of such amenities, making living in these areas less convenient or attractive. In contrast, the lack of amenities in nongentrifying neighborhoods would be less of a disamenity during the pandemic. In addition, increases in violent crime in many cities during the pandemic may have made urban living a greater disamenity (Whitaker, 2021), although it is unclear whether violent crimes in cities had become more prevalent in gentrifying neighborhoods. Thus, the decrease in the premium that residents applied to urban amenities in the pre-COVID era and possibly increased disamenities could diminish the appeal of gentrifying neighborhoods, relative to those nongentrifying ones.

Second, the literature suggests that one of the driving forces for gentrification before COVID was the easy access to jobs in central cities (Baum-Snow and Hartley, 2016): Given the scarcer leisure time among high-SES households, job access matters for attracting such individuals to gentrifying neighborhoods, especially young professionals without children. Our data confirm that gentrifying neighborhoods are on average closer to city centers, where most jobs are concentrated (4.8 miles for gentrifying ones versus 6.6 miles for nongentrifying ones, see Table 1). COVID-induced work-from-home arrangements and flexible work scheduling, however, reduced commute frequency and costs, making living in neighborhoods farther away from the city center or other job centers more attractive. This would decrease the utility of job access for both existing and potential residents, especially high-SES residents, in gentrifying neighborhoods closer to job centers. The skill bias in working from home, such that workers with a bachelor's degree are much more likely to hold jobs with flexible work arrangements (Dingel and Neiman, 2020), may disproportionately affect gentrifying neighborhoods that used to be more attractive for high-skilled workers.

Furthermore, the increased health risks from the spread of COVID-19 and increased working from home require more living space, which would make neighborhoods with denser or smaller housing less attractive. As Table 1 shows, gentrifying neighborhoods generally have denser housing than other urban neighborhoods (with about 11,703 housing units per square mile, higher than the 8,406 units per square mile in nongentrifying neighborhoods). In contrast, nongentrifying neighborhoods are likely to remain stable and could become more attractive in

[5] Not all amenity values decreased; the value of certain natural amenities, such as access to beaches or natural trails, likely increased during the pandemic.

certain circumstances because of their lower population density and more spacious and lower-cost housing.

Finally, a couple of studies have documented that property values and rents for either commercial properties or residential properties declined (or experienced smaller increases) in areas close to downtowns compared with areas farther from downtowns because of the pandemic (Ramani and Bloom, 2021; Gupta, et al., 2021; Rosenthal, et al., 2022). The pandemic, however, also coincided with a housing boom in the residential market, driven by increased demand for housing and a limited supply. It is still unclear whether rents or property values in gentrifying neighborhoods have become so affordable that they could have helped attract new homebuyers or residents.

Overall, because of the higher risk of virus contagion and increased working from home, living in gentrifying communities likely became less attractive to both existing and potential residents. The decrease in the attractiveness of gentrifying neighborhoods may have manifested more quickly during the pandemic as people moved to alleviate a problematic situation. As people gradually adapted to the new reality, some of these changes may have resulted in long-term changes in the preferences for residential location choice when considering gentrifying neighborhoods over other urban communities. In our analysis, we use residential mobility measures to gauge the change in the attractiveness of gentrifying neighborhoods during the pandemic.

3. Data and Methodology

3.1 Gentrification Measures

The term *gentrification* in this paper is used to describe such neighborhood changes that are characterized by the influx of new residents of a higher SES relative to incumbent residents and rising housing prices in initially lower-income urban neighborhoods (Smith 1998:198). We operationalize gentrification by specifically concentrating on shifts in the SES of residents and housing prices in previously low-income neighborhoods. The gentrification measure that we use in this study employs the same methodology as in Ding et al. (2016) but is based on a different study period and the 2010 census tract boundaries.

By our working definition, for tracts to gentrify, they must have been lower-income tracts at the beginning of the period.[6] We consider tracts to be *gentrifiable* if their median household income was below the citywide median household income in 2009, using estimates from the 2005–2009 American Community Survey (ACS) five-year estimates. We consider a tract to be *gentrifying* if it was gentrifiable in 2009 and experienced both a percentage increase above the median increase among city tracts in either its median gross rent or median home value *and* an increase above the median increase among city tracts in its share of college-educated residents from 2009 to 2019,

[6] Some scholars have noted the socioeconomic upgrading of higher-income neighborhoods — "super-gentrification" (Lees, 2003), but this is not the focus of our study.

based on data from the 2005–2009 and 2015–2019 ACS five-year estimates. 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 they nonetheless indicate changing value in a previously low-income neighborhood. We additionally include criteria for demographic changes to deal with issues with past strategies, which misidentified gentrification in neighborhoods that only experienced housing price spillovers without demographic changes. We rely on above-median increases in the share of college-educated residents, rather than incomes, so we can capture young professionals who may have relatively lower incomes and so we can better distinguish an influx of new residents from incumbent upgrading (Clay, 1979; Freeman, 2005). Table 1 summarizes the neighborhood characteristics of nongentrifying, gentrifying, and nongentrifiable neighborhoods, and Figure 1 provides maps of gentrifying neighborhoods in select cities with distinct housing markets (Philadelphia, San Francisco, and Detroit) based on our measure.

For the purposes of this analysis, we primarily use a control group for the gentrifying tracts that consists of nongentrifying tracts from the same group of cities. We recognize that there is heterogeneity across gentrifying areas in different cities. For example, gentrifying neighborhoods in certain cities like San Francisco are likely to be in the later stages of gentrification because a large share of the city had been gentrifying by the beginning of the study period. In contrast, gentrifying neighborhoods in a more distressed city like Detroit may still be in the very early stages of gentrification. The intention of this study is not to assume all gentrifying neighborhoods are in the same stage of gentrification; instead, this study primarily compares initially lower-income but rapidly improving neighborhoods with other nongentrifying neighborhoods in the same sample of cities. The final analytic sample thus includes a total of 1,263 gentrifying tracts; 3,938 nongentrifying tracts in the control group; and 5,289 nongentrifiable tracts that had a higher income initially. Tracts in the control group had similar or slightly lower income and property values relative to gentrifying neighborhoods in the baseline year (2009) (Table 1), but they did not experience the same level of neighborhood change as gentrifying neighborhoods in the 10-year period before the pandemic.

3.2 FRBNY Consumer Credit Panel/Equifax

We use FRBNY Consumer Credit Panel/Equifax data to evaluate the impact of the COVID-19 crisis on residential mobility in gentrifying urban neighborhoods. The CCP data consist of an anonymized 5 percent random sample of U.S. consumers in a major credit bureau's total population of eligible individuals, as well as consumers in each sampled individual's household. This 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) (see details in Lee and van der Klaauw, 2010).[7] The CCP data report limited information on individual demographic characteristics such as age and the credit characteristics for sample members quarterly beginning in 1999. The CCP data allow us to study

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

residential mobility, because the CCP data include census geography identifiers for an individual in any particular quarter based on census boundaries associated with each consumer's updated credit file (Ding et al., 2016). The unit of analysis is individuals who are in the original 5 percent CCP sample (instead of other members from the same household). This helps preclude overcounting moves by members of households with multiple adult householders.[8]

The CCP data have many advantages for studying residential mobility. First, because the CCP data include census geography identifiers based on census boundaries associated with each consumer's credit file, we are able to identify whether an individual has moved across neighborhoods and track the origin and destination neighborhoods of a mover. This approach overcomes some of the major limitations in using cell phone data to study an individual's mobility pattern, such as difficulty in distinguishing travels or temporary moves from a relocation, the lack of validation of an individual's identification, and challenges in constructing a representative sample for the population. Furthermore, the CCP data also provide information on the age of the consumer and extensive information on consumer credit use and credit performance, such as an individual's Equifax Risk Score, a widely used credit score that provides a summary measure of an individual's financial health.[9] Risk Scores are useful indicators of SES when it comes to the housing market — landlords screen applicants for rentals with credit history checks, while borrowers' access to and pricing of home mortgage products are sensitive to credit scores. Of course, we want to acknowledge a few caveats to the CCP data for the purpose of suitability for this particular research. First, the CCP data contain limited information on household demographic characteristics other than age. Second, the CCP data have limited or no coverage for individuals without any credit records (so-called *credit invisibles*) and may miss movers across countries. However, the CCP data contain consumers with no Risk Scores, which suggests a thin file (containing very few accounts or the credit is new) such that too little information is provided for estimating a Risk Score, and these consumers could still be included in our analysis. Further, since the focus of this analysis is on high-SES residents and international moves were less common during the pandemic because of various travel restrictions, these limitations are less applicable to our analysis.

3.3 Methodology

This study identifies the effects of the COVID-19 crisis[10] on residential mobility in gentrifying neighborhoods using a two-way, individual-level, DID model that can be specified as:

$$Y_{ijt} = \beta_0 + \beta_1 * GENTRIFY_j + \beta_2 * QTR_t + \beta_3 * GENTRIFY_j * QTR_t + \gamma * X_i + CITY_j + \varepsilon_{ijt}, \quad (1)$$

in which Y_{ijt} represents the outcome measure for individual i in tract j and in quarter t, which will be discussed in more detail later. The key independent variable of interest is our gentrification

[8] A small share (about 5 percent) of households has multiple householders in the original 5 percent CCP sample. The results are similar when we exclude individuals in the same household.

[9] A Risk Score ranges from 280 to 850 and is intended to serve as a proxy for the probability that an individual will repay his or her debts without defaulting. Like other credit scores, a higher Risk Score indicates a lower default risk for an individual, while a lower Risk Score indicates a greater likelihood of default.

[10] The treatment can be roughly considered to be the COVID-19 crisis, coupled with various policy responses to the pandemic and the economic crisis.

measure, $GENTRIFY_j$, which is a categorical variable that represents whether tract *j* was nongentrifiable in 2009, gentrifying, or gentrifiable but nongentrifying during 2009–2019. QTR_t is a quarterly dummy variable, and the fourth quarter of 2019 is set as the reference group. The effects of the COVID-19 crisis on residential mobility in gentrifying neighborhoods can be estimated by estimating the coefficient, β_3, of $GENTRIFY_j*QTR_t$, the two-way interaction of the treatment and quarterly dummies, for the quarters since the first quarter in 2020. X_i represents a set of individual characteristics based on information available in the CCP data that help predict the probability of moving, including an individual's initial Risk Score (in quarter *t-8*), an individual's initial age category, and whether the individual has at least one mortgage. The Risk Scores provide a summary measure of an individual's financial health and reflect a dimension of an individual's socioeconomic status. Age serves as a proxy for an individual's stage in the life cycle. The absence of a mortgage in a household is used as a rough proxy for renters. Although some of these variables are imperfect measures and there are likely some unobserved factors that can prompt a residential move not due to gentrification, such as an employment or a marital status change, we can at least control for some of the most important factors associated with residential mobility and observe patterns across various strata of residents. We use linear probability models for mobility outcomes to estimate the effect of gentrification. We rely on linear models partly for ease of interpretation of the coefficients.

Outcome measures on residential mobility are based on the outmigration or in-migration of individuals aged 18–85. A *mover* is defined here as an individual who was living in a different census tract than she or he lived in two years earlier. We use an interval of two years to identify movers because that is the interval between the last quarter with data before the pandemic and the most recent quarter of data used in this study (from the fourth quarter in 2019 to the fourth quarter of 2021). This approach thus focuses on moves that are more likely to be permanent moves. Thus, temporary movers such as college students who moved to their parents' home in the initial stage of the pandemic but then moved back to their original neighborhood would not be considered *movers* here. Put differently, this approach focuses on individuals who have moved to neighborhoods different from their original ones over a two-year period, instead of temporary moves or within-neighborhood moves. Similarly, in-migration focuses on whether a resident moved into a tract between quarter *t-8* and quarter *t.* Out-of-city outmigration, which measures whether a move is to somewhere outside of the origin city, and out-of-city in-migration, which measures whether a move is from somewhere outside the destination city, are also used as alternative outcomes to capture the outflow or inflow of residents in the respective cities.

To evaluate the heterogeneity in the effects of the COVID-19 pandemic across gentrifying neighborhoods, we employ the following model only using data from gentrifying neighborhoods.

$$Y_{ijt} = \beta_0 + \beta_1 * NBHD_j + \beta_2 * QTR_t + \beta_3 * NBHD_j*QTR_t + \gamma * X_i + CITY_j + \varepsilon_{ijt}, \quad (2)$$

in which *NBHD* represents the different types of gentrifying neighborhoods (by distance to city center, housing density, population density, and median rent) and the coefficient of the interaction, β_3, captures the change in the outcome measures post-COVID in the corresponding type of gentrifying neighborhoods relative to the change in the reference group. In other words, β_3 measures how COVID-19 impacts residential mobility in a particular type of gentrifying

neighborhood differently from other gentrifying neighborhoods. All other terms are as defined in Equation (1) above. We identify city centers based on Manduca's (2021) algorithm, which relies on concentrations of employment locations. We calculate housing and population density and median rents using the 2015–2019 American Community Survey (ACS) five-year tract-level estimates. We expect that gentrifying neighborhoods closer to city centers, with greater density, and with higher rents will be more affected by COVID-19.

To evaluate if the effects vary by features of metropolitan areas or cities, following Rosenthal et al. (2022), we partition the cities in our data into *transit* and *car* cities in separate regressions. The former include eight cities in large, dense metropolitan areas, such as New York, San Francisco, and Chicago, that rely heavily on light rail and subway systems.[11] Not surprisingly, cities that rely more on rail/subway transportation generally have the highest population densities (with one exception: Miami) and are more likely to be coastal cities, larger and older cities, or cities with more educated populations or more cultural amenities, so the term *transit* likely represents multifaceted features of cities in this group, instead of their reliance on rapid transportation alone. We also partition cities by the share of remotable jobs in the metro and housing costs. Remotable jobs are those that can be performed entirely at home based on the responses to two surveys included in the database administered by O*NET (Dingel and Neiman, 2020).[12] We measure housing costs in two ways. First, we consider the median rent for the city, based on the household-weighted median of 2015–2019 ACS tract-level data, and separate those above and below the median among the sample. Second, we consider the Federal Housing Finance Agency Housing Price Index, which is only available at the metropolitan level, and separate the cities above and below the median.[13] We expect that the effects of COVID-19 on gentrifying neighborhoods will be more evident in transit-oriented cities, cities with more remotable jobs, and higher-priced cities.

The total number of observations is about 1.5 million individuals per quarter in these 39 cities, resulting in about 25.8 million individual-quarters over the entire study period. About 11.0 percent of the individuals were in gentrifying neighborhoods, 33.8 percent were in nongentrifying neighborhoods, and the remaining 55.3 percent were in nongentrifiable neighborhoods.

4. Empirical Results

[11] In order of rail/subway ridership, *transit cities* include New York City (and Newark, NJ); Washington, D.C.; Chicago; Boston; San Francisco (and Oakland, CA); and Philadelphia (see American Public Transportation Association, 2019). All other cities in our sample are referred to as *car cities* because of their greater reliance on car transport, but this is an approximation. Many car cities have rail and/or subway service, but to a far smaller degree than transit cities.

[12] Cities within metros with at least 40 percent of jobs that are remotable are considered more remotable cities, while the rest are considered less remotable ones. A total of 14 cities were classified as more remotable cities, including San Jose, CA; Austin, TX; Washington, D.C.; Boston; San Francisco; Oakland, CA; Seattle, Atlanta; Denver; Minneapolis; New York; Newark, NJ; Philadelphia; and Baltimore.

[13] Some of the cities (e.g., New York and Newark) are in the same metropolitan area.

4.1. Descriptive Analysis

Gentrifying neighborhoods had been more dynamic, with higher out- and in-migration rates than other communities in both the pre- and post-COVID periods (Figures 2 and 3, and Table 2). The two-year period post-Q42017 (from Q42017 to Q42019) represents the period immediately pre-COVID, while the post-Q42019 period (from Q42019 to Q42021) serves as a proxy of the post-COVID pattern. About 26.6 percent of the residents originally in gentrifying neighborhoods as of Q42017 moved out within a two-year period, higher than the 23.3 percent and 22.0 percent outmigration rates for residents in nongentrifiable and nongentrifying neighborhoods, respectively. Almost half of the movers out of gentrifying neighborhoods (12.7 percent) moved out of the respective city entirely. The in-migration rate into gentrifying neighborhoods was higher as well: 26.7 percent of residents in gentrifying neighborhoods as of Q42019 moved into these neighborhoods in the previous two years, higher than the 23.2 percent and 20.0 percent for those in nongentrifiable and nongentrifying neighborhoods, respectively.

In the post-COVID period, the mobility pattern changed significantly for gentrifying neighborhoods: Outmigration from these neighborhoods increased significantly, while in-migration, especially in-migration from out-of-city areas, decreased significantly; these changes were found to be more significant in gentrifying neighborhoods than in other communities (Figure 2). As the top left panel of Figure 2 illustrates, about three quarters into the pandemic, the outmigration rate in gentrifying neighborhoods exceeded that in the pre-COVID period. By December 2021, about 28.1 percent of residents originally living in gentrifying neighborhoods moved out after Q42019, which was 1.5 percentage points higher than the two-year mobility rate of 26.6 percent pre-COVID. About two to three quarters into the pandemic, out-of-city migration rates in gentrifying neighborhoods became significantly higher than the pre-COVID level. The share of residents who moved out of the city from these neighborhoods was 1.6 percentage points higher than the pre-COVID share. The change in the outmigration rates in nongentrifying neighborhoods, however, was marginal, if there was any, while changes for nongentrifiable neighborhoods were in between those of gentrifying and nongentrifying neighborhoods. We find similar patterns for in-migration rates (Figure 3): There were decreases in the in-migration rates for all neighborhood types post-COVID, but about two to three quarters into the pandemic, the reduction in the out-of-city in-migration rate was larger for gentrifying neighborhoods than the other two groups.

There were significant variations in the changes in mobility rates of gentrifying neighborhoods in the post-COVID period across different cities. San Francisco; Oakland, CA; Washington, D.C.; Philadelphia; Austin, TX; and New York had the largest increases in out-of-city moves from their gentrifying neighborhoods (with an increase of about 2.1–4.5 percentage points by December 2021) (Figure 4). In contrast, San Diego and three cities in Texas (San Antonio, Houston, and El Paso) saw decreased outmigration rates in the post-COVID period. When looking at the changes in in-migration rates, gentrifying neighborhoods in San Francisco, Chicago, Seattle, New York, and Los Angeles experienced the largest declines in the share of movers from out-of-city areas into these neighborhoods (Figure 5). Nashville, TN; Oakland, CA; and several cities in Texas (Dallas, San Antonio, and Austin) instead saw increases in the share of movers from out-of-city areas into their gentrifying neighborhoods by December 2021.

Overall, the descriptive results suggest that gentrifying neighborhoods generally saw more people moving out than in during the pandemic, relative to the pre-COVID period, compared with other urban neighborhoods.

4.2. Regression Results

Impact of COVID-19 on Outmigration from Gentrifying Neighborhoods

Consistent with the descriptive results, residents in gentrifying neighborhoods were significantly more likely to move out during the pandemic than those in nongentrifying neighborhoods in general.[14] Figure 6 and Table 3 summarize the impact of COVID-19 on the probability of moving from the difference-in-differences models, and the pattern clearly shows a significant increase in the outmigration rate in gentrifying neighborhoods starting from the third quarter of 2020 (about 0.3 percentage point higher than that in nongentrifying neighborhoods). This is consistent with the fact that business shutdowns and stay-at-home mandates were adopted during the COVID outbreak period (roughly from mid-March until October in 2020), leading to a precipitous decrease in residential mobility. After restrictions on mobility were gradually lifted and when residential mobility started to increase, there were significantly higher outmigration rates in gentrifying neighborhoods.

By December 2021, residents in a gentrifying neighborhood were 1.2 percentage points more likely to move out of the tracts where they initially lived, relative to those in nongentrifying neighborhoods. Put differently, about 12 more people per 1,000 residents in gentrifying neighborhoods than in nongentrifying ones moved out their neighborhoods about two years into COVID. To put these numbers in context, the average two-year mobility rate was about 26.6 percent in gentrifying neighborhoods pre-COVID, so an increase of 1.2 percentage points would be roughly 4.6 percent of the pre-COVID level. Most of the pandemic-induced moves were out-of-city moves, instead of moves within the city. The out-of-city migration rate is about 0.9 percentage point higher in gentrifying neighborhoods (or 6.9 percent of the pre-COVID level) compared with nongentrifying neighborhoods. In other words, over 71 percent (0.9 divided by 1.2) of the increased moves out of gentrifying neighborhoods were by residents who left their respective city entirely, instead of by residents who moved to other neighborhoods within the city. Because moving is usually a major, life-changing event, our estimates of post-COVID effects encompass both short-term effects and expectations of future events, including the fear of future health risks and a structural increase in work-from-home arrangements.

A similar pattern was found in nongentrifiable neighborhoods, but the magnitude of the changes was much smaller. The coefficients of the interactions of the post-COVID quarters and the nongentrifiable indicator are smaller, although they are statistically significant. By December 2021, residents in nongentrifiable neighborhoods were slightly more likely to move (by 0.2 percentage point) or move out of their respective city (with an increase of 0.3 percentage point, or 2.3 percent of the pre-COVID level).

[14] Other control variables in the models of residential mobility generally perform as expected. Risk Score, age, and having a mortgage are all important predictors of whether someone moves.

Impact of COVID-19 on In-Migration to Gentrifying Neighborhoods

The regression results suggest that, at the aggregate level, there was no significant change in the overall in-migration rate for gentrifying neighborhoods, relative to that in nongentrifying neighborhoods during the pandemic (Figure 7 and Table 3). The insignificant results on in-migration for gentrifying neighborhoods, however, do not necessarily suggest there was no decline in in-migration in gentrifying neighborhoods at all. Indeed, we observed a decline in the in-migration rates for all neighborhood types, as the descriptive analysis suggested. The results instead just suggest that the decline in in-migration rates in gentrifying neighborhoods was not significantly different from that in the control group. There was, however, a significantly larger decline in the out-of-city in-migration rate for gentrifying neighborhoods during the pandemic. The decline also started in the third quarter of 2020, and by December 2021, residents in gentrifying neighborhoods were about 0.5 percentage point less likely to move from out-of-city areas, which represents a decline of about 3.6 percent of the pre-COVID level. Because there were generally no significant differences in changes in in-migration rates between gentrifying and nongentrifying neighborhoods, results suggest the significant decrease in out-of-city in-migration was largely offset by moves from other neighborhoods within the city. Put differently, gentrifying neighborhoods remained attractive to movers within cities, but they became less attractive to those from outside the city. Similar patterns can be found for nongentrifiable neighborhoods, where there was a similar level of decline in the out-of-city in-migration rate (a decline of about 0.4 percentage point by December 2021, about 3.6 percent of the pre-COVID level).

Overall, the results suggest both gentrifying neighborhoods and nongentrifiable neighborhoods continued to attract movers from other neighborhoods within the city, but fewer people from out-of-city areas were moving into these neighborhoods. Movers to previously gentrifying neighborhoods were more likely to be within-city movers in the post-COVID period, suggesting that these desirable neighborhoods became more accessible to residents within cities. With increased avoidance of those previously gentrifying neighborhoods, the results are consistent with the contention that COVID-19 slowed gentrification by weakening the attractiveness of previously gentrifying communities in general.

COVID's Impact on Residential Mobility: Heterogeneity Among Residents

Which residents were more likely to leave or avoid gentrifying neighborhoods? When residents are categorized by their demographic and financial characteristics, the results suggest younger residents, residents with higher Risk Scores, and residents with mortgages became less interested in living in gentrifying neighborhoods. Table 4 reports the regression results on the interaction terms between the dummy of the fourth quarter of 2021[15] and individual-level indicators that distinguish residents (by Risk Score, age, or mortgage status) from a series of linear probability models based only on data for gentrifying neighborhoods.

The results on Risk Scores show that, by December 2021, high-score residents (those with initial

[15] Assuming few movers during the pandemic would have moved back to same neighborhoods by the end of 2021, the fourth quarter 2021 results could be roughly considered the "cumulative" effects of COVID. Results for other quarters are available and will be available upon request.

Risk Scores of 750 or higher) in a gentrifying neighborhood were 1.8 percentage points more likely to move out than those with low or no Risk Scores, and they were also about 1.2 percentage points more likely to move out of their respective city. High-score residents increasingly avoided moving into gentrifying neighborhoods as well: They were about 1.5 percentage points less likely to move into previously gentrifying neighborhoods and about 1.8 percentage points less likely to move from out-of-city areas to gentrifying neighborhoods. For individuals with moderate Risk Scores (650–749), the results are somewhat in between: They were also more likely to move out and less likely to move in than those with lower or no Risk Scores, but the changes were smaller than those with higher Risk Scores. These results suggest that previously gentrifying neighborhoods became less attractive to financially advantaged residents with higher Risk Scores after the onset of the pandemic.

Younger residents (30 or younger) in gentrifying neighborhoods were significantly more likely to move, relative to those more than 50 years old (3.3 percentage points more likely to leave and 2.0 percentage points more likely to move out of the city). Those residents between 31 and 50 years old were in between: They had a higher probability of moving out than older residents, but the increase was not as high as that for younger residents. Younger individuals also became less likely to move into gentrifying neighborhoods from out-of-city areas (1.4 percentage points less likely), although the change in the aggregate in-migration rate was insignificant. Overall, younger residents were more likely to leave and avoid gentrifying tracts, which likely led to a net loss in younger residents in these neighborhoods.

Interestingly, the results suggest residents in households with mortgages — a proxy for homeowners — became much more likely to leave gentrifying neighborhoods during the pandemic (about 2.8 percentage points more likely to move and 2.5 percentage points more likely to move out of the city by December 2021). The significantly higher outmigration rates among mortgage holders suggest that homeowners became more likely to leave gentrifying neighborhoods for out-of-city areas (such as second homes or other housing in suburban areas, smaller cities, or other remote areas) in the post-COVID period. The coefficients are generally insignificant for residents with mortgages where the outcome is in-migration.

The overall pattern is clear: Younger residents, high-SES residents, and likely homeowners generally became more likely to abandon or avoid gentrifying neighborhoods during the pandemic.

COVID's Impact on Residential Mobility: Heterogeneity Among Gentrifying Neighborhoods

Gentrifying neighborhoods that are more vulnerable to COVID-induced health risks and increased working from home were more significantly affected. When we categorized gentrifying neighborhoods by their proximity to city centers and density, the regression results confirm that those closer to city centers and with higher density (measured by either housing or population density) were hit harder, reflected by more significant increases in outmigration and larger reductions in the in-migration of new residents to these neighborhoods. Table 5 summarizes results of the interaction term for the fourth quarter of 2021 and neighborhood-level

indicators that distinguish different types of gentrifying neighborhoods.

By December 2021, residents in gentrifying neighborhoods closer to city centers were significantly more likely to move out than those in tracts farthest away from city centers (fourth quartile). Residents in gentrifying neighborhoods closest to urban centers (first quartile) were 2.3 percentage points more likely to move and 1.9 percentage points more likely to move out of their respective cities, relative to those in gentrifying neighborhoods farthest from urban centers. The change in outmigration rates generally decreases monotonically with the distance to urban centers. At the same time, residents were less likely to move from out-of-city areas into gentrifying neighborhoods that are closer to urban centers (about 0.8 percentage point[16] less likely for gentrifying tracts in the first quartile). The results are consistent with the contention that COVID reduced the amenity value of access to urban centers.

Gentrifying neighborhoods with higher density, either measured by housing density or population density, also experienced larger increases in outmigration rates and larger declines in in-migration rates: Residents were 1.8 percentage points more likely to move out of the gentrifying neighborhoods with the highest level of housing density (4th quartile) about two years into the pandemic. Residents in these neighborhoods were also 1.4 percentage points more likely to move out of the city. The increases in outmigration rates were similar for gentrifying neighborhoods with housing density in the 3rd quartile. Residents were also significantly less likely to move from out-of-city areas into gentrifying neighborhoods with the highest housing density post-COVID (a decrease of 1.3 percentage points). We found similar patterns when the density of gentrifying neighborhoods was measured by population density instead of housing density, although these results were less significant and of a slightly smaller magnitude. We also found a significant increase in outmigration rates to outside the city and avoidance of gentrifying neighborhoods with higher rents — both in overall in-migration and from movers from outside the city. However, we did not find significant differences in overall outmigration rates by neighborhood rent. While higher rents often correlate with distance to urban centers and density, the dynamics varied across the different characteristics. The finding is consistent with the contention that increased work-from-home provides more options and incentives for residents to move to areas with lower housing costs.

Overall, in the post-COVID period, the change in outmigration from a gentrifying neighborhood decreases with its distance to the urban center and increases with the density or median rent of the neighborhood. For the most expensive gentrifying neighborhoods, outmigration rates to areas outside the city were substantially higher. The change in the in-migration rates from outside the city, instead, positively correlates to the distance to the urban center and negatively correlates to the density of the gentrifying neighborhood and rents. In-migration rates were significantly lower in high-rent gentrifying neighborhoods. The results suggest that COVID makes denser and more expensive gentrifying neighborhoods, or neighborhoods with a higher amenity value of access to urban centers, less attractive.

COVID's Impact on Residential Mobility: Heterogeneity Across Cities

[16] Significant at the 0.1 level.

We ran separate regressions comparing mobility patterns between gentrifying and nongentrifying neighborhoods in different city groups, by their reliance on rapid transportation, share of remotable jobs, or housing costs (Table 6).[17] The results suggest the impact of COVID on residential mobility was significantly larger in transit cities than in car-oriented cities: an increase of 1.5 percentage points in the outmigration rate and an increase in the out-of-city outmigration rate of 1.1 percentage points for gentrifying neighborhoods in transit-oriented cities (versus 1.0 percentage point for the outmigration rate and 0.7 percentage point for the out-of-city outmigration rate for car-oriented cities). The decrease in the out-of-city in-migration rate in gentrifying neighborhoods was also much larger in transit cities (a decrease of 1.0 percentage point for transit cities compared with an insignificant change for car-oriented cities). The results also suggest that COVID-19 led to a significant increase in the outmigration rate and avoidance of nongentrifiable neighborhoods in transit cities but not in car cities.[18] This could be explained by the decrease in the appeal of transit-oriented cities in general. In car cities, instead, we primarily found reduced interest in staying in gentrifying neighborhoods by original residents.

When all cities are partitioned by the share of remotable jobs, the results suggest COVID led to larger increases in outmigration rates in gentrifying neighborhoods in cities with higher shares of remotable jobs: an increase of 1.5 percentage points in the outmigration rate and an increase in the out-of-city mobility rate of 1.0 percentage point for gentrifying neighborhoods in cities with more remote jobs (versus 0.6 percentage point for the overall outmigration rate and 0.5 percentage point for the out-of-city outmigration rate for other cities). The decline in the out-of-city in-migration rate in gentrifying neighborhoods, however, was not significantly larger in cities with more remotable jobs (a decrease of 0.7 percentage point for gentrifying neighborhoods in cities with more remotable jobs versus a decrease of 1.0 percentage point for those in other cities). The results make sense in that as people holding remote jobs increasingly moved to suburban and other remote areas, gentrifying neighborhoods in cities with concentrations of remotable jobs experienced larger outflows of existing residents. However, a concentration of remotable jobs does not necessarily prevent new residents from moving into these neighborhoods, especially if these neighborhoods are in cities like Austin, TX, or San Jose, CA, with concentrations of remotable jobs that are not as densely populated as those in transit-oriented cities that bear significantly higher health risks.

Furthermore, gentrifying neighborhoods in cities with higher housing costs, either measured by median rent or house price appreciation after 2000, were more significantly affected than lower-cost cities. For example, the regression results suggest that gentrifying neighborhoods in cities with higher housing costs experienced more significant increases in outmigration and larger reductions in the in-migration of residents to gentrifying neighborhoods in those cities by December 2021. This is consistent with the contention that residents were leaving denser and more expensive urban neighborhoods for suburban and other more remote areas during the pandemic.

[17] Results of the three-way interactions from the regressions using the full sample yield consistent results and suggest the differences across city groups are generally statistically significant for key outcomes (outmigration, out-of-city outmigration, and out-of-city in-migration).

[18] COVID led to an increase in the out-of-city outmigration rate of 1.0 percentage point and a decrease in the out-of-city in-migration rate of 0.7 percentage point for nongentrifiable neighborhoods in transit-oriented cities. The impact on mobility rates for nongentrifiable neighborhoods were largely insignificant in car-oriented cities.

The overall pattern is clear: Previously gentrifying neighborhoods partly lost their appeal during the COVID-19 pandemic, but COVID's impact on gentrifying neighborhoods varies across cities, with gentrifying neighborhoods in more transit-oriented cities or cities with concentrations of remotable jobs or with higher housing costs being hit harder than others.

5. Conclusion

The COVID-19 pandemic hammered the U.S. economy, causing significant flight and the avoidance of many major cities, and this study focuses on the significant heterogeneity in the impact of COVID across urban communities. We examined in this study the effects of the COVID-19 pandemic on previously gentrifying neighborhoods in major U.S. cities, measured by the extent and pace of outmigration and in-migration of residents in these neighborhoods relative to other urban neighborhoods that did not gentrify and relative to the pre-COVID period.

Gentrifying neighborhoods have been attractive to younger and high-SES populations often because they have higher density and better access to job centers and urban amenities. Our results, however, suggest that these factors became less appealing and even undesirable during the pandemic, which made gentrifying neighborhoods less appealing to existing and potential high-SES residents. When tracking the in- and out-migration rates of gentrifying neighborhoods, we record a significant increase of 1.2 percentage points in the outmigration rate nearly two years into the pandemic. Younger residents and higher-SES residents were more likely to leave these neighborhoods, and the inflow of such people into these neighborhoods slowed.

Results also confirm that gentrifying neighborhoods that are more vulnerable to the pandemic or increased working from home, such as those closer to city centers and neighborhoods with higher density and higher rents, were hit harder than others. These neighborhoods experienced more significant losses of existing residents and increased avoidance among potential in-movers. Similarly, gentrifying neighborhoods in transit-oriented cities, cities with higher housing costs, and cities with more remotable jobs became less appealing in general, relative to gentrifying neighborhoods in other cities. Several forces may have contributed to these patterns. The likely disparate impact of lockdowns on different communities and the association of health risks with density and crowding all reduce the amenity value of access to downtown, transit, and other amenities that used to make gentrifying neighborhoods more attractive than other neighborhoods. COVID-19 has also altered the way in which people work, with many high-SES people being able to work from home, and profoundly changed people's spatial preferences for working and living close to urban centers. All these trends could have made many previously gentrifying neighborhoods less attractive during the pandemic.

The findings confirm that the pace of gentrification had slowed in major U.S. cities and that gentrifying neighborhoods became less appealing among typical gentrifiers of the pre-COVID period, particularly those neighborhoods that are more vulnerable to the COVID-19 crisis. Eventually, the increased flight of younger and higher-SES residents, if it were to become permanent, could induce decreased housing demand and reduce housing prices in these neighborhoods. When rents and housing prices ultimately reach a new equilibrium level in hard-

hit gentrifying neighborhoods, however, population outflows could be stabilized and inflows would be reignited.

As cities are still recovering from the abrupt shocks of the COVID-19 crisis, it remains unclear how much the moves documented in this study could affect their long-term fates. Almost two years into the pandemic, however, it is reasonable to assume some of the trends could be lasting. To the extent that the observed urban migration remains persistent, the pace of gentrification could be slowed, and certain previously gentrifying neighborhoods may become more affordable. Some communities in cities, even some previously gentrifying ones, may also face renewed challenges of population decline, lower income taxes, and potential neighborhood decline and disinvestment, while some other communities could become more attractive in the changed urban landscape. While these changes could mitigate inequality, the extent to which alternative structures of inequality emerge in this new landscape of urban space is yet to be seen.

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Table 1. Summary Statistics of Gentrifying, Nongentrifiable, and Nongentrifying Neighborhoods

	Gentrifying		Nongentrifying		Nongentrifiable	
	2009	% Change, 2009–2019	2009	% Change, 2009–2019	2009	% Change, 2009–2019
Distance to City Center (miles)	4.8	-	6.6	-	8.4	-
Population Density (per sq mile)#	25,979	-	21,427	-	15,561	-
Housing Density (per sq mile) #	11,703		8,406		7,365	
Population	3,549	15.5	3,992	4.5	4,081	18.6
Median Household Income ($)	40,005	42.7	38,052	7.4	81,525	5.6
Median Home Value ($)	384,950	31.6	300,113	-3.9	463,001	3.6
Median Rent ($)	820	43.4	809	11.5	1,168	19.1
% Non-Hispanic White	29.5	4.5	21.5	-2.5	54.7	-5.2
% Non-Hispanic Black	29.4	-4.9	34.8	-1.6	16.6	0.2
% Hispanic	30.8	-2.1	35.2	2.6	18.0	2.3
% Asian	7.9	1.6	6.4	0.9	8.3	1.8
% Foreign-Born	26.6	-2.1	26.0	0.1	20.2	1.1
% Immigrated in Last 10 Years	8.0	4.7	7.8	5.5	4.8	5.0
% Below Poverty	27.1	-5.9	29.1	-1.1	10.6	0.5
% College-Educated	22.3	16.6	16.5	2.4	41.0	5.5
% Professional/Managerial	29.0	13.0	22.2	2.6	44.2	4.0
% Owner-Occupied Units	31.2	-0.3	37.1	-3.3	61.2	-3.4
% Vacant Units	13.1	-1.9	13.1	-1.0	8.8	0.0
% Units Built in Last 20 Years	11.7	9.3	11.0	4.1	19.0	4.4
N	1,263		3,938		5,289	

Note: Dollar values are adjusted to 2019 dollars; attributes with # are values in 2019.
Sources: Authors' calculations using data from the 2005–2009 and 2015–2019 American Community Surveys.

Table 2. Descriptive Statistics for the 2017–2019 (Q42017 to Q42019) and the 2019–2021 (Q42017 to Q42019) Panels

	Gentrifying		Nongentrifying		Nongentrifiable	
	2017–2019	2019–2021	2017–2019	2019–2021	2017–2019	2019–2021
Outmigration rate (two-year)	26.6%	28.1%	22.0%	22.2%	23.3%	23.6%
Out-of-city outmigration rate (two-year)	12.7%	14.3%	10.1%	10.6%	12.5%	13.3%
In-migration rate (two-year)	26.7%	26.1%	20.0%	18.9%	23.2%	22.2%
Out-of-city in-migration rate (two-year)	14.4%	13.0%	8.4%	8.0%	11.9%	11.0%
Initial Equifax Risk Score (mean)	684	690	658	661	709	709
Initial individual age (mean)	44.2	44.3	45.5	46.0	46.9	47.4
Share with 1+ mortgage	17.1%	18.1%	13.9%	14.3%	28.0%	27.9%
N (Q42017 or Q42019)	159,143	164,752	497,234	503,309	829,591	848,435

Sources: Authors' calculations using American Community Survey data and data from the FRBNY Consumer Credit Panel/Equifax (CCP).

Table 3. Summary of Regression Results, COVID's Impact on Migration Rate (Qtr*Gentrification Status)

	Outmigration		Out-of-City Outmigration		In-Migration		Out-of-City In-Migration	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Gentrifying (vs. Nongentrifying)								
2017Q4	-0.005**	0.002	-0.003*	0.001	-0.005***	0.002	-0.004**	0.001
2018Q1	-0.004*	0.002	-0.002	0.001	-0.003	0.002	-0.002	0.001
2018Q2	-0.004*	0.002	-0.003*	0.001	-0.001	0.002	-0.001	0.001
2018Q3	-0.004*	0.002	-0.002	0.001	-0.003	0.002	0.000	0.001
2018Q4	-0.003	0.002	-0.001	0.001	-0.001	0.002	0.001	0.001
2019Q1	-0.001	0.002	0.000	0.001	0.000	0.002	0.001	0.001
2019Q2	-0.001	0.002	0.001	0.001	0.000	0.002	0.001	0.001
2019Q3	-0.002	0.002	0.000	0.001	0.001	0.002	0.000	0.001
2020Q1	0.001	0.002	0.001	0.001	0.002	0.002	0.000	0.001
2020Q2	0.001	0.002	0.000	0.001	0.000	0.002	-0.002	0.001
2020Q3	0.003*	0.002	0.002	0.001	0.000	0.002	-0.004***	0.001
2020Q4	0.007***	0.002	0.004**	0.001	0.001	0.002	-0.005***	0.001
2021Q1	0.010***	0.002	0.006***	0.001	0.003	0.002	-0.006***	0.001
2021Q2	0.011***	0.002	0.007***	0.001	0.003	0.002	-0.005***	0.001
2021Q3	0.012***	0.002	0.008***	0.001	0.003	0.002	-0.005***	0.001
2021Q4	0.012***	0.002	0.009***	0.001	0.003*	0.002	-0.005***	0.001
Nongentrifiable (vs. Nongentrifying)								
2017Q4	-0.003*	0.001	0.000	0.001	-0.004***	0.001	-0.002*	0.001
2018Q1	-0.003**	0.001	0.000	0.001	-0.003***	0.001	-0.001*	0.001
2018Q2	-0.003**	0.001	-0.001	0.001	-0.003**	0.001	-0.001	0.001
2018Q3	-0.004***	0.001	0.000	0.001	-0.002*	0.001	0.001	0.001
2018Q4	0.000	0.001	0.001	0.001	-0.002	0.001	0.001	0.001
2019Q1	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001
2019Q2	0.001	0.001	0.002*	0.001	0.000	0.001	0.001	0.001
2019Q3	0.000	0.001	0.001	0.001	-0.001	0.001	0.000	0.001
2020Q1	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001
2020Q2	0.000	0.001	0.000	0.001	0.001	0.001	-0.001	0.001
2020Q3	0.000	0.001	0.000	0.001	0.000	0.001	-0.003***	0.001
2020Q4	0.002	0.001	0.002*	0.001	0.001	0.001	-0.003***	0.001
2021Q1	0.003**	0.001	0.003***	0.001	0.001	0.001	-0.003***	0.001
2021Q2	0.003**	0.001	0.003***	0.001	0.001	0.001	-0.003***	0.001
2021Q3	0.002*	0.001	0.003***	0.001	0.002	0.001	-0.003***	0.001
2021Q4	0.002	0.001	0.003***	0.001	0.001	0.001	-0.004***	0.001

Note: *** significant at 0.001, ** significant at 0.01, and * significant at 0.05

Sources: Authors' calculations using American Community Survey data and data from the FRBNY Consumer Credit Panel/Equifax (CCP).

Table 4. Summary of Regression Results on Heterogeneity in COVID's Impact Across Residents (Coefficients of Q42021*Resident Characteristics; Gentrifying Neighborhoods Only)

	Outmigration		Out-of-City Outmigration		In-Migration		Out-of-City In-Migration	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
By Risk Score								
650-749 (vs. <650)	0.010**	0.004	0.007*	0.003	-0.014***	0.003	-0.019***	0.003
750+ (vs. <650)	0.018***	0.004	0.012***	0.003	-0.015***	0.003	-0.018***	0.003
By Age								
<=30 (vs. 51+)	0.033***	0.004	0.020***	0.003	0.005	0.004	-0.014***	0.003
31-50 (vs. 51+)	0.020***	0.003	0.011***	0.003	0.006	0.003	0.000	0.003
By Mortgage Status								
With mortgage (vs.no mortgage)	0.028***	0.004	0.025***	0.003	0.005	0.004	0.002	0.003

Note: *** significant at 0.001, ** significant at 0.01, and * significant at 0.05
Sources: Authors' calculations using American Community Survey data and data from the FRBNY Consumer Credit Panel/Equifax (CCP).

Table 5. Summary of Regression Results, Heterogeneity in COVID's Impact Across Gentrifying Neighborhoods (Coefficients of Q42021*Neighborhood Types; Gentrifying Neighborhoods Only)

	Outmigration		Out-of-City Outmigration		In-Migration		Out-of-City In-Migration	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
By Tract Distance to City Center								
1st Quartile (vs. 4th Quartile)	0.023***	0.005	0.019***	0.004	-0.001	0.005	-0.008	0.004
2nd Quartile (vs. 4th Quartile)	0.025***	0.006	0.017***	0.004	0.005	0.006	-0.005	0.004
3rd Quartile (vs. 4th Quartile)	0.014*	0.006	0.013**	0.005	0.007	0.006	-0.004	0.005
By Tract Population Density								
2nd Quartile (vs. 1st Quartile)	0.011*	0.005	0.011**	0.004	-0.006	0.005	-0.003	0.004
3rd Quartile (vs. 1st Quartile)	0.017***	0.005	0.013***	0.004	0.004	0.005	-0.007	0.004
4th Quartile (vs. 1st Quartile)	0.012*	0.005	0.011**	0.004	-0.008	0.005	-0.011**	0.004
By Tract Housing Density								
2nd Quartile (vs. 1st Quartile)	0.003	0.006	0.004	0.005	-0.004	0.006	-0.005	0.005
3rd Quartile (vs. 1st Quartile)	0.020***	0.005	0.015***	0.004	-0.002	0.005	-0.010**	0.004
4th Quartile (vs. 1st Quartile)	0.018***	0.005	0.014***	0.004	-0.004	0.005	-0.013***	0.004
By Tract Median Rent								
2nd Quartile (vs. 1st Quartile)	-0.002	0.004	0.000	0.003	-0.001	0.004	0.001	0.003
3rd Quartile (vs. 1st Quartile)	0.003	0.004	0.001	0.003	-0.009**	0.004	-0.006	0.003
4th Quartile (vs. 1st Quartile)	0.001	0.005	0.012**	0.004	-0.012**	0.005	-0.009**	0.004

Note: *** significant at 0.001, ** significant at 0.01, and * significant at 0.05
Sources: Authors' calculations using American Community Survey data and data from the FRBNY Consumer Credit Panel/Equifax (CCP).

Table 6. Summary of Regression Results, Heterogeneity in COVID's Impact Across Cities (Coefficients of Q42021*Gentrifying: Each Coef./Std. Err. Pair Represents Results from a Separate Regression)

	Outmigration		Out-of-City Outmigration		In-Migration		Out-of-City In-Migration	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
By Transit/Car City								
Transit city	0.015***	0.003	0.011***	0.002	0.003	0.002	-0.010***	0.002
Car city	0.010***	0.002	0.007***	0.002	0.004	0.002	-0.001	0.002
By Share of Remotable Jobs								
Higher-share remotable jobs	0.015***	0.002	0.010***	0.002	0.004*	0.002	-0.007***	0.002
Lower-share remotable jobs	0.006**	0.002	0.005**	0.002	-0.005*	0.002	-0.010***	0.002
By Median Rent								
Higher-rent	0.015***	0.002	0.010***	0.002	0.003	0.002	-0.006***	0.001
Lower-rent	0.003	0.003	0.005*	0.002	0.004	0.003	0.000	0.002
By HPI								
Higher-HPI	0.015***	0.002	0.009***	0.002	0.003	0.002	-0.006***	0.001
Lower-HPI	0.003	0.003	0.005*	0.002	0.003	0.003	-0.001	0.002

Note: *** significant at 0.001, ** significant at 0.01, and * significant at 0.05

Sources: Authors' calculations using American Community Survey data and data from the FRBNY Consumer Credit Panel/Equifax (CCP).

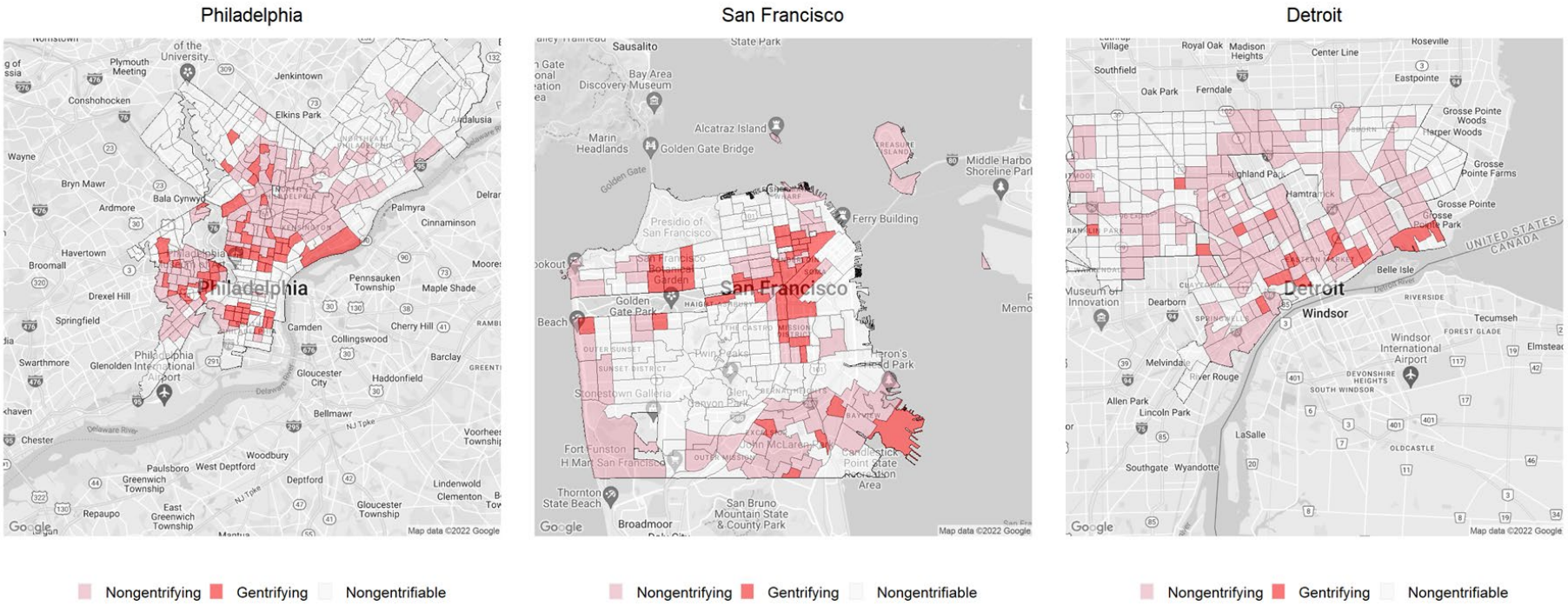

Figure 1. Tract Maps in Philadelphia, San Francisco, and Detroit by Gentrification Status
Sources: Authors' calculations using data from the 2005–2009 and 2015–2019 American Community Surveys.

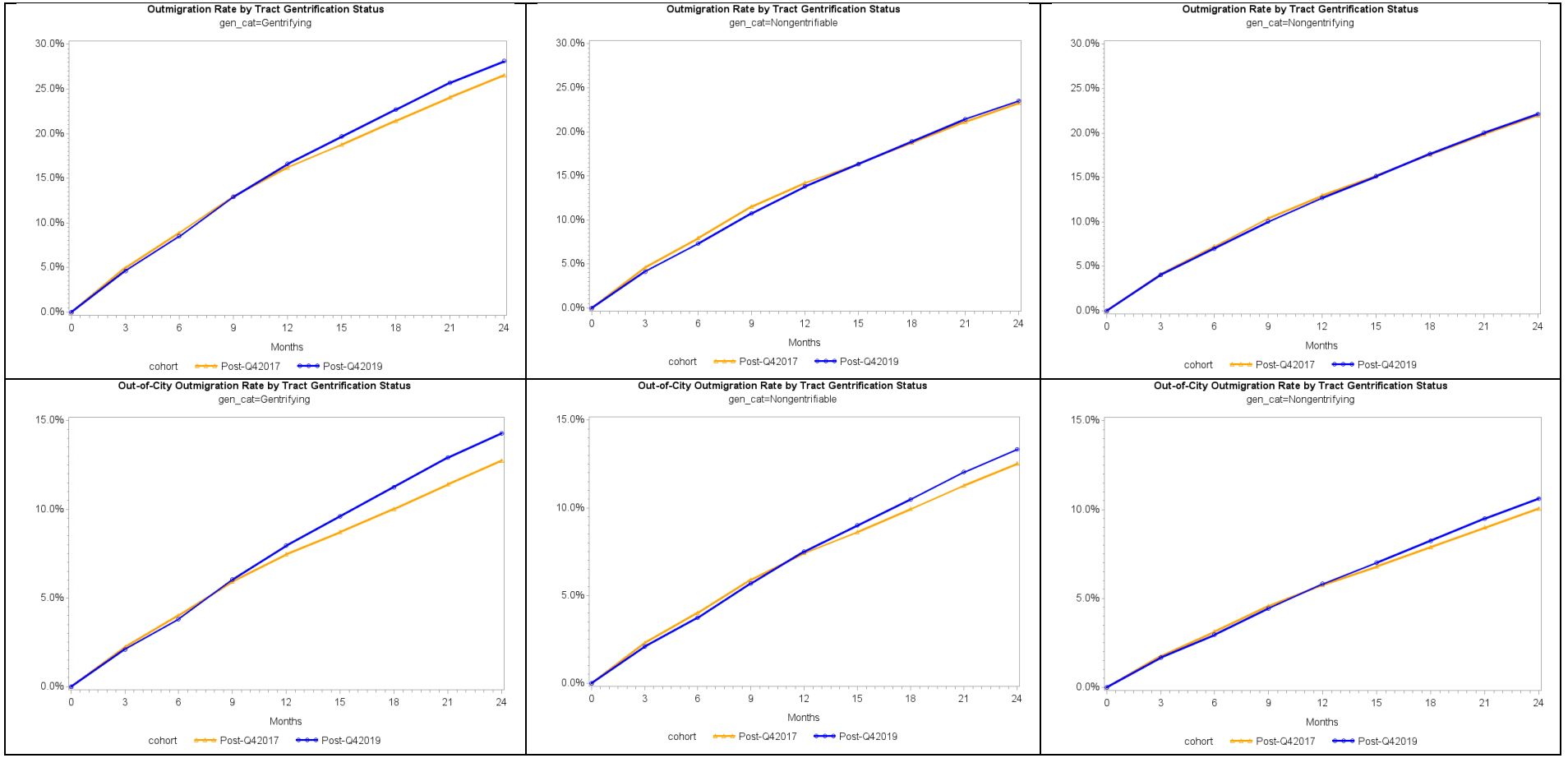

Figure 2. Outmigration Rates for Gentrifying (Left), Nongentrifiable (Middle), and Nongentrifying (Right), Pre- and Post-COVID (Post-Q42017 and Post-Q42019)

Sources: Authors' calculations using American Community Survey data and data from the FRBNY Consumer Credit Panel/Equifax (CCP).

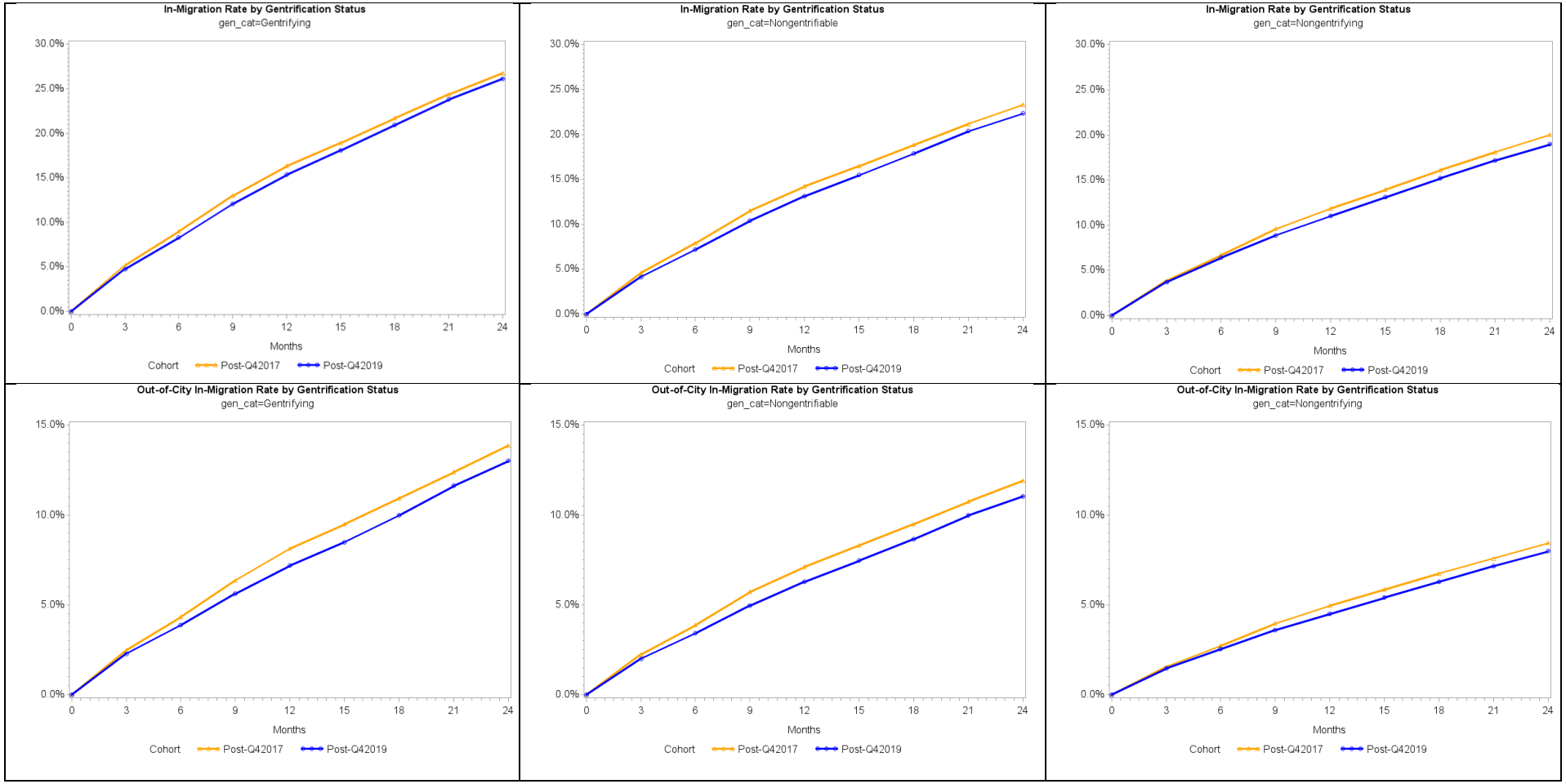

Figure 3. In-Migration Rates for Gentrifying (Left), Nongentrifiable (Middle), and Nongentrifying (Right) Neighborhoods, Pre- and Post-COVID (Post-Q42017 and Post-Q42019)

Sources: Authors' calculations using American Community Survey data and data from the FRBNY Consumer Credit Panel/Equifax (CCP).

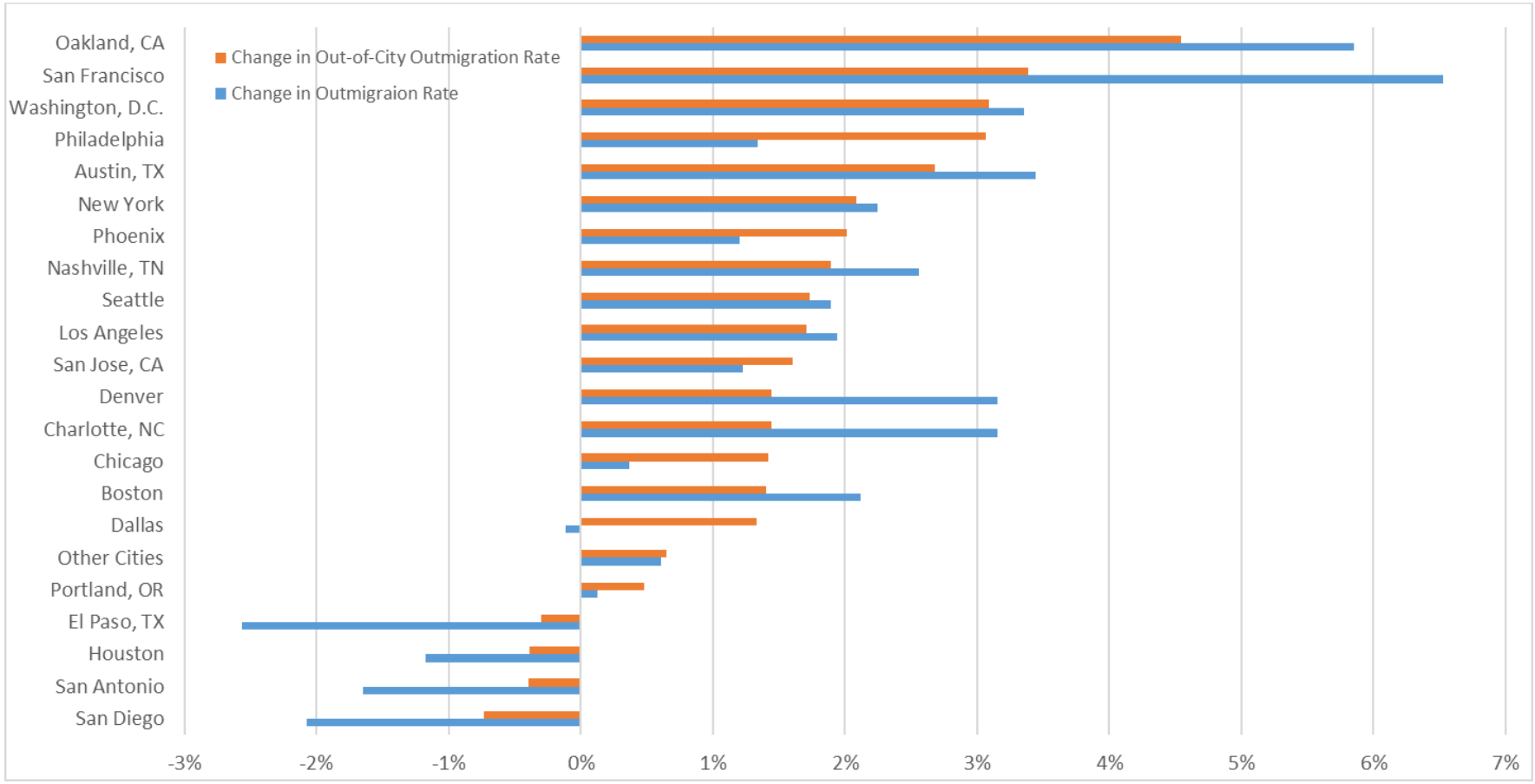

Figure 4. Change in Outmigration Rates in Gentrifying Neighborhoods (Post-COVID minus Pre-COVID)
Sources: Authors' calculations using American Community Survey data and data from the FRBNY Consumer Credit Panel/Equifax (CCP).

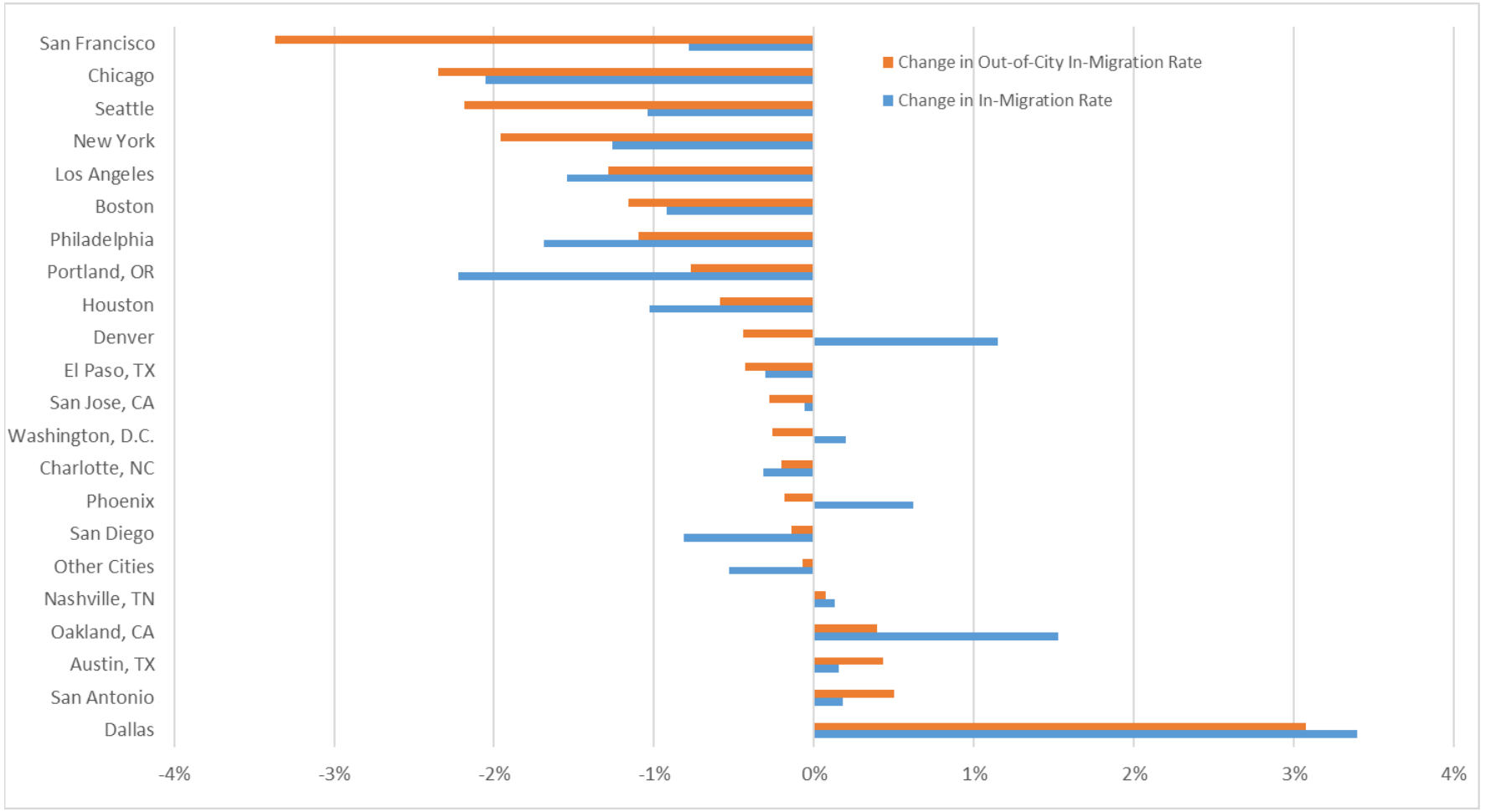

Figure 5. Change in In-Migration Rates in Gentrifying Neighborhoods (Post-COVID minus Pre-COVID)
Sources: Authors' calculations using American Community Survey data and data from the FRBNY Consumer Credit Panel/Equifax (CCP).

Figure 6. Impact of COVID on Residential Outmigration Rate in Nongentrifiable and Gentrifying Neighborhoods (Two-Year Outmigration Rates)

Sources: Authors' calculations using American Community Survey data and data from the FRBNY Consumer Credit Panel/Equifax (CCP).

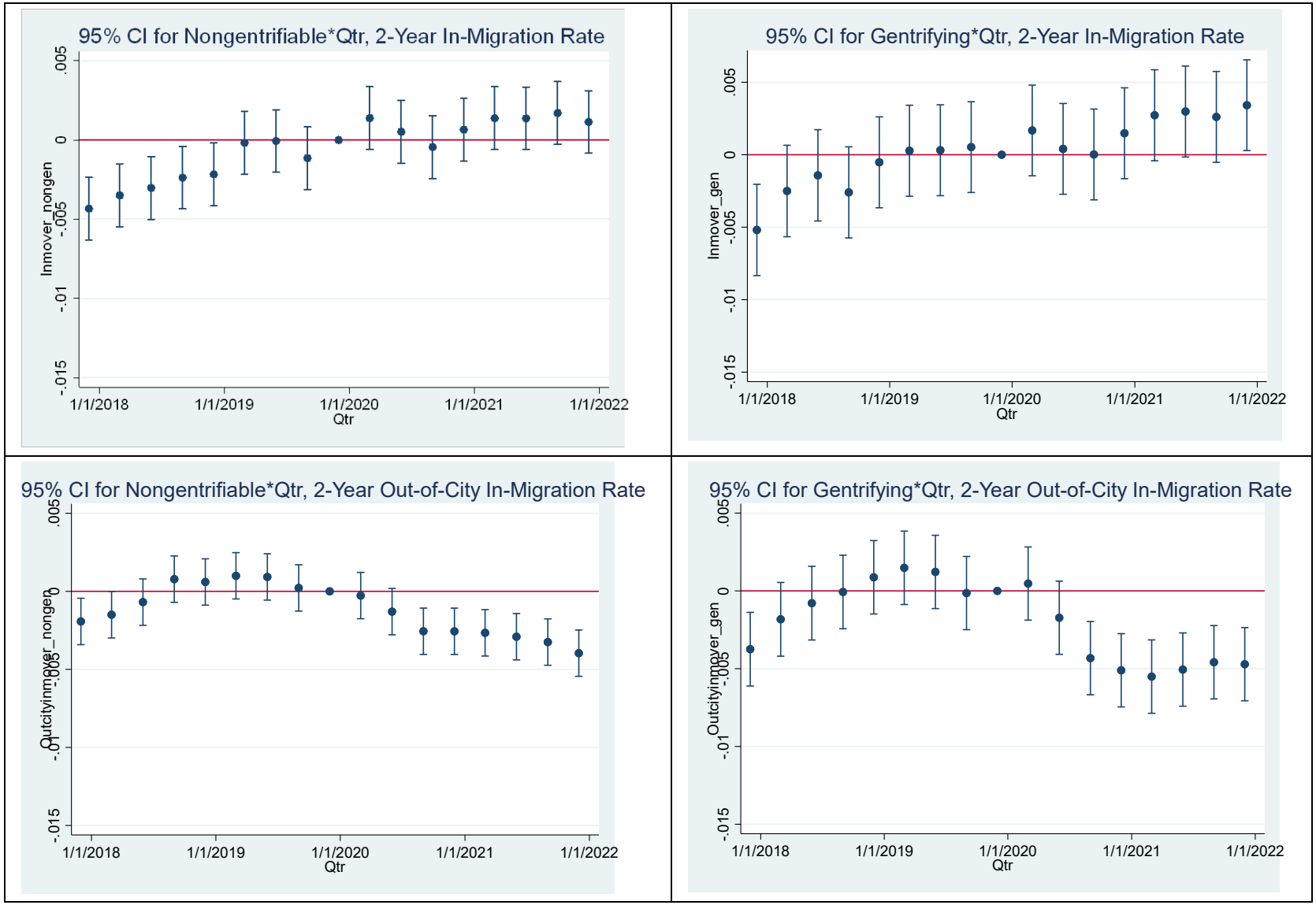

Figure 7. Impact of COVID on Residential In-Migration Rates in Nongentrifiable and Gentrifying Neighborhoods (Two-Year In-Migration Rates)

Sources: Authors' calculations using American Community Survey data and data from the FRBNY Consumer Credit Panel/Equifax (CCP).