

## New Development for Whom?

### How New Housing Production Affects Displacement and Replacement in the San Francisco Bay Area

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Karen Chapple, Jackelyn Hwang, Jae Sik Jeon, Iris Zhang, Julia Greenberg, and Vasudha Kumar



#### Key Takeaways

- Most renters (80%) don't live where there's new housing being built.
- When new market-rate housing is built, there is a slight increase in both people moving out of the neighborhood and people moving in (churn) across most socio-economic groups.
- New market-rate housing production slightly increases displacement for lower income people, and slightly decreases moving out for high-income people.
- The increase in rates of displacement (involuntary moves) for very low- to moderate-socio-economic groups are not as high as commonly feared, at 0.5% to 2% above normal rates.
- The highest socio-economic groups move in at higher rates than other groups, and move out at lower rates. In other words, the highest-socio-economic groups experience disproportionate benefits of new market-rate housing production.
- Residents of extremely low and middle socio-economic status experience little change in moving out of their neighborhood.
- In gentrifying areas, new market-rate construction neither worsens nor eases rates of moving out. It increases rates of people moving in across all socio-economic groups, particularly high-socio-economic residents.
- To help existing residents stay in their neighborhoods after new market-rate construction, we recommend either subsidized housing construction (with community preference) or housing preservation with continued protections.
- More research is needed to understand effects in different contexts and over the long term.

## Executive Summary

Researchers have struggled to pinpoint the impacts of new housing production on residents in surrounding blocks, due to the lack of fine-grained data on construction as well as resident mobility. Because of this unavailability of appropriate data, there is little research available to inform which housing solutions will be most effective in stabilizing communities so that those who wish to stay are able to, even as newcomers arrive. For this study we address this shortcoming by building unique (and cross-validated) datasets on mobility and linking them to a bespoke block-level housing construction database.

In the context of the San Francisco Bay Area's extreme housing supply shortage, we find that when new market-rate housing is built, there is a slight increase in both people moving out of the neighborhood and people moving in (churn) across most socio-economic groups. The highest socio-economic groups move in at higher rates than other groups, and move out at lower rates. In other words, the highest-socio-economic groups experience disproportionate benefits of new market-rate housing production. New market-rate construction's effects on both outmigration and immigration are stronger for most income groups in Oakland than in San Francisco and San Jose; in gentrifying areas, they tend to disappear. Over the short-term, the net impact is minimal, suggesting that is at least partially mitigable through policies to promote housing affordability and protections to keep low-SES residents in place. These analyses account for subsidized housing and tenant protections, and our full report demonstrates how they reduce outmigration but may not increase immigration. Additional policy briefs in this series discuss these findings and implications in more detail.

## Introduction

California's housing affordability crisis has many culprits, the most obvious of which are rising income inequality that keeps incomes low while rents increase and a shortfall in housing production that dates back to the early 1990s and will reach 1.5 million units by 2025, according to the most conservative estimates.<sup>1</sup> City and state policymakers have numerous tools to boost housing production, but even so, most cities continue to fall short for a variety of reasons.<sup>2</sup>

In recent years, affordable housing advocates have become some of the most vociferous opponents of new market-rate housing development, largely because of concerns about displacement.<sup>3</sup> New housing development in built-up urban areas (i.e., infill development) may displace local residents as housing is demolished and redeveloped at higher densities; or this displacement may occur indirectly, as land values and thus rents increase, forcing some renters out and limiting who can move in. Yet, studies to date have failed to produce definitive evidence on the relationship between market-rate development and displacement. Our findings improve on those of

other studies because we are able to examine the socio-economic status of households that move, rather than assuming that households have the same characteristics as their overall neighborhood. By accounting separately for both moves in and moves out by socio-economic status, this study is better able to pinpoint how neighborhoods change in the Bay Area. Using two different proprietary datasets on individual and household characteristics, as well as multiple data sources to identify new market-rate construction, we validate results across datasets, achieving unique robustness. We are thus able to determine how market-rate development impacts displacement – both direct and exclusionary – over the short term, by looking at movement both out of and into local neighborhoods over a four-year period. Direct displacement pushes people to move out of their neighborhoods, whereas exclusionary displacement limits who can move into a neighborhood, highlighting reduced housing choice particularly for lower-SES people.

Given the decades-long deficit in new housing production in the Bay Area's urban core, using it as a case study creates a rare kind of natural experiment: what happens to existing residents when new development actually occurs? And who moves into neighborhoods afterwards? In short, this study suggests that in this context of scarcity, new market-rate housing production is generally resulting in slight increases in both outmigration and immigration. Thus new construction fosters churn: some households leave and others move in. Market-rate construction is easing some housing market pressures, but pushing some households out. Over the short-term, the net local impact is minimal, even in a tight housing market like the San Francisco Bay Area. Yet, since some households may be moving involuntarily, there is both good cause to mitigate displacement impacts, and good reason to believe that it will be effective at stabilizing communities, at least for now.

This policy brief presents findings from a longer report entitled [Housing Market Interventions and Residential Mobility in the San Francisco Bay Area](#), authored by researchers from the Urban Displacement Project at the University of California Berkeley and the University of Toronto, the Changing Cities Research Lab at Stanford University, and the Federal Reserve Bank of San Francisco.<sup>4</sup> It is the first of a series, summarizing findings on the relationship between new market-rate housing production and mobility into and out of neighborhoods in the Bay Area, with an additional focus on its core cities and gentrifying areas. Subsequent briefs in the series focus on where displaced households move, and the relationship between mobility and subsidized housing production, just cause for eviction ordinances, and rent stabilization laws.

We begin with a brief summary of the debate about how market-rate housing production affects neighborhood stability and then provide an overview of our data and methods. After a description of new housing construction

and mobility patterns, we provide our model results. A conclusion outlines policy recommendations and next steps for research.

### How inappropriate data and models have muddled the relationship between development and displacement

By increasing the supply of housing at the regional level, new housing production helps moderate housing costs, to make housing more affordable to more households, and relieve displacement pressures.<sup>5</sup> But researchers still debate how this plays out at the level of a local neighborhood, or a particular block. When new developments are built, might rents actually increase because of their catalytic effect on surrounding blocks? And even if local policies are helping residents stay in place, who is able to move into the neighborhood as it changes?

Studies to date have fallen short largely because of an inability to distinguish the experience of low-income residents within their housing market or neighborhood, due to the lack of appropriate data. Although evidence is mixed on whether nearby housing prices rise or fall with new residential development, studies have generally concluded that rents will decrease.<sup>6</sup> However, they may not decrease for everyone: for older buildings catering to low-income renters, new construction may raise rents, with even higher spikes for buildings closest to the new construction.<sup>7</sup>

*Market-rate construction is easing some housing market pressures, but pushing some households out. Over the short-term, the net local impact is minimal, even in a tight housing market like the San Francisco Bay Area.*



Image Credit: dorombach

Thus, housing markets are diverse, and neighborhoods are as well. This complicates studies of filtering, the process by which we produce most affordable housing: as the cost and quality of older market-rate housing fall over time, higher-income people move to new market-rate housing, and lower-income households move into the older units.<sup>8</sup> The process of moving into market-rate housing initiates

multiple rounds of migration, i.e., vacancy chains, which ultimately free up housing supply in low-income areas in just a few years, creating a critical infusion of lower-cost housing.<sup>9</sup> But studies to date have only been able to establish that residents of low-income neighborhoods (measured by census tracts) are moving into these filtered units, not that it is actually low-income renters that are moving in.<sup>10</sup> This “ecological fallacy” problem leaves open the possibility that high-income (rather than low-income) households are moving from low-income gentrifying areas to higher-income neighborhoods.

The ecological fallacy problem also occurs in studies that try to measure displacement by comparing the number of low-income residents in a neighborhood across two time periods, but cannot determine whether households actually moved out, moved within the neighborhood, or simply changed income level. The displacement identified in such studies turns out to have little relationship to involuntary household mobility.<sup>11</sup>

Most studies overlook critical factors in the local context as well. Many focus on individual cities, even though housing markets operate regionally, and may function differently in city and suburban contexts. Some only analyze rent levels, rather than examining household mobility per se. Few control for local housing policies, such as the presence of subsidized housing or rent stabilization. Few also

examine the historical context of the local market, which is important since long-term shortages in supply (as is the case in California) may heighten displacement impacts. This study fills these gaps by using fine-grained data on development and residents aggregated to the block group level for the nine-county San Francisco region, while taking local housing policy into account.

### A note on data and methods

In this study we use individual and household mobility as a proxy for displacement, or forced moves, looking at the marginal increase in out- and immigration when new construction occurs. To measure displacement, we track the movements of individuals and households by income and financial stability levels in and out of neighborhoods, using proprietary data on household characteristics. We also build a unique block-level dataset on new market-rate housing units constructed, as well as data on new subsidized housing units constructed and units currently protected by either just cause eviction ordinances or rent stabilization (used to control for policy).<sup>12</sup>

To measure mobility, we use both Infogroup<sup>13</sup> and Federal Reserve Bank of New York Consumer Credit Panel/Equifax (CCP) data, excluding data for individuals or households where the head is less than 25 years old. Running models



separately for each dataset, we examine mobility each year into and out of block groups, a census geographic unit typically containing between 600 and 3,000 residents; the number of blocks in a block group ranges from about six in a dense city to as many as 30 in an outlying suburb. (Appendix A describes the data in more detail.)

Using these two very different data sources (Infogroup and CCP), it is challenging to devise equivalent socio-economic categories for comparison. Infogroup offers income data but requires significant smoothing and weighting to be comparable to the American Community Survey. CCP provides credit scores that measure financial stability, a proxy for socio-economic status (SES). Both teams mapped their datasets to four categories: extremely low (under 30% area median income (AMI)), very low-low (30%-50% AMI), moderate-middle (50%-100% AMI), middle-high (over 100% AMI), and the Infogroup analysis added a high category (over 150% AMI).<sup>14</sup>

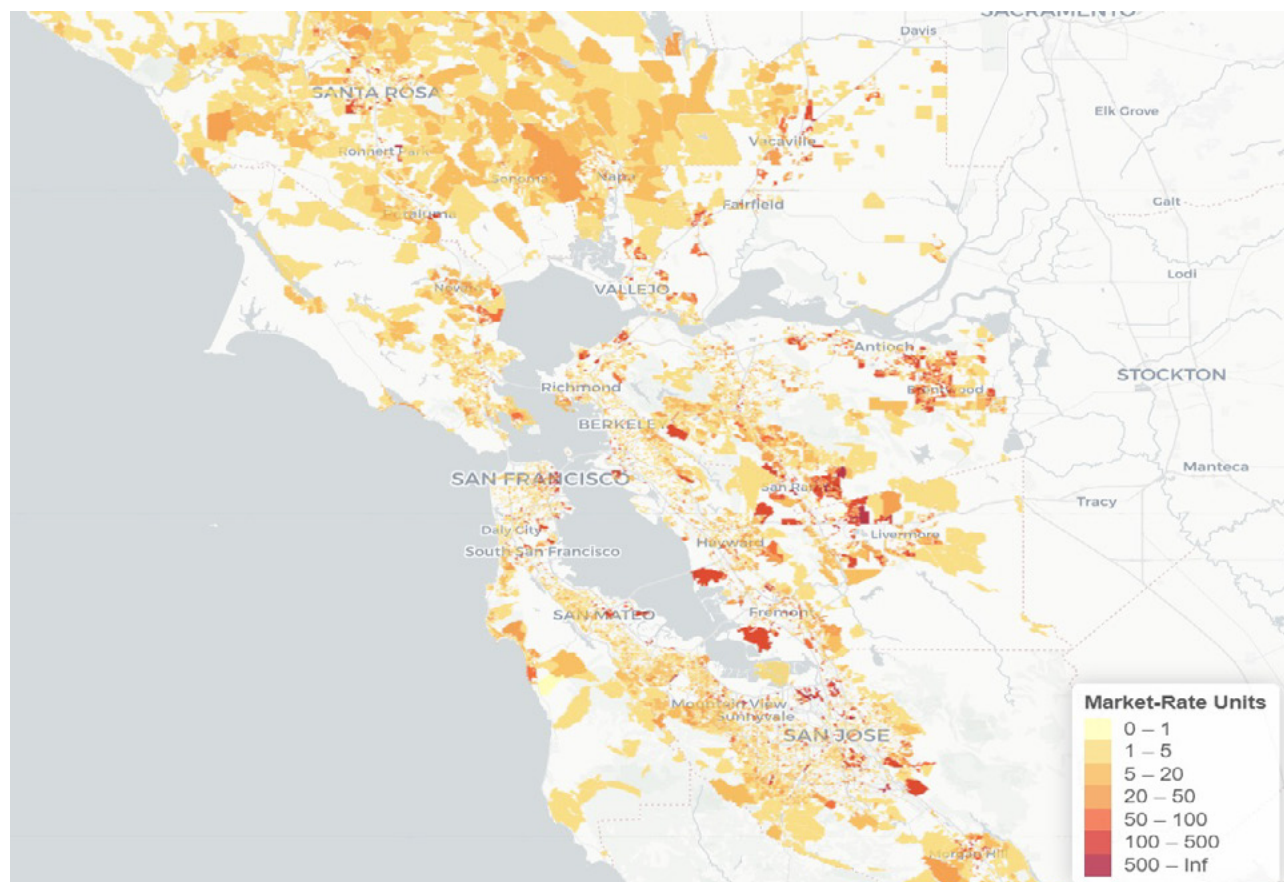
We present these results for the overall Bay Area as well as three specific cities: San Francisco, San Jose, and Oakland. We selected these cities to represent contrasting principal cities of the Bay Area: high-density San Francisco, populous San Jose, and rapidly changing Oakland. We also run an analysis on a subset of gentrifying tracts in these cities,

representing only “hot-market” areas. (For more detail on the model controls and variable construction, see Appendix A.)

### **The San Francisco Bay Area context: low housing production, low mobility**

We first examine trends in housing production over time. From 2000-2019, 408,884 new units were produced in the Bay Area, of which 12.2% were subsidized. This total falls far short of demand and is much lower than in previous decades, creating unusual pressure on the regional housing market (Metropolitan Transportation Commission 2020). Figure 1 displays the distribution of new housing production across different regions in the Bay Area and over time. Most new production over the last two decades occurred during the housing boom period (2000-2006), and there has been an increase in the post-recovery period (2015-2019). Most newly produced housing has been in the East Bay outside of Oakland, but more new units were produced in San Francisco than the entire East Bay in the post-recovery period. There was also a substantial amount of market-rate development in the South Bay throughout the last two decades.

**Figure 1: New Market-Rate Unit Construction in the Bay Area by Census Block, 2000-2019**

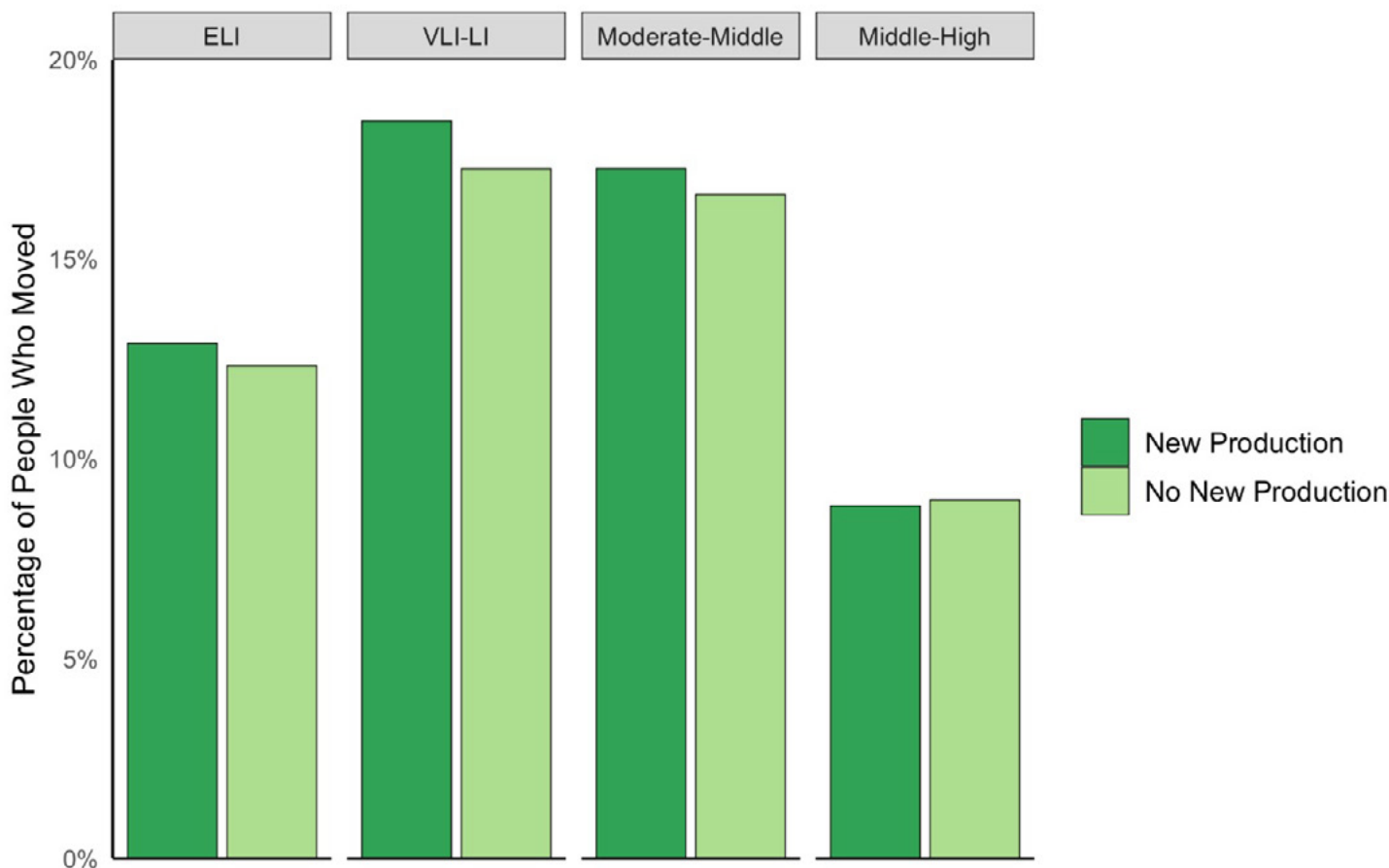


Source: Urban Displacement Project New Housing Production database

Overall, about 10% of the U.S. population moves each year.<sup>15</sup> Our two Bay Area datasets suggest that mobility rates may range from 5% to 25% depending on SES and year; in general outmigration has declined over time. About 20% of renters were living in a block group that had new housing produced in a given year.<sup>16</sup> Figure 2 displays the percent of households who move from their

block groups by income categories in block groups with and without new housing production in the prior year, demonstrating that residents of moderate/middle-SES and below move out more (an increase of 0.5 to 2%) in neighborhoods with new housing built in the prior year, while those of middle/high-SES and above are slightly less likely to move out when new production occurs.<sup>17</sup>

**Figure 2. Percent Moving by SES in Block Groups With and Without New Production**



Source: FRBNY Consumer Credit Panel/Equifax Data and UDP New Housing Production Database

Lower-SES people may move more in neighborhoods with new production due to other reasons, like differences in age, household, or neighborhood characteristics, region, subsidized housing, and local tenant protections. We account for these differences in our regression models. We next show a series of visualizations after accounting for these potential differences of how outmigration rates change from when there is no market-rate construction at all in the neighborhood (defined as the block group) to 100 new units, looking at two years and four years afterwards.<sup>18</sup> Our analysis describes mobility for eight SES groups from the CCP (solid line) and Infogroup (dotted line) datasets, ranging from the extremely low SES in solid yellow to the moderate SES in orange, middle in blue,

and high in purple. For figures presenting outmigration, an upward slope indicates increased displacement, while a downward slope indicates decreased displacement. A flat line indicates that new production does not ease displacement. The two different datasets agree on most, but not all, patterns.

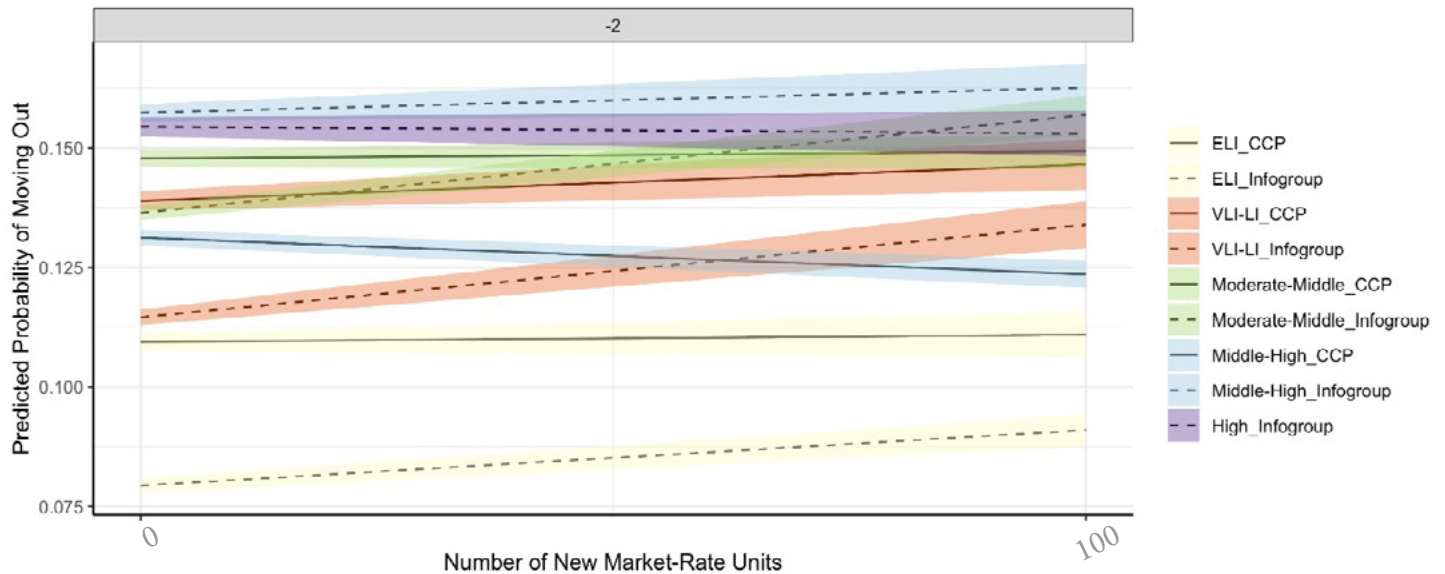
#### **New market-rate housing production increases displacement for some and decreases it for others**

In a typical year, about 11 of every 100 very low socio-economic status households move out, but with 100 new units in a neighborhood, about 13 move out (Figure 3). For socio-economic groups ranging from very low through moderate, this increase in displacement ranges from 0.5%

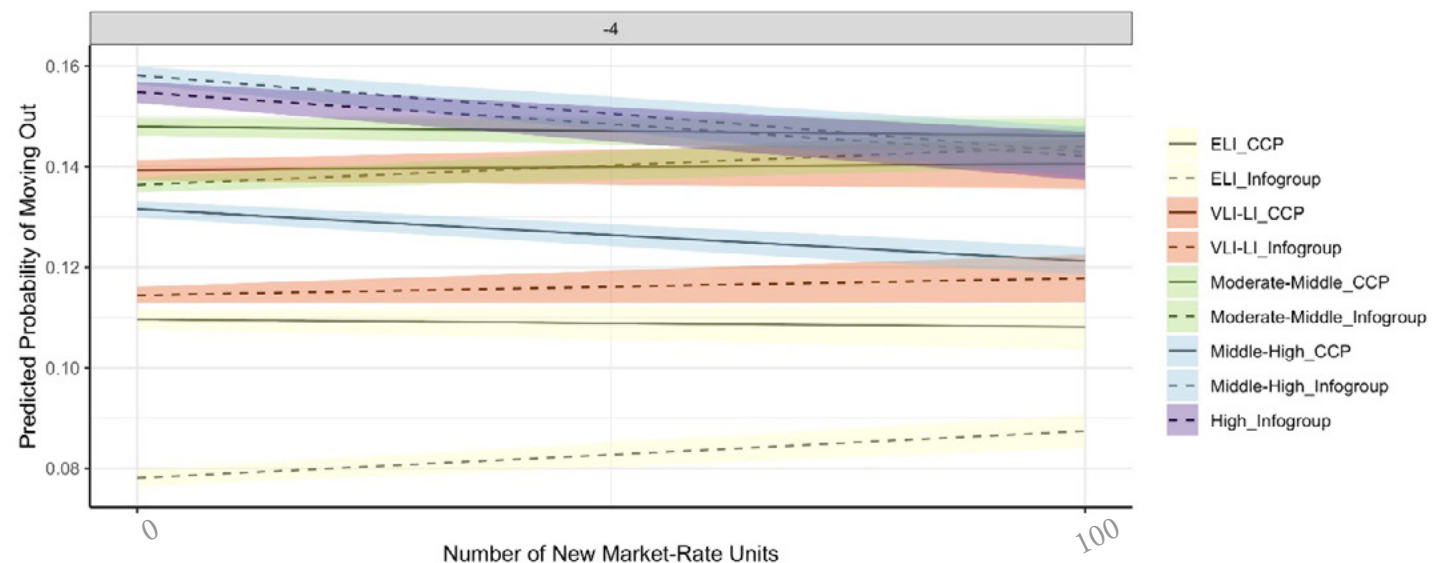
to 2%. On the other hand, the highest socio-economic status residents are slightly less likely to move out when new housing is built. Where 15 high socio-economic status households would have moved out without the new construction, 14 move out when 100 new units are built (a decrease in moving out rate of less than 1%). Residents of

extremely low and middle socio-economic status experience little change in moving out of their neighborhood. Overall, then, the new construction is causing more churn, with more outmigration for lower-SES groups than for higher.

**Figure 3. San Francisco Bay Area: Moving out after Two Years...**



**and after Four Years...**



Sources: FRBNY Consumer Credit Panel/Equifax Data, Infogroup, and UDP New Housing Production Database

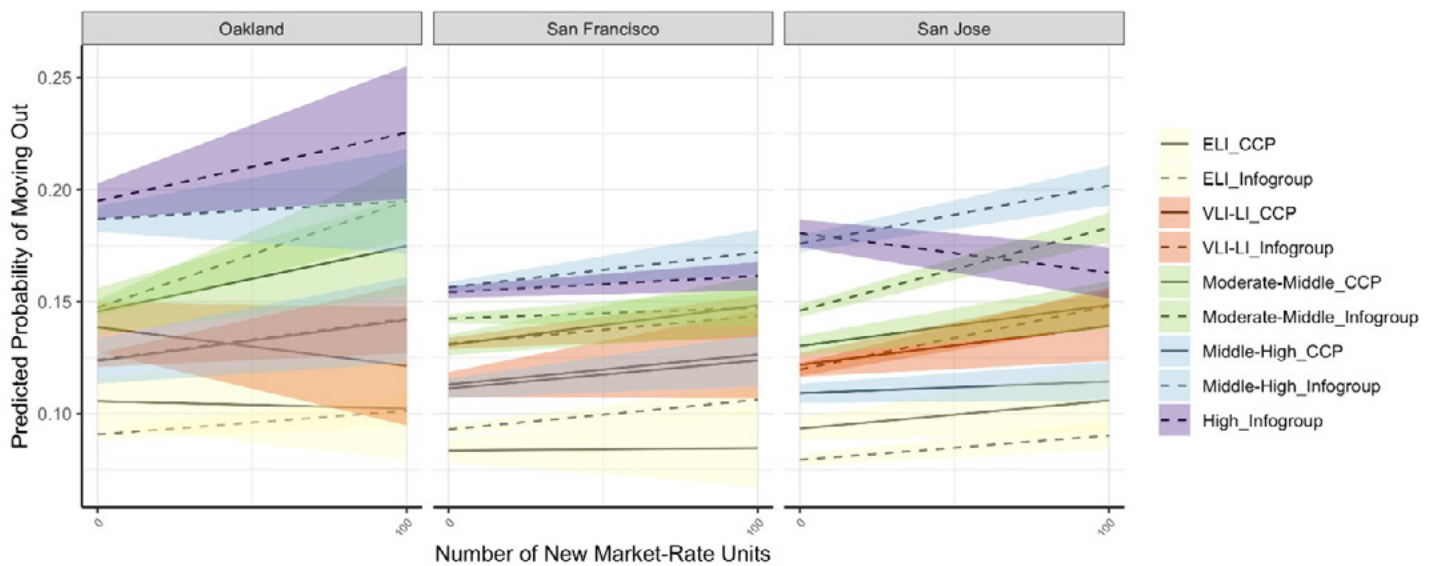
### **New market-rate construction is associated with higher displacement rates in Oakland than in San Francisco and San Jose**

Since the Bay Area is very diverse, impacts may differ between its core cities and suburbs. We next compare effects across Oakland, San Francisco, and San Jose (Figure 4). Across the cities, market-rate construction is associated with slight increases in outmigration after two years, except for high-income groups, for whom outmigration

decreases in San Jose, and for very low income groups, who are less likely to be displaced in the Oakland context. By Year 4, impacts have changed little in Oakland, but in San Francisco, displacement begins decreasing for the lowest- and highest SES groups, and in San Jose for the middle-SES groups. Thus, for example, whereas about 8 out of every 100 extremely low-SES residents in San Francisco move out without new construction, just 7 move out when 100 new market-rate units are built.



**Figure 4. Principal Cities: Moving out after Two Years...**



**and after Four Years...**



Sources: FRBNY Consumer Credit Panel/Equifax Data, Infogroup, and UDP New Housing Production Database

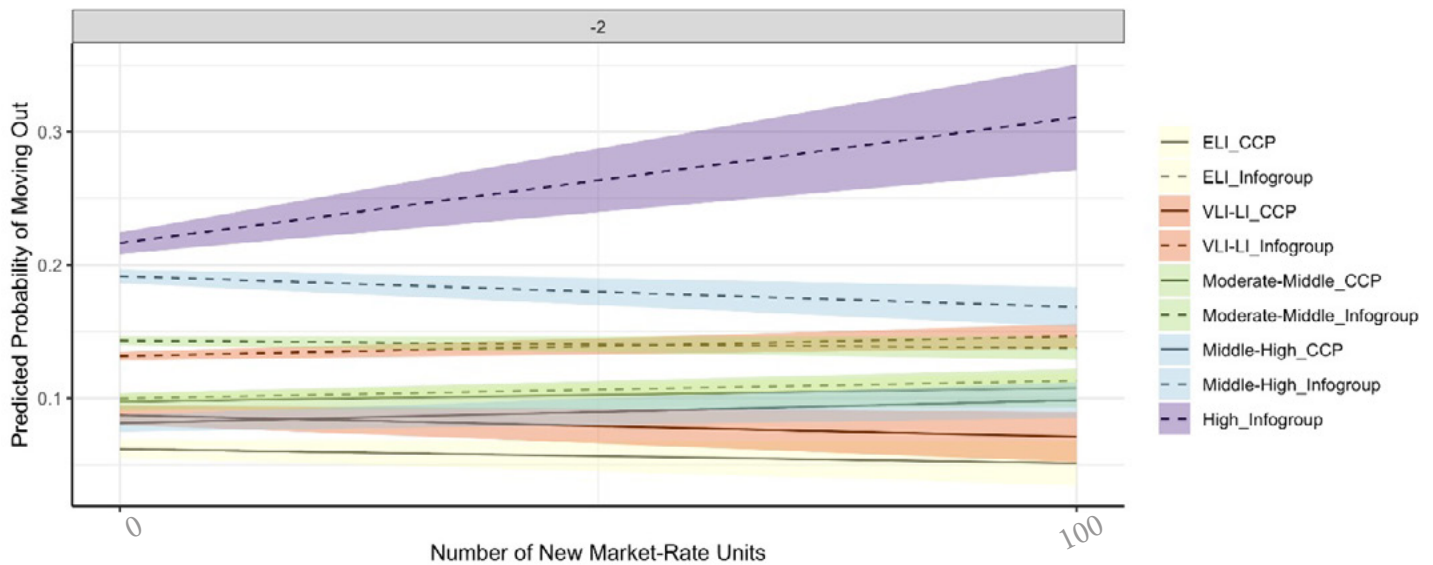
### **New market-rate construction does not alleviate displacement in gentrifying areas**

Within a strong housing market like the Bay Area, low-income neighborhoods may experience growth dynamics that are different from those in weaker markets or high-income areas. Specifically, gentrifying neighborhoods in core cities may experience high demand across market segments, such that new market-rate construction alone is not able to alleviate housing market pressures. In such cases, are communities better off building new-market rate housing or not, in order to prevent displacement?

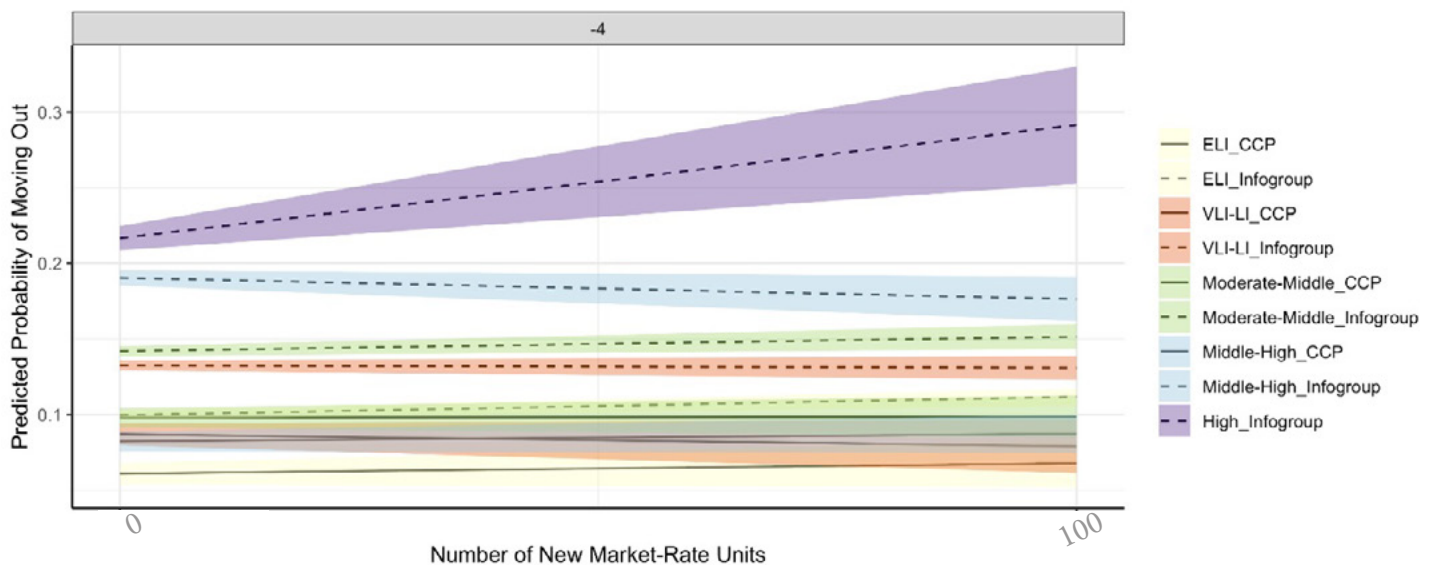
We examine this question by subsetting our sample to just the Oakland, San Francisco, and San Jose neighborhoods that are gentrifying (substantially increasing in housing

prices or rents, while also experiencing a substantial influx of high-income or highly-educated residents) and examining the impacts of new market-rate housing production. As Figure 5 demonstrates, overall mobility rates tend to be higher in gentrifying tracts, perhaps due to transient occupancy by higher-SES groups. Rates of people moving out remain the same in gentrifying areas through four years after construction of 100 units, with the exception of the highest socio-economic status residents. They are much more likely to move out (increasing from 22% to 31%). Middle socio-economic status residents are slightly less likely to move out. Of note, however, the full analysis suggests that outmigration rates may be slightly higher in the initial year after construction, or when the number of new units constructed reaches as many as 600.

**Figure 5. Gentrifying neighborhoods: Moving out after Two Years...**



**and after Four Years...**



Sources: FRBNY Consumer Credit Panel/Equifax Data, Infogroup, and UDP New Housing Production Database

The models confirm that over a four-year period, new market-rate housing construction slightly increases outmigration for very low- to moderate-SES groups, while slightly decreasing it for middle- and high-SES residents; impacts for extremely low-SES groups are mixed. Positive and negative impacts vary by context and disappear quickly (except for high-SES groups) in gentrifying areas. The slight impacts occur despite accounting for previous churn patterns, i.e., controlling for outmigration and immigration rates in previous years. The models also control for the presence of subsidized housing and tenant protections (both just cause and rent stabilization ordinances), which both significantly reduce outmigration (as discussed in more detail in the full report).

The next section turns to the effects of new market-rate

housing production on immigration, i.e., the potential of new supply to initiate the vacancy chains that will create affordability through filtering. In these figures, an upward slope indicates that residents are more likely to move into neighborhoods with new production, while a downward trend indicates that they are less likely to move in. A flat slope means that new production does not make these neighborhoods more accessible for those residents.

#### **New market-rate housing production increases immigration**

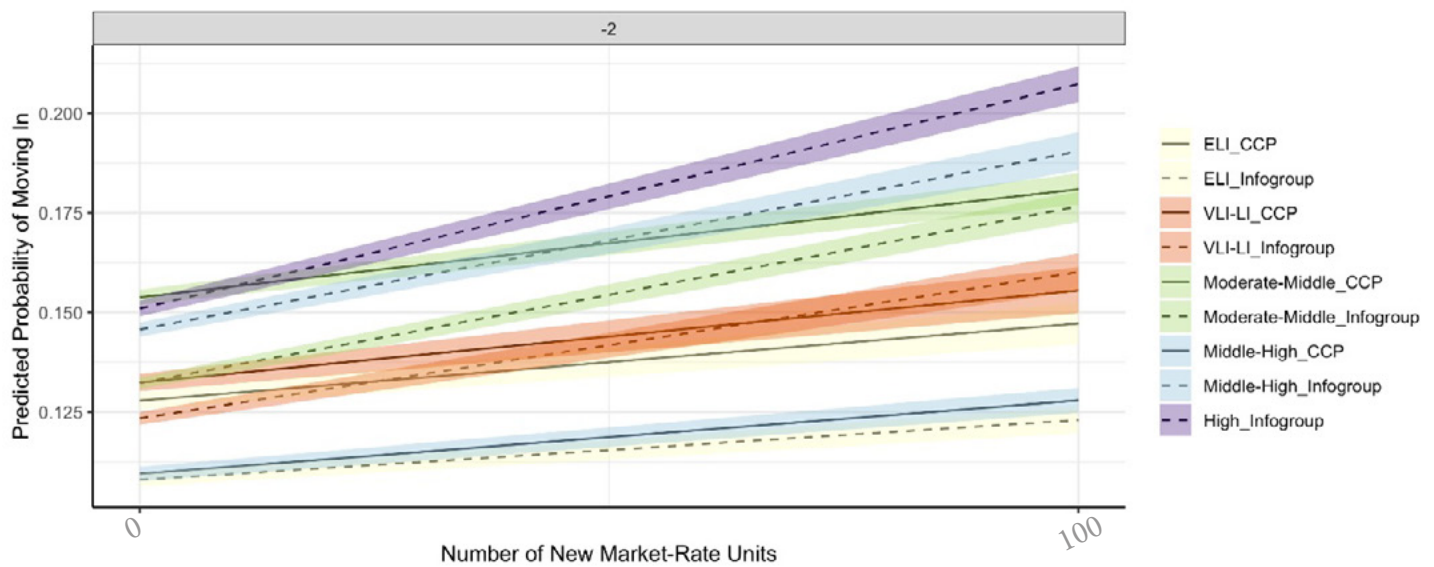
For all socio-economic groups and across the nine-county Bay Area, new market-rate construction in a neighborhood results in more people moving in. These effects become less pronounced, however, four years after construction



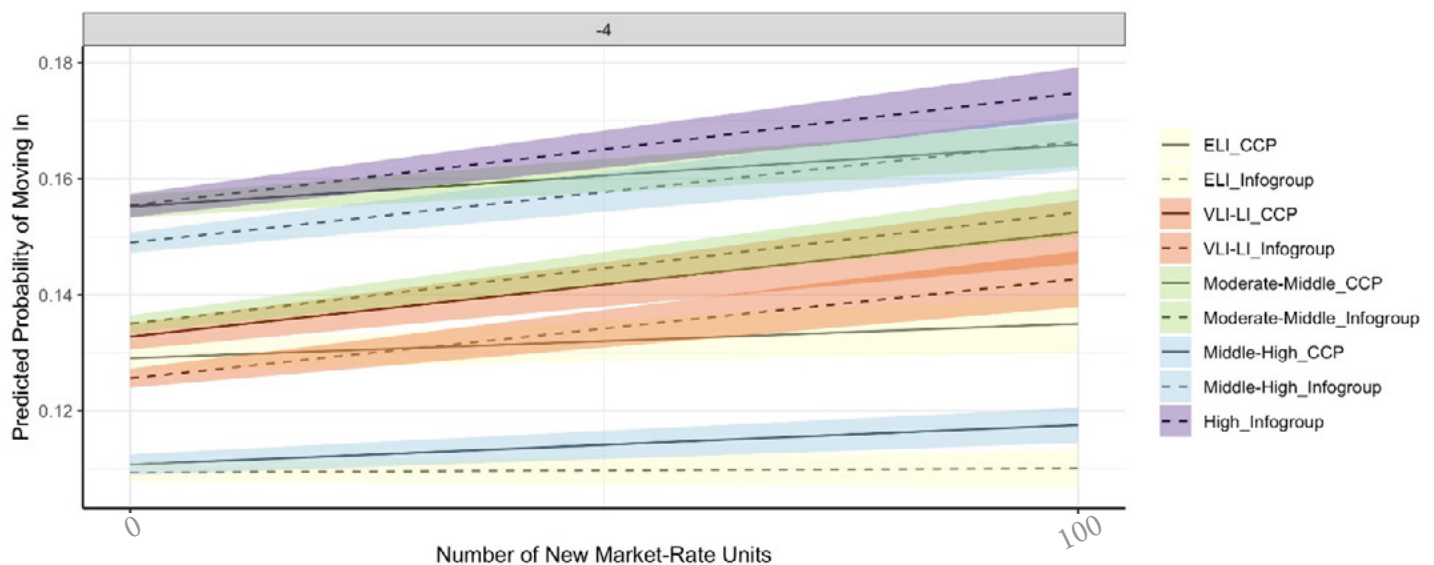
(Figure 6). For extremely low-SES households, for every 100 new market-rate units built, one more household

moves into the neighborhood than would have without the construction.

**Figure 6. San Francisco Bay Area: Moving in after Two Years...**



**and after Four Years...**



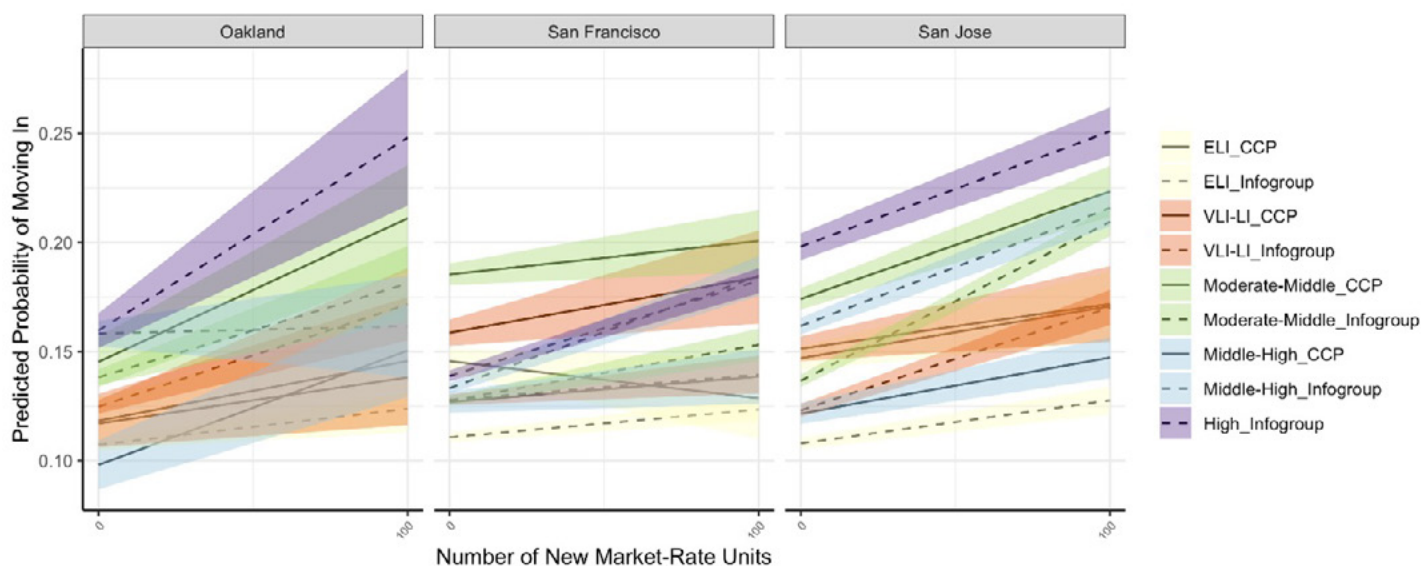
Sources: FRBNY Consumer Credit Panel/Equifax Data, Infogroup, and UDP New Housing Production Database

### **New market-rate construction is associated with higher immigration for most groups in major cities**

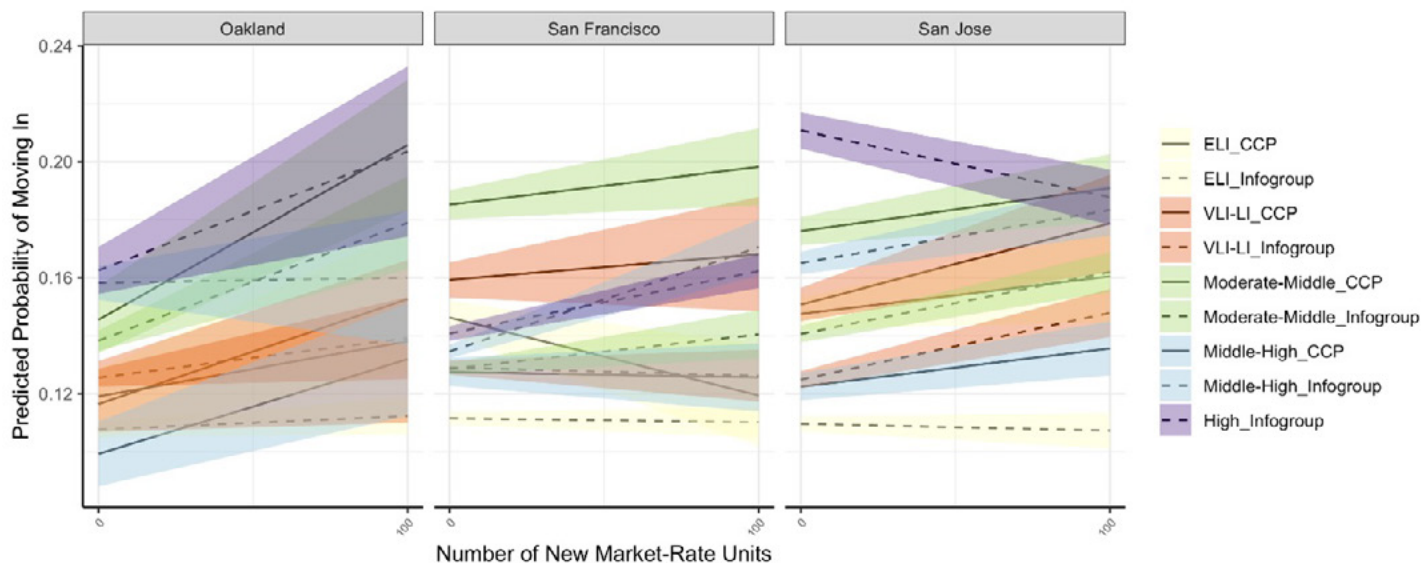
The production of new market-rate housing is accompanied by increases in immigration in all three cities across SES groups and time periods, with the exception of extremely low-SES groups in San Francisco (according to the

CCP/Equifax data only) and high-SES groups in San Jose (after four years) (Figure 7). Impacts are steepest in the beginning and decline over time. For example, the immigration rate for very low-SES residents in San Francisco increases by about 2% in Year 2, but the increase slows to about 0.5% or less by Year 4.

**Figure 7. Principal Cities: Moving in after Two Years...**



**and after Four Years...**



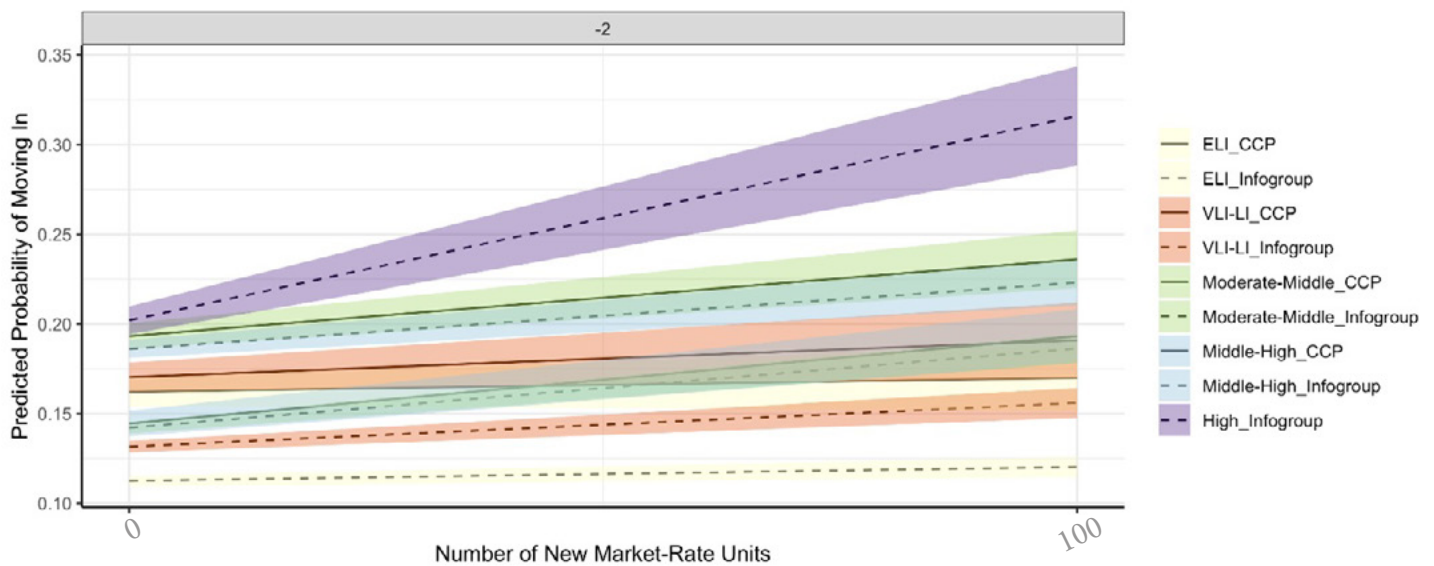
Sources: FRBNY Consumer Credit Panel/Equifax Data, Infogroup, and UDP New Housing Production Database

**New market-rate construction is associated with higher immigration in gentrifying areas, particularly for high-SES groups, but effects decay after 4 years for all groups except the high-SES**

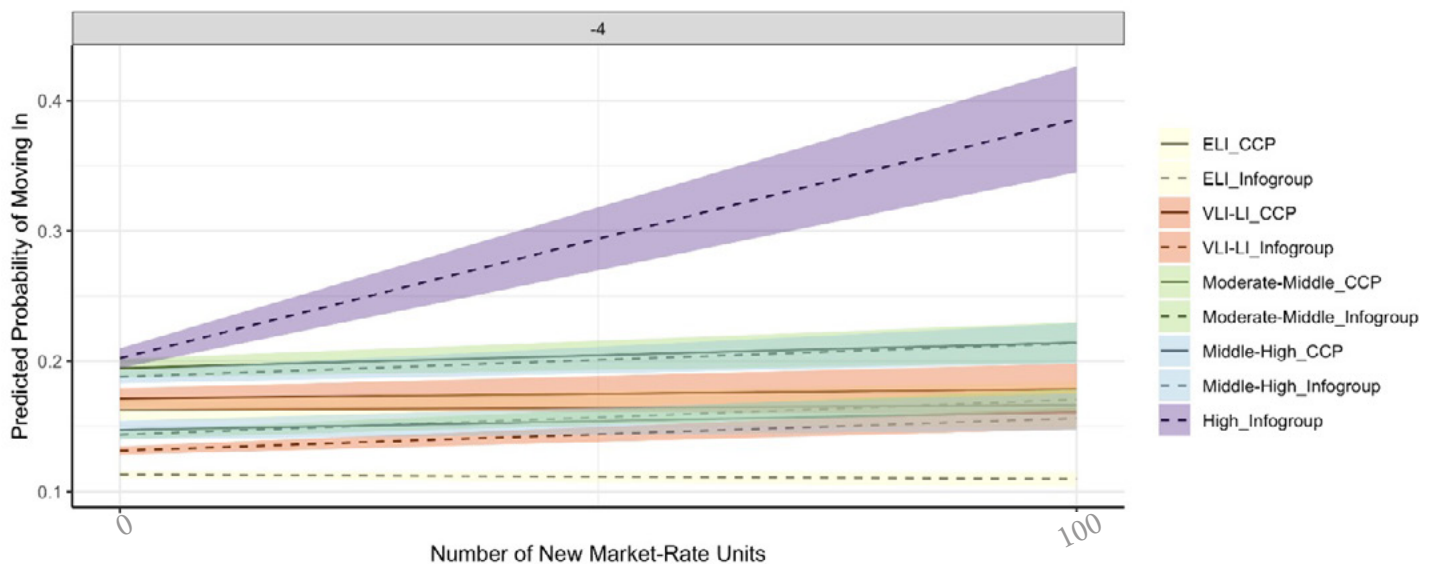
In gentrifying neighborhoods of the core cities in the San Francisco Bay Area, new market-rate construction is associated with increasing immigration across all SES groups

(Figure 8), particularly high-SES residents. For example, very low-SES groups might see one or two additional households for every 100 move-ins. Rates of people moving into a gentrifying area after new construction at first increase for all socio-economic groups, but by 4 years later return to normal for all groups except high-SES residents, who continue to move in at higher rates.

**Figure 8. Gentrifying neighborhoods: Moving in after Two Years...**



**and after Four Years...**



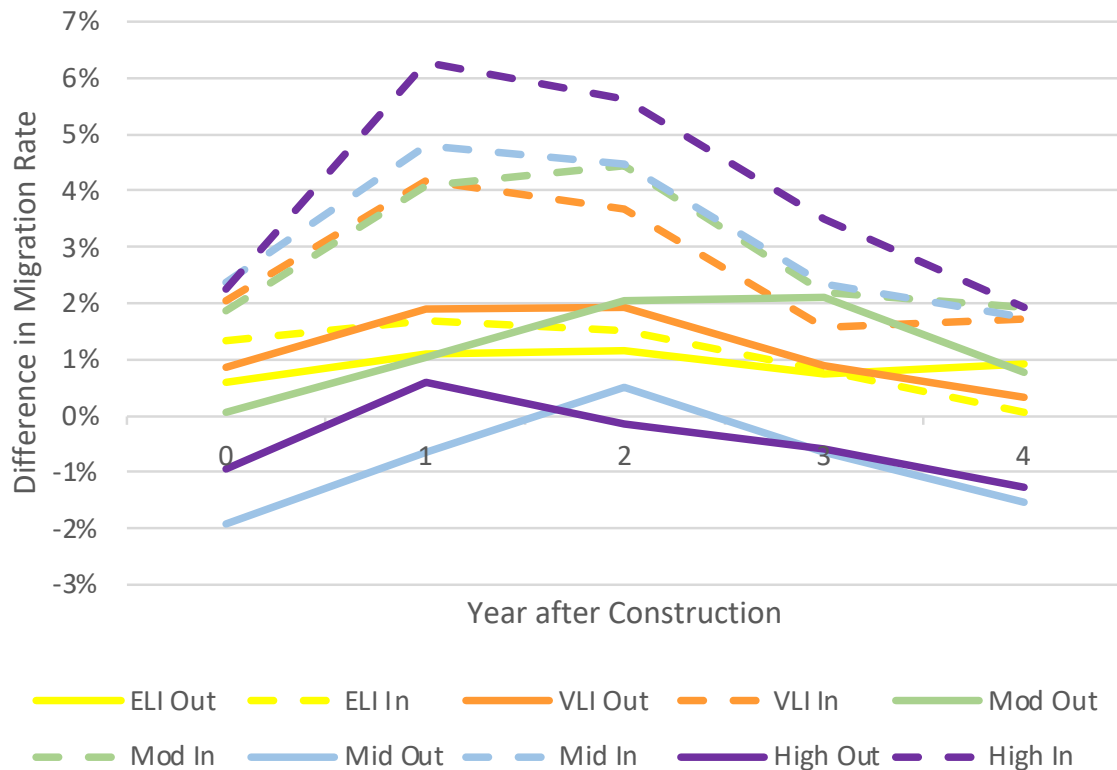
*Sources: FRBNY Consumer Credit Panel/Equifax Data, Infogroup, and UDP New Housing Production Database*

Thus, the construction of new market-rate housing units increases immigration in all types of neighborhoods in the Bay Area. These impacts occur despite controlling for previous churn patterns. Tenant protections may be reducing immigration for some groups, which we describe in more detail in another brief in this series.

**In sum, new market-rate production increases both outmigration and immigration slightly, and benefits higher-SES groups the most.**

To summarize, Figure 9 illustrates outmigration (solid line) and immigration (dotted line) rates for different SES groups

by year after construction.<sup>19</sup> Across SES groups, immigration rates are consistently higher than outmigration, suggesting that market-rate production is associated with net positive migration to a neighborhood. In a typical year without construction, outmigration rates generally range from a low of about 9% for the lower-SES groups to a high of 16% for higher-SES groups, and when construction occurs, outmigration rates never increase by more than 2%. But results differ across SES groups, with the middle- and high-SES groups most likely to move in and least likely to move out (i.e., experiencing the greatest benefit)



Source: Infogroup data and UDP New Housing Production Database.

## Conclusion and policy implications

Using fine-grained data on new market-rate housing production and household mobility, this study finds that when new market-rate housing is built, there is a slight increase in both people moving out of the neighborhood and people moving in (churn) across most socio-economic groups. All but the lowest-SES residents experience increased outmigration rates, and the highest-SES groups move out at lower rates and move in at higher rates than others. In other words, market-rate housing production shifts outmigration and immigration patterns only very slightly, and primarily benefits high-SES groups.

Thus building new housing creates modest churn: some households leave and others move in, and the net impact on mobility is minimal, at least over the four-year period studied. The fact that new housing encourages newcomers at all income levels to move in suggests that market-rate construction is easing housing market pressures. At the same time, some households may be moving out involuntarily. Even if they are replaced by others at similar income levels, there is cause for mitigation of displacement impacts, in order to avoid the disruption of lives and communities.

Effects of new market-rate construction on both outmigration and immigration tend to be stronger in Oakland than in San Francisco and San Jose, and tend

to be less pronounced in gentrifying areas. Differences among cities may occur for a variety of reasons related to the local market and policy context. For example, perhaps because gentrifying areas offer a variety of housing types that regularly experience high churn, the new construction per se does not make a major difference in outmigration, except it is increasing churn—both outmigration and immigration—for the highest-SES groups.

Of note, this study only examined development impacts on mobility during a four-year period after construction. Over the long-term, effects may change: outmigration may increase, and immigration may well slow. However, given the lack of new construction in the region, it is not yet possible to study displacement effects over the long term.

Our findings improve on those of other studies because we are able to examine the SES of households that move, rather than assuming that households have the same characteristics as their overall neighborhood (i.e., the ecological fallacy). Our own previous work examined only the aggregate change in low-income residents.<sup>20</sup> By accounting separately for both in- and out-migration by SES, this new study is better able to pinpoint neighborhood change.

This study suggests a level of displacement associated with new construction that is at least partially mitigable. For example, while in a normal year, 10% of households



might move out, a construction year will mean that 12% move out per year for the next four years. If a block group houses 500 households, then 50 move out in a typical year, but 60 might move out each year post construction, for a total of 40 displaced households over four years. Thus, displacement impacts could be mitigated with one mid-size apartment building with entirely affordable or subsidized units.



Image Credit: rbotman01

To help existing residents stay in their neighborhoods after new market-rate construction, we recommend either subsidized housing construction (with community preference) or housing preservation with continued protections. The most effective strategy may be acquiring multi-unit rental properties that are at risk of becoming unaffordable, via a program like San Francisco's Small Sites Acquisition and Rehab Program. Other potential approaches include tenant opportunity to purchase programs, property tax incentives for building owners, condominium conversion restrictions, and community land trusts.<sup>21</sup> Tenant protections will also help to mitigate displacement, but may increase exclusion for some low-SES groups without being coupled with these other strategies. Other policy briefs in this series explore the potential of tenant protections in more detail. Ultimately, policymakers must pursue not only new market-rate production, preservation, and tenant protections, but also bolder initiatives that substantially expand social housing.

The San Francisco Bay Area is an extreme case study, with job growth outpacing new housing production and resulting in supply shortages and price spikes that date back at least 30 years. In this context, the traditional mechanism for providing housing affordability for all but the lowest income households—filtering—is broken. In the face of this structural problem, the relatively few market-rate units that are being built are only providing minimal relief, and their impacts may be distorted. Notably, in regions where there is no shortage of affordable housing to start with, market-rate construction may have different impacts, or may not be the appropriate approach to mitigate displacement.

### About the Authors

**Karen Chapple**, Ph.D., is Professor Emerita of City & Regional Planning at UC Berkeley, and Director of the School of Cities/Professor of Geography & Planning at the University of Toronto.

**Jackelyn Hwang**, Ph.D., is Assistant Professor of Sociology and Director of the Changing Cities Research Lab at Stanford University.

**Jae Sik Jeon**, Ph.D., is Assistant Professor of Real Estate Studies at Konkuk University.

**Iris Zhang**, M.A., is a Ph.D. student in Sociology at Stanford University

**Julia Greenberg**, M.P.P., is Research Manager at the Urban Displacement Project at UC Berkeley.

**Vasudha Kumar**, B.Sc. is the Social Science Research Analyst at the Changing Cities Research Lab at Stanford University

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The Institute of Governmental Studies is California's oldest public policy research center. As an Organized Research Unit of the University of California, Berkeley, IGS expands the understanding of governmental institutions and the political process through a vigorous program of research, education, public service, and publishing.

### About CCRL

The Changing Cities Research Lab at Stanford University uses innovative data and methods to study the relationship between contemporary changes in U.S. cities and the durability of neighborhood inequality and segregation. With a focus on gentrification and racial stratification, CCRL aims to advance policy solutions that promote equity as cities change.

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### About UDP

The Urban Displacement Project (UDP) is a research and action initiative of the University of California Berkeley and the University of Toronto. UDP conducts community-centered, data-driven, applied research toward more equitable and inclusive futures for cities. Our research aims to understand and describe the nature of gentrification, displacement, and exclusion, and also to generate knowledge on how policy interventions and investment can support more equitable development.

## Endnotes

- 1 Based on estimates in Myers & Park (2018), who estimate a need for 2.5 million additional units by 2025, with just 1 million permits projected. Also see California Department of Housing and Community Development 2000; Myers & Park 2019 <https://www.huduser.gov/portal/periodicals/cityscape/vol21num1/article7.html>; Rodríguez-Pose & Storper 2020.
- 2 One reason is the entrenched opposition to new development, which creates costly delays and often halts development altogether (Manville & Monkkonen 2021, Monkkonen & Manville 2019).
- 3 See, for example, the battle against SB 50 <http://hrcsf.org/2020/01/22/tenant-groups-oppose-sb50/>.
- 4 Chapple et al. 2022. This full report can be accessed [here](#).
- 5 Been, Ellen, and O'Regan, 2018
- 6 For prices, see Brunes et al. 2016, Ding & Knaap 2002, Ooi & Le 2011, but see Ahvenniemi et al. 2018, Ding et al. 2000, and Wiley 2009, which found mixed or no impacts or decrease; for rents, see Asquith, Mast, & Reed 2019, Li 2019, and Pennington 2021, but also see Damiano & Frenier 2021, who find no significant impact.
- 7 Damiano & Frenier 2021. Looking at new residential development in San Francisco and nearby property prices, Olsen (2019) also finds heterogeneous impacts across price tiers.
- 8 Been, Ellen, O'Regan, 2018; Rosenthal, 2014
- 9 Mast 2019; Myers, Park, & Cho 2021.
- 10 Asquith, Mast, & Reed 2019; Mast 2019; Pennington 2021.
- 11 See Carlson 2020 for this critique of studies such as Zuk & Chapple 2016.
- 12 For full details, please see our technical report, [here](#).
- 13 Now called Data Axle.
- 14 Category names are consistent with the Federal Reserve Bank definitions, accessed at [https://www.federalreserve.gov/consumerscommunities/cra\\_resources.htm](https://www.federalreserve.gov/consumerscommunities/cra_resources.htm). Infogroup categories are relative to the AMI for the county, while the CCP/Equifax data is relative to the region as a whole. Categories for the CCP/Equifax data were assigned as follows:
- Extremely low-income ("ELI"): < 580 or no Score (too few accounts or new credit)
  - Very low-income ("VLI-LI"): 580-649
  - Moderate-Middle SES: 650-749
  - Middle-High SES: 750 or higher
- 15 Source: <https://www.census.gov/library/visualizations/time-series/demo/historic.html>
- 16 Our estimates range from 18.7% (Infogroup) to 23% (CCP/Equifax).
- 17 The Infogroup results are similar, and also show that the highest SES group moves out less frequently when new construction occurs.
- 18 Patterns are generally similar for years one and three as well.
- 19 Note, this figure uses Infogroup data only.
- 20 Zuk & Chapple 2016.
- 21 Chapple & Loukaitou-Sideris 2021.
- 22 These data are based on 2000 Census boundaries and utilize a crosswalk from the National Historical Geographic Information System to 2010 Census block group and tract boundaries for the analysis.
- 23 For the Stanford team, because the CCP data starts at 2002 and does not include values for 2004, panel year 2002 (222,881 observation) is dropped, panel year 2003 is based on the prior year rates, panel years 2005 and 2006 are based on the two-year averages from 2002 and 2003, and 2003 and 2005 respectively. 3-year averages are only used for panel years 2007 and above.
- 24 Due to collinearity issues, the Berkeley team removes the "percent college-educated" control from the San Francisco and Oakland models.
- 25 We also made use of the San Francisco Planning Department's Housing Inventory dataset, which contains information on new construction, demolition and alteration and repair activity in the city back to 2005.
- 26 Because this data does not include a year built variable, we matched these properties to the Zillow data as well as data from Dataquick and the National Housing Preservation Database to obtain this information.
- 27 As a sensitivity analysis, we also ran the same set of models with moves at the tract level (i.e., a household's moves in and out of its census tract instead of its block group, which should include more local moves), and the results were very similar.

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## Appendix A. Data and Model Construction.

### Data

The Infogroup Residential Historical Data provides annual information on individual owner and renter households from 2006-2019, including geographic coordinates of where the households live, household income, and demographic characteristics (many imputed), with an average of approximately 3 million Bay Area households per year. The process of validation revealed that the Infogroup data requires careful data cleaning and wrangling, including elimination of households not consistently represented in the dataset, and weighting to be consistent with the American Community Survey. The CCP data provides quarterly information on a 5% sample of adult consumers from 2002-2018, with census block-level<sup>22</sup> information on where respondents live, as well as respondents' age, loans, mortgages, financial issues (e.g., delinquencies, bankruptcy, foreclosure), and Equifax Risk Scores (credit scores that indicate financial stability), with an average of 240,000 Bay Area residents per year.

### Model Construction

To account for household-level characteristics that are related to differences in whether individuals (or households) move, the Infogroup team controls for age and race of household head, length of residence, number of children, number of adults, and marital status. The CCP/Equifax team controls for age, whether the household has a mortgage as a proxy for homeownership, whether the household has delinquency on credit accounts as a proxy for financial instability, and the adult household size. Both control for locational characteristics by including indicators in our models of the subregion: the City of Oakland, the City of San Francisco, the City of San Jose, the North Bay (Marin, Napa, Sonoma, and Solano Counties), South Bay (San Mateo and Santa Clara Counties) excluding San Jose, and East Bay (Alameda and Contra Costa Counties) excluding Oakland. The Stanford team also includes indicators in our models for the panel year.

We also include a control for the natural log-transformed number of new market-rate units and number of new subsidized units, respectively, as well as the percent of housing units covered by rent control or just cause that year. To account for the possibility that outmigration and immigration rates are simply a product of neighborhood churning, we also include a rolling prior 3-years' average of the block group out- and immigration rates by SES.<sup>23</sup> Finally, we account for several neighborhood-level characteristics that could be associated with mobility patterns. These include percent Hispanic, percent college-educated, percent foreign-born, poverty rate, percent homeownership, median home value, median gross rent,

vacancy rate, and percent of housing built in the last 20 years, all based on 2000 U.S. Census data. In addition, we include the number of subsidized housing units as of 2016 from the National Housing Preservation Database.<sup>24</sup>

Since neither of these data sources accounts for household size in assigning SES categories, the analysis controls for this. We subset the Infogroup data to renters, but the Equifax/CCP data does not differentiate between renters and owners. We ran supplementary analyses separately for individuals under age 65 without a mortgage.

We constructed two separate databases of new housing production; one for total units and one for subsidized units. The total units database, which was created using the ZTRAX sales and assessor data from Zillow, along with California Department of Housing and Community Development's Annual Progress Report (APR) data from 2018 and 2019, spans the years 2000-2019 and aggregates new production by year and census block group.<sup>25</sup> The subsidized housing database, which uses data from the California Housing Partnership, includes properties that either used to or currently receive state (LIHTC, HCD, CalHFA) or federal funding (HUD, USDA).<sup>26</sup>

The analysis estimates two models. First, we estimate the probability that an individual (CCP) or household (Infogroup) of different SES moves out of a block group following new production using a linear probability model.<sup>27</sup> Second, we estimate the probability an individual or household moves into a block group following new production using a linear probability model. We test how the effects of new production differ across SES categories by including interaction terms between the new production variable and SES categories in these two sets of models.

To examine only gentrifying neighborhoods in the three cities, we construct gentrification measures from the 2000 and 2006-2010 ("2010") ACS. Tracts are considered gentrifiable if the median household income in 2000 was less than the subregion's median household income in 2000. Among gentrifiable tracts, tracts are split into gentrifying and non-gentrifying tracts. Tracts are considered to be nongentrifying only if 1) the percentage increase in either the median rent or median home value was less than the subregion's 25<sup>th</sup> percentile of the percent increase on either of those indicators, and 2) the percent increase in either the population of college-educated residents or the median household income was less than the subregion's 25<sup>th</sup> percentile of the percent increases on either of those indicators. Tracts are considered to be gentrifying otherwise.