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Housing Market Interventions and Residential Mobility in the San Francisco Bay Area

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Executive Summary

Governments at all levels enact a wide array of policies and programs to ensure that residents of all incomes will have access to housing. To boost production, jurisdictions enable some development by upzoning, land assembly, and permit streamlining, among other strategies. For those unable to procure housing via the market, policymakers support subsidized housing production, affordable housing preservation, and tenant protection programs. Despite these efforts, an affordable housing crisis still afflicts many US housing markets, including most of California. Yet, in part because of the unavailability of appropriate data, there is little evaluation research on which housing solutions will be most effective in stabilizing communities so that those who wish to stay are able to, even as newcomers arrive.

This study seeks to fill this gap by building unique, fine-grained data sets that capture both patterns of individual and household mobility and the impacts of specific housing interventions on the nine-county San Francisco Bay Area. We use individual and household mobility and the type of neighborhood moved to (similar or downward) as proxies for displacement, or forced moves, and assess exclusionary displacement by examining who moves into neighborhoods with specific interventions. To measure displacement, we track the movements of individual households by income and financial stability levels in and out of neighborhoods, measured as census block groups (geographic areas with typically 600 to 3,000 people), using two different proprietary datasets on individual and household characteristics. This provides unique robustness to our study, since we can validate results across datasets. We examine mobility patterns for a four-year period for new developments and a one-year period for tenant protections. To identify the role of housing policies and investments, we build a unique block-level dataset on new market-rate and subsidized housing constructed, with estimates of the number of existing housing units currently protected by either just cause or rent stabilization ordinances.

Using this new dataset, we are able to answer four key questions about displacement, looking at movement both out of and into local neighborhoods:

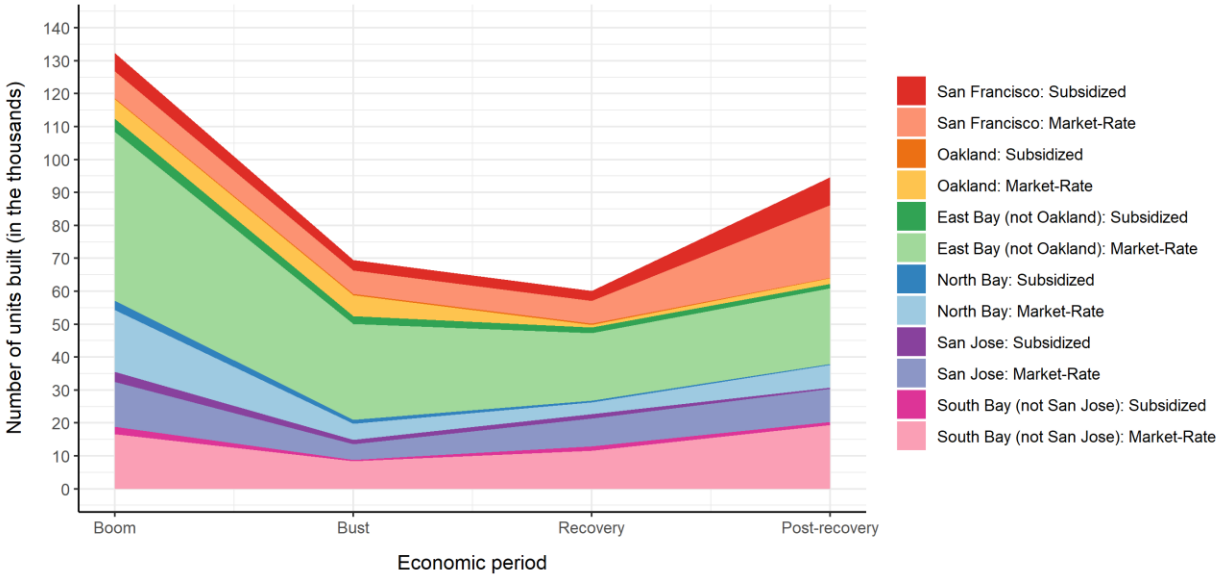
- How does market-rate development impact displacement?
- How does subsidized development impact displacement?
- How do tenant protections, including both rent stabilization and just cause for evictions protections impact displacement?
- And where do people go when they are displaced?

We first examine trends in housing production and tenant protections over time. From 2000-2019, 385,094 new units were produced in the Bay Area, of which 6.2% were subsidized. This total falls far short of demand, creating unusual pressure on the regional housing market (Metropolitan Transportation Commission 2020). Figure ES1 displays the distribution of new housing production across different regions in the Bay Area and over time, distinguishing between market-rate and subsidized housing units. Most new production, including subsidized housing, over the last two decades occurred during the housing boom period (2002-2006), 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.

Figures ES2 and 3 display the number of units covered by just cause for evictions and rent stabilization ordinances, respectively, for each jurisdiction in the Bay Area where these tenant protections existed between 2002 to 2019. Between 2014 and 2017, there was an increase in the number of units covered by both types of protections. Of all the jurisdictions, San Francisco consistently has the highest number of units subject to both types of tenant protections. San Jose and Oakland have the next highest coverage for rent stabilization; San Jose did not adopt any just cause for evictions protections until 2017.

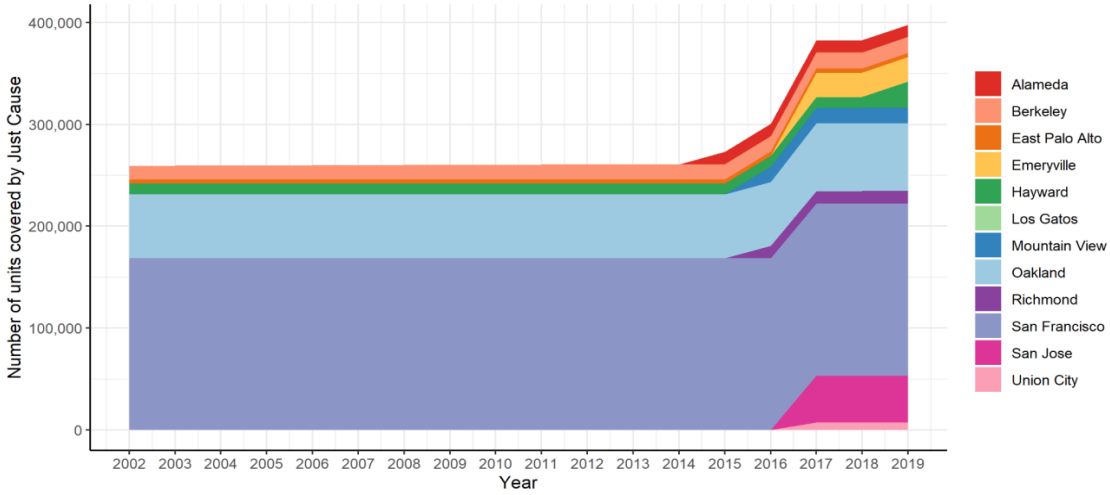
Figure ES1. Construction of New Housing Over Time by Subregion[2]



Source: Urban Displacement Project (UDP) New Housing Production Database

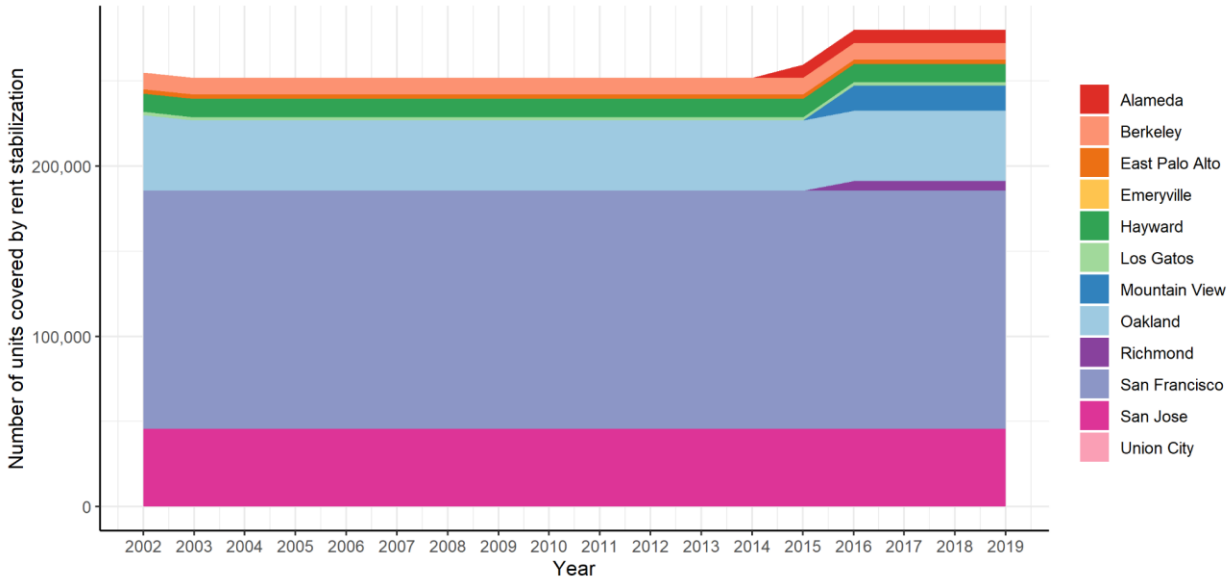
[2] 'Boom' = 2002-2006; 'Bust' = 2007-2009; 'Recovery' = 2010-2014; 'Post-recovery' = 2015-2019.
'North Bay' includes Marin, Napa, Solano, and Sonoma Counties. 'East Bay' includes Contra Costa and Alameda Counties, excluding Oakland. 'South Bay' includes Santa Clara and San Mateo Counties, excluding San Jose.

Figure ES2. Number of Units Subject to Just Cause for Evictions Ordinances by Jurisdiction



Source: UDP Tenant Protection Database

Figure ES3. Number of Units Subject to Rent Stabilization Ordinances by Jurisdiction



Source: UDP Tenant Protection Database

The UC Berkeley and Stanford teams utilize two distinct large-scale datasets–Infogroup and the Federal Reserve Bank of New York/Consumer Credit Panel (CCP), respectively–and generally find similar impacts of market-rate construction and of tenant protections for some groups, but sometimes disagree on other findings.

In sum, we find that market-rate housing production is associated with increased moving—both out of and into neighborhoods—across all income/financial stability status (hereafter SES) levels, except for the highest-SES households, who move out less with more housing production and are relatively more likely to move in than the lowest-SES groups. When market-rate housing production occurs, the lowest-SES movers tend to make constrained moves—similar or downward moves as measured by the income or poverty level of the receiving neighborhood.

We are not able to discern impacts from subsidized housing production because of low sample sizes and lack of subsidized production, but we do find that middle-SES groups are more likely to both move in and out. Both just cause and rent stabilization ordinances are associated with decreased moving out of neighborhoods for the lowest SES and increased moving out of neighborhoods for those in higher-SES groups. Rent stabilization is associated with fewer lower-SES residents moving into neighborhoods, and both just cause and rent stabilization ordinances are associated with fewer high-SES residents moving into neighborhoods. Subsidized housing production, just cause, and rent stabilization are all associated with the lower likelihood of low-SES groups making a constrained move.

Summary and Policy Implications

Despite some areas of disagreement and uncertainty, this study suggests that new market-rate housing production is generally resulting in slight increases in both outmigration and inmigration. New subsidized construction tends to increase inmigration but has mixed effects on outmigration. Thus, new construction fosters churn: some households leave while others move in, and the net impact is minimal, at least over the four-year period studied. That newcomers at all SES levels can move in suggests that market-rate construction is easing housing market pressures. At the same time, some households may be moving involuntarily, with lower-SES groups exhibiting constrained moves. Even if they are replaced by others at similar SES levels, displacement would still need to be mitigated in order to avoid the disruption of lives and communities.

Extremely low- to low-SES groups experience increases in outmigration of 1-2% in each subsequent year for 4 years when new market-rate construction occurs in their block group, whether there are 100 or 1,000 new units. For example, while in a normal year 10% of households might move out, new construction will mean that 12% move out per year for the next 4 years. In a block group that houses 500 households with 50 moving out in a typical year, new construction will result in 60 households moving out each year after construction, totaling 40 additional displaced households in 4 years.

This suggests a level of impact that is readily mitigable. Which approach is most appropriate? Since producing new subsidized units may have the unintended consequence of spurring displacement, communities might best look to housing preservation strategies. The most effective 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, property tax incentives for building owners, condominium conversion restrictions, and community land trusts.

Tenant protections have mixed effects across income groups, but they are generally reducing this churn. Where tenant protections fall short is by discouraging inmigration, reflecting reduced housing options. Although the exact mechanism by which this works is unclear, our models and results suggest that new housing production should help mitigate this.

This study examines the effects of new housing production and tenant protections together, finding that they can complement and reinforce each other. In general, even when new market-rate housing production is associated with heightened outmigration, tenant protections (measured together) reduce it. In contexts where tenant protections are reducing outmigration, new subsidized construction can help reduce it further. When tenant protections reduce inmigration, policies to promote housing production can help mitigate it.

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 thirty 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 policies studied here–market-rate and subsidized housing production, just cause ordinances, and rent stabilization–are only providing minimal relief, and their impacts may be distorted. For example, new construction may result in direct displacement, while rent stabilization may result in exclusionary displacement, subsequently leaving local residents with limited opportunities to move by choice. At the same time, the depth of the housing shortage means that tenant protections may enable cities to retain accessibility for residents at all income levels in the short and medium timeframe. In regions where there is no shortage of affordable housing to start with, these policies may have very different impacts–and may not be needed to mitigate displacement.

I. Introduction

Governments at all levels enact a wide array of policies and programs to ensure that residents of all incomes will have access to housing, yet consistently fail to meet the housing needs of the lowest income. To boost production, jurisdictions enable some development via upzoning, land assembly, and permit streamlining, among other strategies. For those unable to procure housing via the market, policymakers support subsidized housing production, housing choice vouchers, affordable housing preservation, and tenant protection programs.

Despite these efforts, an affordable housing crisis still afflicts many US housing markets, including most of California. As regional economies continue to grow, an influx of high-income workers has put new pressure on affordable rental housing stock. The lack of affordability has forced some households to move out and made it challenging even for middle-income households to move in. With scarce resources available to mitigate the crisis, lawmakers need to target spending to the most effective programs. Yet, in part because of the unavailability of appropriate data, there is little evaluation research on which housing solutions will be most effective in stabilizing communities so that those who wish to stay are able to, even as newcomers arrive.

This study seeks to fill this gap by building unique, fine-grained data sets that capture both patterns of household mobility and the impacts of specific housing interventions on the nine-county San Francisco Bay Area. We use individual and household mobility and the type of neighborhood moved to (similar or downward) as proxies for displacement, or forced moves, and assess exclusionary displacement by examining who moves into neighborhoods with specific interventions. To measure displacement, we track the movements of individual households by income and financial stability levels in and out of neighborhoods, measured as census block group, using two different proprietary datasets on individual and household characteristics.[3] This provides unique robustness to our study, since we can validate results across datasets.

We examine mobility patterns for a four-year period for new developments and a one-year period for tenant protections. Higher-than-normal mobility rates indicate that involuntary displacement may be occurring. This measure lacks the precision of data produced from surveys that ask directly about the decision to move but is highly correlated with data that measures motivation (Carlson, 2020).[4] This measure thus falls short of a full measure of forced moves, but still captures disproportionate mobility that may occur for complex reasons not easily captured in a closed-ended survey.[5] Thus, we also duplicate our analysis focused on whether people move to similar or lower-income/higher-poverty neighborhoods to better reflect constrained moves (DeLuca et al. 2013; Desmond and Shollenberger 2015).

[3] Block groups are subdivisions of census tracts usually containing between 600 and 3,000 people.
[4] Carlson (2020) finds a significant 0.64 correlation between "motivational" mobility (economic or physical displacement, evictions, or harassment identified from survey data) and individual household mobility overall, with the former distributed far more unevenly across New York City neighborhoods.
[5] For example, households may move in anticipation of a life or rent change in future years, or because a better housing opportunity arises; these might be recorded in a survey as voluntary but may still be in a sense forced.

To identify the role of housing policies and investments, we build a unique block-level dataset on new market-rate and subsidized housing constructed, with estimates of the number of existing housing units currently protected by either just cause or rent stabilization ordinances.

Using this new dataset, we are able to answer four key questions about displacement, looking at movement both out of and into local neighborhoods:

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This report is organized as follows. We begin by describing research to date on the housing market impacts of infill housing development and tenant protections. The next section discusses our database construction effort and methods to analyze impacts. The results section provides both plots and regression tables looking at the patterns of moves out of homes (displacement) and moves into block groups (exclusion) and movers' destinations over time. We conclude with recommendations for how to prevent displacement most effectively using these interventions.

II. Reviewing the debate on housing interventions and displacement to date

The following reviews existing studies on the impacts of new housing production and tenant protections on displacement.

New housing production and displacement

In theory, by increasing the supply of housing, new housing production helps moderate housing costs, make housing more affordable to more households, and relieve displacement pressures (Been, Ellen, and O'Regan, 2018). But empirical studies reveal that though this is true at the regional level, supply impacts vary locally by sub-market and context. New market-rate production may actually result in rent increases in lower-priced residential buildings nearby (Damiano and Frenier, 2020), and may not preserve income diversity over the long-term (i.e., one or more decades) as low-income newcomers cannot move into a hot market context like San Francisco (Ding, Hwang, & Divringi 2016; Pennington, 2020; Zuk and Chapple, 2016). Yet, in markets that have struggled to add housing supply in recent decades, fostering new market-rate production is critical to local housing affordability in multiple ways: it reduces demand for existing stock, it enables funding for subsidized housing (e.g., via inclusionary housing programs), and it fills a gap where government subsidies will always fall short. In the following sections, we examine the literature on how new construction in the form of infill housing development impacts housing prices, rents, and household mobility.

Housing prices and rents

In the absence of rigorous data on household mobility, researchers have focused on how infill development affects prices and rents. Most of these studies examine just one case, usually in urban strong markets, but rarely contextualize their findings in terms of local growth trends. A

slight preponderance of studies finds that prices increase around new projects, with effects decaying with distance and tending to be greater for larger, for-profit developments relative to smaller, affordable housing projects (Brunes et al. 2016, Ding & Knaap 2002, Ellen & Voicu 2006, Galster et al. 2004, Simons et al. 1998 but see Ahvenniemi et al. 2018, Ding et al. 2000, Pollakowski et al. 2005, and Wiley 2009, which found mixed or no impact or decrease). In the case of San Francisco, new residential development leads to decreasing property prices in the immediate vicinity, presumably by adding more housing supply, but impacts are heterogeneous across price tiers (Olsen 2019). Property value increases are more likely to occur and will likely be larger in distressed or low-income neighborhoods (Brunes et al. 2016, Galster et al. 2004, and Ding et al. 2000).

Due to the lack of fine-grained, up-to-date data on rents, few studies have addressed how new development affects nearby rents. A recent study of new market-rate buildings in 11 cities across the US found that new buildings lower nearby rents by 5-7% (Asquith, Mast, and Reed 2019), while a study of high-rise building construction in New York City found that for every 10% increase in housing supply there is a 1% decrease in rents within 500 feet (Li, 2019). However, looking at new market-rate construction in Minneapolis, Damiano and Frenier (2020) find that the rent effects of the new construction depended on the submarket of the nearby buildings in terms of proximity, price, and size. For buildings catering to low-income renters, new construction significantly raised rents, with even higher spikes for those buildings closest to the new construction. These types of impacts are suggested by Davidson and Lees (2010), who argue that market-rate housing development raises rents and leads to displacement in multiple forms, for instance by "price shadowing" and loss of sense of place.

Household mobility and displacement

Infill development affects displacement more directly through two mechanisms that increased housing supply triggers: filtering and migration. The more housing available, the lower prices will get (Asquith, Mast, and Reed, 2019; Been, Ellen, O'Regan, 2018; Rosenthal, 2014). The cost of older market-rate housing will fall over time as units decline in quality, thus filtering to people at lower-income levels. Meanwhile higher-income people move from lower-rent housing to new market-rate housing, thus theoretically freeing up their previous units for lower-income households. This process may also work horizontally, as new housing stock accommodates local demand and eases pressures on existing housing stock.

Filtering has long functioned as the source of most affordable housing in the United States (JCHS, 2015). However, it works slowly (approximately 2% of rental units filter down to lower-income households each year), meaning that new units may take many decades to trickle down to the lowest income brackets (Rosenthal 2014). Filtering thus works particularly well to provide affordable options to moderate- and middle-income households, and usually falls short for the very low-income.

Regions with rapid housing price appreciation, affordable housing shortages, and high levels of rental demand relative to supply will experience slower rates of filtering, and desirable older units may filter up instead of down (JCHS 2019, Liu et al. 2020, Rosenthal 2014). While downward filtering can be rapid in certain regions, there are others, such as Los Angeles and Washington, DC, which primarily see upward filtering (Liu et al. 2020). Higher cost metros like these have seen decreased housing production–and presumably filtering–since the 1990s, due to

a variety of factors from regulation and zoning to the 1986 changes in the tax code that reduced incentives for multifamily construction. These regions are also facing serious affordable housing shortages; policies that encourage the creation of more housing will assist in easing demand pressures and allow downward or horizontal filtering to occur for those of relative moderate incomes (Liu et al., 2020).

Filtering works only as long as market-rate housing production keeps pace with demand, and households migrate into new market-rate housing, vacating their older units. Recent research suggests that the process of moving into market-rate housing initiates multiple rounds of migration that ultimate free up housing supply in low-income areas in just a few years (Mast 2019). A study of market-rate construction in 11 cities found that the share of people from very low-income neighborhoods moving into neighborhoods with these new units is higher, suggesting that the presence of these new units reduces costs in lower segments of the housing market (Asquith, Mast, and Reed 2019). Notably, these studies did not have data specifically on the income level of inmovers, and did not examine patterns of neighborhood change in the low-income areas from which households moved. This leaves open the possibility that high-income (rather than low-income) households are moving from low-income gentrifying areas to higher-income neighborhoods.

While the lion's share of the research on housing production and displacement is focused on market-rate housing, a San Francisco study also examines the effect of affordable housing production on displacement, finding that both market-rate and subsidized housing production prevent displacement (Zuk and Chapple, 2016). On the other hand, a subsequent study that examines the impact of both market-rate and subsidized construction on individual mobility finds no significant short-term impact of affordable housing on either rents or displacement nearby (Pennington, 2020). However, these studies suggest that subsidized housing construction can help reduce displacement over the long term, by targeting income groups at risk, preserving their housing, and preserving income diversity.

Adding housing affordable to the lowest income households may free up more units for other low- and moderate-income households—similar to the process described above for market-rate housing production (Emmanuel, 2016). On the other hand, new construction of subsidized units may crowd out nearby new rental construction in gentrifying areas, complicating these dynamics (Baum-Snow and Marion, 2009). Another San Francisco study found that new market-rate development reduces eviction risk for those living in close proximity, even with an influx of affluent residents (Pennington 2018). However, eviction notices are a narrow proxy for displacement that do not capture the many forms of indirect displacement related to market-rate development.

Tenant protections and displacement

Rent stabilization

Rent regulations (including rent control) emerged after World War II, when, in the face of housing shortages for returning soldiers, cities across the country implemented different forms of rent regulation to limit housing cost increases (Pastor et al., 2018). While specific rent regulation policies vary across time and geographic context, rent control today refers to a set of policies

restricting the amount landlords can raise rent in a given year, along with provisions that exempt new construction and bring rents to market rate once tenants move out.

The literature generally finds that rent control or, more accurately, rent stabilization policies are effective in preventing displacement and stabilizing neighborhoods (Pastor et al. 2018). Notably, the majority of these studies do not measure displacement directly, instead using proxy measures such as housing costs or rent prices to estimate the effect on existing tenants. Examining the migration patterns of tenants in small multi-family apartment buildings built before 1980 (protected by rent control) as compared with those built in 1980 or after (not protected by rent control), Diamond et al. (2019) suggest that rent control limited the displacement of tenants and allowed them longer tenure in their units, having an especially strong effect among minority and elderly communities.

Overall, tenants in rent-controlled units are 10-20% more likely to remain at their original address and are more likely to remain in San Francisco (ibid.). When Massachusetts unexpectedly removed rent control in 1995, property values in Cambridge increased by 16%, on average, for units that were no longer subject to rent regulations, which ostensibly led to the displacement of some tenants who had been protected by rent control (Autor et al., 2016). Another Boston study found that removing rent control shortened renter stays in a property by about 1.84 years (Sims, 2007).

Several recent studies examine rent stabilization in the California context, which is a unique policy environment due to the Costa-Hawkins Rental Housing Act. This state law, passed in 1995, ensures that stabilization does not apply to newly constructed units, but it enacts vacancy decontrol, which may encourage people to stay longer in units they would otherwise prefer to move away from, Research in Silicon Valley showed that the nuances of rent control (what cap exists, how many buildings are included, etc.) can make a significant difference. In San Jose, for example, where there has been some version of rent control in place since 1979, the cap on annual rent increases was set at 8%. While other cities with rent regulations in the area saw lower tenant outmigration than nearby cities without regulations, San Jose witnessed no difference, potentially demonstrating that the 8 percent cap was too high to have an effect (Hwang and Shrimali, 2019).

Yet, rent stabilization distorts housing markets in several ways that may end up exacerbating displacement. Various studies have shown that owners of rent stabilized units keep them off the rental market, convert them to condos, renovate them so they are no longer covered by rent control, or let their properties deteriorate (Asquith 2019; Diamond et al., 2019; Sims 2007). In sum, rent stabilization protects current tenants while potentially harming lower-income residents who are not benefitting from the policy (Diamond et al., 2019). It may also exacerbate exclusionary displacement, by inducing residents to remain in a location they would want to move away from and slowing normal neighborhood churn.

Just cause eviction protections

Just cause eviction protections forbid property owners from evicting tenants except under certain specified circumstances, such as nonpayment of rent, violation of lease terms, or permanent removal of a dwelling from the rental market. In the absence of such restrictions, landlords may serve tenants with notices to vacate without cause (“no fault” evictions), legally compelling the

surrender of the unit to the property owner within a certain period of time. Just cause protections therefore generally shield tenants from arbitrary evictions that may occur for reasons including economic incentives in a warming rental market, retaliation against tenants, or other instances in which tenants are not at fault (Cuéllar 2020). The coverage of just cause ordinances varies by jurisdiction: they may apply their protections universally or only to a subset of the housing stock (e.g., structures built prior to 1980).

There is little systematic evidence about whether just cause ordinances reduce evictions (and thus displacement). However, one recent study selected four cities with recently passed just cause protections, compared evictions and eviction filings before and after their implementation, and compared these results to those of cities with similar characteristics but not similar protections (Cuéllar 2020). Cities with just cause protections saw the incidence of evictions and eviction filings decline after passage, compared to their counterparts without such protections in place (ibid.).

III. Data and methods

This section first describes the data for the housing market interventions (new market-rate and subsidized production, just cause ordinances, and rent stabilization ordinances) under study. Then, we describe the data and measures for mobility outcomes for the UC Berkeley and Stanford teams separately. A final section outlines the models used, which were the same across the two teams.

Housing market interventions data

Urban Displacement Project (UDP) New Housing Production Database

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, spans the years 2002-2019 and aggregates new production by year and census block group. Since the Zillow dataset was either lacking or entirely missing data for most counties in 2018 and 2019, we used the California Department of Housing and Community Development's (HCD) Annual Progress Report (APR) data from 2018 and 2019 to override the 2018 and 2019 data for all counties. 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. Considering this dataset is more robust and accurate than ZTRAX data, we used SF Planning's dataset to replace ZTRAX's new construction counts for all years it was available (2005-2019). In doing so, we were able to segregate and exclude new units that were constructed as part of alterations to existing buildings (e.g. ADUs or garage conversions), but only for San Francisco County.

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). 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[6] to obtain this information. While some of these units may have been originally constructed as market-rate and then later converted to subsidized housing (as occurs, for example, in San Francisco's Small Sites Acquisition Program), we were not able to distinguish these and therefore assume that all currently subsidized units were built as subsidized. This may result in a slight overcount of subsidized units in early years.

We also calculated the number of new market-rate units by subtracting the number of subsidized units from the number of total units for each block group-year combination. For approximately 1% of all block group-year combinations, the number of subsidized units was larger than the number of total units, likely due to an undercount in the total units data. In these cases, we assigned the total units variable as the number of subsidized units and the number of market-rate units as 0.

UDP Tenant protections database

In addition to the new construction data, we also used the ZTRAX sales and assessor data from Zillow to construct a dataset that documents the number and percent of housing units in each block group and year that are covered by rent stabilization and just cause protections. These numbers were determined separately for the two distinct types of protections, but if a unit is subject to both, we counted it in both categories.

To determine coverage by tenant protections we first subset the ZTRAX data to only renter-occupied residential properties by keeping only properties with residential land use codes and then removing all owner-occupied properties with only one unit.[7] For owner-occupied properties with multiple units, we assumed that one of these units is occupied by the owner and the rest are renter-occupied, so we calculated the number of rental units as the number of units listed minus one. We also deleted properties whose land use codes indicated that they were transient or seasonal lodging, dormitories, fraternity houses, cooperatives, timeshares, garages, landominiums, "miscellaneous improvements," or common areas.

Since only a limited number of jurisdictions in the Bay Area–the City of Alameda, Berkeley, East Palo Alto, Emeryville, Hayward, Los Gatos, Mountain View, Oakland, Richmond, San Francisco, San Jose, and Union City–have implemented rent stabilization and just cause protections, we next subset the data to only these jurisdictions. Next, we removed properties based on jurisdiction-specific laws that exempt certain types of units from either just cause protections, rent stabilization protections, or both (see Appendix A for a complete list). We only counted units in years during or after the years the laws were passed in their respective jurisdictions, and accounted for amendments to the laws that affected which units were covered. Lastly, we removed single-family homes, condominiums, and all units built in 1995 or later from the rent stabilization counts (but not from the just cause counts) to account for the Costa Hawkins Rental Housing Act, which exempts these units from rent stabilization laws.

[6] https://preservationdatabase.org/

[7] We did not account for the fact that single-family homes can be rented out and are therefore subject to partial coverage in some cities, so we likely underestimated the number of units subject to tenant protections.

To standardize the unit counts across block groups, we calculated the percentage of units covered by each type of protection by dividing the number of units covered by the total number of housing units in each block group and year.

Mobility data

Infogroup[8] residential historical data (UC Berkeley)

This longitudinal dataset from Infogroup provides annual information on individual households from 2006-2019, including geographic coordinates of where the households live, household income, and demographic characteristics (many imputed). The origin of the fields is proprietary and while we have done some degree of manual validation, some individual household data may be unreliable. While the dataset theoretically includes the entire population of the Bay Area, it is not entirely complete and likely underrepresents lower-income households. These data allow us to analyze households' income categories and mobility patterns over time for an average of approximately 3 million Bay Area households per year. In our analysis, we exclude households where the household head is less than 25 years old, so that we are not analyzing households with transient living situations, such as students. The process of validation revealed that the Infogroup data requires careful data cleaning and wrangling. First, households occasionally appear and disappear in the dataset, and also experience extreme income fluctuations. Thus, we subset the data to the households that Infogroup consistently includes, without wide fluctuation in income. Second, validation against the American Community Survey (ACS) proved that there is overrepresentation of low-income households and underrepresentation of high-income households in certain years, so we devised a weighting scheme to correct the data to be consistent with the ACS.

To account for an unrealistic amount of fluctuation in households' incomes over time, we "smoothed" the data using the following method:

- If a household occupies only one income category for all of the years in which it appears in the dataset, it is assigned that income category
- If a household occupies two "adjacent" income categories (i.e., the difference between the two ranks equals one), it is assigned the most common income category in which it appears. If the household appears an equal number of times in two adjacent income categories, it is assigned to the income category with the higher rank
- If a household occupies more than two income categories or occupies two "non-adjacent" income categories, the household is removed from the dataset entirely

When validating the Infogroup data against American Community Survey (ACS) data, we found that Infogroup undercounts the number of low-income households (based on income category definitions described below) in 2006 and 2009-2013, and overcounts the number of low-income households in 2007-2008 and 2014-2019. Infogroup also undercounts the number of high-income households in 2006-2008 and 2014-2019 and overcounts the number of high-income households in 2009-2013. To adjust for this, we created household weights by dividing the

[8] Now called Data Axle

number of households in the given income category, year and county in the ACS data by the number of households in the given income category, year and county in the (smoothed) Infogroup data. We include these weights in all of our models. We construct weights for each household such that the weighted number of households in the panel for each income category in a given county and year approximates the estimated count of households for that income category, county, and year in the 1-Year ACS PUMS.[9]

Federal Reserve Bank of New York Consumer Credit Panel/Equifax Data (CCP) (Stanford)

The Federal Reserve Bank of New York Consumer Credit Panel/Equifax Data (CCP) is a restricted longitudinal dataset that provides quarterly information on a 5% sample of adult consumers from 2002-2018, with census block[10] 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). These data allow us to analyze individuals' financial health and mobility patterns over time for an average of 240,000 Bay Area residents per year. Adult consumers comprise those with at least one credit account or collection/public record (such as bankruptcy or foreclosure), as well as those with closed or authorized user accounts. We analyze Bay Area residents from 2002 to 2018[11] aged 25 to 84 years old. We restrict our analysis to residents between 25 to 84 years old to deal with the under- and over-representation of individuals using credit reporting in lower and higher age categories.[12] More details about the dataset and Equifax Risk Scores are in Appendix B.

Measures

Outcome measures

For the household-level models, we examine the following outcome measures:

- *Moving out:* Using the Infogroup data, for each year, we examine if households move out of their census block group. However, since the Infogroup data was collected on different dates throughout each year for different households, the exact start and end dates for the "year" changes depending on the household. For example, if data for a household was collected in July 2008 and then next in February 2009, and the household moved from block group X to block group Y in November 2008, the household would be considered to have moved out of block group X in 2008 and moved into block group Y in 2009. If the household was recorded in block group X in July 2008, disappeared from the dataset

[9] Weights are constructed by dividing the number of households in the ACS PUMS estimates for a given income category, county, and year, by the number of households in the remaining panel dataset for that income category, county, and year.

[10] 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.

[11] We do not include 2004 Bay Area residents in our analysis because the geographic data are inconsistent across that particular year due to changes in the geocoding procedures by the data vendor in that year.

[12] Residents younger than 25 are underrepresented in the data and can have inaccurate address reporting due to mobility related to higher education during this period; residents older than 84 years old are overrepresented in the data, most likely due to a lag in registered deaths in the data.

for a few years and then reappeared in block group Y in February 2011, the household would be considered to have moved out of block group X in 2008 and moved into block group Y in 2011. While residents may move within a given block group, we do not account for these short-distance moves in our analysis. Using the CCP data, for each year (beginning on June 1 of one year and ending on June 1 of the following year), we examine if individuals move out of their census block group (which contain an average of 39 blocks and about 600 to 3,000 people) over the period.[13] Residents may certainly move within these block groups, and our data do not capture these short-distance moves.

- *Moving in:* Based on the same yearly time period for each household, we also examine what kinds of residents, using the SES categories described next, move into block groups, based on whether an individual lived in a census block group on June 1 of one year and did not live there in the prior year on June 1 (for the CCP data).

For the block group-level models in the Appendix, we examine the following outcome measures:

- *Outmigration rate:* Using the Infogroup data, for each year, we examine the percent of all households who move out of each block group. When calculating these percentages, we exclude households who disappear from the dataset in all subsequent years from the denominator. For example, if a household is in the dataset for years 2007-2009, then disappears from the dataset from 2010 onwards, we do not count the household as part of the total block group population when determining the percent of households that move out in 2009. However, if the household disappears from the dataset in 2010 but reappears a few years later, it is counted in the denominator. Using the CCP data, for each year, we examine the percent of all households who move out of each block group.
- *Low-SES outmigration rate:* For each year, we examine the percent of all very low- and low-income households in the Infogroup data and the percent of all extremely low- and very low-to-low-income residents using the CCP data who move out of each block group.
- *Low-SES inmigration:* For each year, we examine the percent of households who move into each block group who are very low- or low-income using the Infogroup data and who are extremely low- and very low-to-low-income using the CCP data.

For the destination models, we use the 2005-2017 cohorts in the Infogroup and CCP data and 5-year ACS tract-level data from 2005-2009 to 2015-2019 (hereafter "2005-2017"), harmonized to the 2000 Census geographic boundaries to match the CCP data and estimate whether residents make constrained moves. We construct three separate measures of constrained moves using three different indicators—tract median household income, tract percent in poverty, and tract median rent.

- *Constrained move*: the destination tract had an equal or lower within-county decile of median household income than the origin tract; the destination tract had an equal or higher within-county decile of percent in poverty than the origin tract; the destination tract had an equal or lower within-county decile of median rent than the origin tract. Moves to higher within-county deciles are considered upward moves.

[13] We rely on annual changes because, although locations are reported quarterly, there is variation in reporting, particularly due to lags when an individual moves.

We merge each cohort of the Infogroup and CCP data with the ACS 5-year estimates by tract and year as follows:

- Cohorts in 2005, 2006, 2007, 2008, 2009 are merged with 2005-2009 ACS tracts
- Cohorts in 2010 are merged with 2008-2012 ACS tracts
- Cohorts in 2011 are merged with 2009-2013 ACS tracts
- Cohorts in 2012 are merged with 2010-2014 ACS tracts
- Cohorts in 2013 are merged with 2011-2015 ACS tracts
- Cohorts in 2014 are merged with 2012-2016 ACS tracts
- Cohorts in 2015 are merged with 2013-2017 ACS tracts
- Cohorts in 2016 are merged with 2014-2018 ACS tracts
- Cohorts in 2017 are merged with 2015-2019 ACS tracts

New production measures

The NHP data are aggregated up to the block-group level by year and merged with the Infogroup and CCP data. Since most block groups have zero new units, they were not normally distributed, requiring a log transformation. We test the following measures of new production in census block groups:

- Logged number of new subsidized housing units + 1
- Logged number of new market-rate housing units + 1

We examine effects up to a four-year lag on the outcomes. For example, the new market-rate and subsidized units production variables are assessed as the number of new respective units in that block group that year, 1 year before, 2 years before, and so on. Since the CCP data begins in 2002, four-year lags are only available from 2005 onwards. For the 2002 cohort in the CCP data, we only examine a 2-year lag.

Just cause and rent stabilization measures

We merged the Tenant Protections Database with the Infogroup and CCP data and tested both the percent of units subject to just cause ordinances and the percent of units subject to Rent Stabilization ordinances in census block groups. Since these units are not newly produced, we only examine their effects for up to a 1-year lag to account for newly converted units.

SES measures

Infogroup income categories

Accounting for variability in the income estimates provided within the household-level data, we construct a subset of the data for which income identification is more reliable. Based on Infogroup's income variable, which is listed for each household-year combination, we categorized households into four different income groups: very low, low, moderate, and high. The first step in this process was to compare households' Infogroup-provided incomes with the area median income (AMI) in the given county and year, which was calculated using the 1-Year estimates from the American Community Survey (ACS) Public Use Microdata Sample

(PUMS).[14] Households whose incomes were less than or equal to 50% of the county- and year-specific AMI were initially designated as Very Low; households with incomes between 50% and 100% of the AMI as Low; households with incomes between 100% and 150% of the AMI as Moderate; and households with incomes above 150% of the AMI as High.

CCP financial stability categories

SES categories are defined using Equifax Risk Scores, a proprietary credit score that estimates the likelihood that an individual will pay their debts without defaulting. They are a proxy of financial stability and reflect a distinct dimension of SES from typical measures, such as income or wealth, that are particularly relevant to the housing market, where landlords often use credit scores to screen tenants and lenders use credit scores to distribute mortgage products and make lending decisions. We split our sample into four SES categories in the following way by their Equifax Risk Scores, which range from 250 to 850, and name them based on the income distribution categories defined by the State of California:

- Extremely low-income ("ELI"): < 580 or no Score (too few accounts or new credit)
- Very low-income to low-income ("VLI-LI"): 580-649
- Moderate-middle SES: 650-749
- Middle-high SES: 750 or higher

The distribution of residents in the Bay Area by these SES categories is similar to the distribution of adult residents in the following income categories, respectively: < 50% of the US median household income; between 50%-100% US median household income; between 100-200% of the US median household income; and 200% of the median household income. Data from the Comprehensive Housing Affordability Strategy (CHAS) suggest that, within the Bay Area, our SES categories are similar to the following HUD Area Median Income (AMI) categories, respectively: <30% AMI ("extremely low", as labeled by the State of California), between 30 and 50% AMI ("very low"), between 50% and 100% AMI ("low" and "moderate"), and above 100% AMI ("high"). To be clear, these categories are not a direct proxy of income and do not consider household size. Appendix Table C1 presents descriptive information about the SES composition, based on Equifax Risk Scores, of the CCP sample in the Bay Area used in our study. Most Bay Area residents are categorized as middle-high SES, and the share of residents that are middle-high SES increases over time, as expected.

Tenure status

Tenure status (owner or renter) was derived from estimates provided by Infogroup, which rated each household on a scale from 0 to 9, with 0 representing a confirmed renter household, 9 representing a confirmed owner household, and values in between for households where status was imputed by Infogroup. The optimal threshold for classifying households as renters or owners was determined by comparing the share of renter households in each tract within the study regions for 2015-2019 with the share of renters in each tract according to 2015-2019 ACS estimates. Using a threshold tenure score of 6 and below for renter households was found to

[14] Steven Ruggles, Sarah Flood, Sophia Foster, Ronald Goeken, Jose Pacas, Megan Schouweiler and Matthew Sobek. IPUMS USA: Version 11.0 [dataset]. Minneapolis, MN: IPUMS, 2021. https://doi.org/10.18128/D010.V11.0

produce tract-level rentership shares that were closest to ACS estimates. Because it is difficult to determine whether mobility of homeowners is voluntary or involuntary, we exclude owners from all of our models. In the CCP data, we determine tenure status based on whether someone in the household has a mortgage. This proxy can categorize residents in households who have paid off their mortgages as renters.

Analytic methods

In our analysis, we estimate four sets of models. First, we estimate the probability that a household moves out of a block group on new production and SES using a linear probability model.[15] Second, we use linear probability models to assess the probability of making a constrained move. Third, we estimate the probability a household moves into a block group on new production and SES 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. Last, we estimate a multinomial logistic regression model predicting the SES categories of residents moving into a block group on new production to compare the effect of new production on the probability of residents of different SES categories moving in. We also conduct all these analyses on the effect of just cause and rent stabilization measures on these outcomes. For block group-level models, we test the effects of new production and tenant protections on outmigration rates, the percent of lower SES households who move out, and the predicted percent of inmovers who are lower SES using linear regression models. We present these results for the overall Bay Area, as well as four specific cities (see Appendix F): San Francisco, San Jose, Oakland, and Santa Rosa. We selected these cities to represent contrasting central cities of the Bay Area: high-density San Francisco, populous San Jose, rapidly changing Oakland, and low-density Santa Rosa.[16]

In the results presented below, we present regression results from models with (1) no control variables and without interaction terms; (2) with controls for individual, household, and location characteristics and interaction terms; and (3) with controls for additional neighborhood characteristics for models examining new production in the same year, 2 years prior, and 4 years prior. We show predicted probabilities of the outcomes based on results from models for each time lag with the full set of controls.

In the destination models, we deploy linear probability regression and restrict the sample to everyone who moved and use linear probability models to estimate the probabilities that a mover makes a constrained move as a result of new production and tenant protections for each SES.

Control variables

[15] 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.

[16] We do not run the tenant protection models for Santa Rosa because the city does not have tenant protections in place.

Using the Infogroup data, to account for household-level characteristics that are related to differences in whether individuals move, we control for age and race of household head, length of residence, number of children, number of adults, and marital status. Using the CCP data, we control 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. For both datasets, we 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, and models using the CCP data also include indicators for the panel year.

We also account for several census tract-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, percent of housing built in the last 20 years based on 2000 US Census data. In addition, we include the number of subsidized housing units as of 2016 from the National Housing Preservation Database.[17]

In models testing newly produced subsidized and market-rate units, 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. For example, in models testing the log-transformed number of new market-rate units built 2 years earlier, we control for the log-transformed number of new subsidized units built 2 years earlier and the percent of units covered by either just cause for evictions or rent stabilization protections 2 years earlier. For models testing percent of housing units covered by rent control and by just cause, we include a control for the rolling prior 3-years' average of the log-transformed number of new market-rate and new subsidized units. For example, in models testing the percent of units covered by rent stabilization protections 1 year earlier, we control for the log-transformed number of new market-rate and subsidized units 1 year earlier.[18] Across all models, to account for the possibility that outmigration and inmigration rates are simply a product of neighborhood churning, we also include a rolling prior 3-years' average of the block group out- and inmigration rates by SES.[19] In the linear models testing probabilities to make a constrained move, we remove the control variables for the rolling 3-years' average of outmigration and inmigration rates.

[17] However, due to collinearity issues, we removed the "percent college-educated" control from the San Francisco, Oakland, and Santa Rosa models, and we removed the "percent Hispanic" and "poverty rate" controls from the Santa Rosa models.

[18] We do not control for the other type of tenant protection in these models because the just cause and rent stabilization variables are highly correlated.

[19] 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.

In the block group-level models, we exclude individual- and household-level characteristics, and instead control for the percent of respondents in that block group who are in each SES category, percent of respondents in that block-group who are delinquent on a loan and who have a mortgage (for the CCP analysis only), in addition to all neighborhood-level controls. To check the robustness of our results and heterogeneity across different geographies, we examined results based on moves in and out of census tracts, rather than census block groups, ran our analysis on only major cities in the Bay Area, and, for the Stanford team, combined extremely low- and very low-SES residents into a single category. These results are discussed in Appendix E and G. We also run models for gentrifying tracts in San Francisco, San Jose, and Oakland only to examine trends in hot-market areas, which are discussed in Appendix F.

Comparing SES categories across Infogroup and CCP/Equifax

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 SES. Both teams mapped their datasets to four categories, but these differ from each other and from the definition used by the Federal Reserve Bank (Table 1). The Infogroup Very Low category encompasses the CCP Extremely Low and Very Low categories, while the CCP High category includes the Infogroup Middle and High. The CCP results thus offer a unique look into extremely low-SES, while the Infogroup provides a special lens into high-SES households. Although we visualize the four groups with similar colors, they are thus not directly comparable. To be consistent with the Federal Reserve designations, we use the categories Extremely Low-Low, Moderate-Middle, Middle-High, and High for the Infogroup results, and Extremely Low, Very Low-Low, Moderate-Middle, and Middle-High for the CCP results.

Table 1. Comparing Income/SES Categories across Infogroup and CCP

Income relative to SFBay Area median	0-30%	30-50%	50-80%	80-100%	100-120%	120-150%	150%+
Berkeley: Infogroup	Extremely Low - Low		Moderate-Middle		Middle		High
Stanford: CCP/Equifax	Extremely Low	Very Low	Moderate - Middle			Middle - High	
Federal Reserve Bank standard*	Extremely Low	Very Low or Low	Moderate	Middle		High	

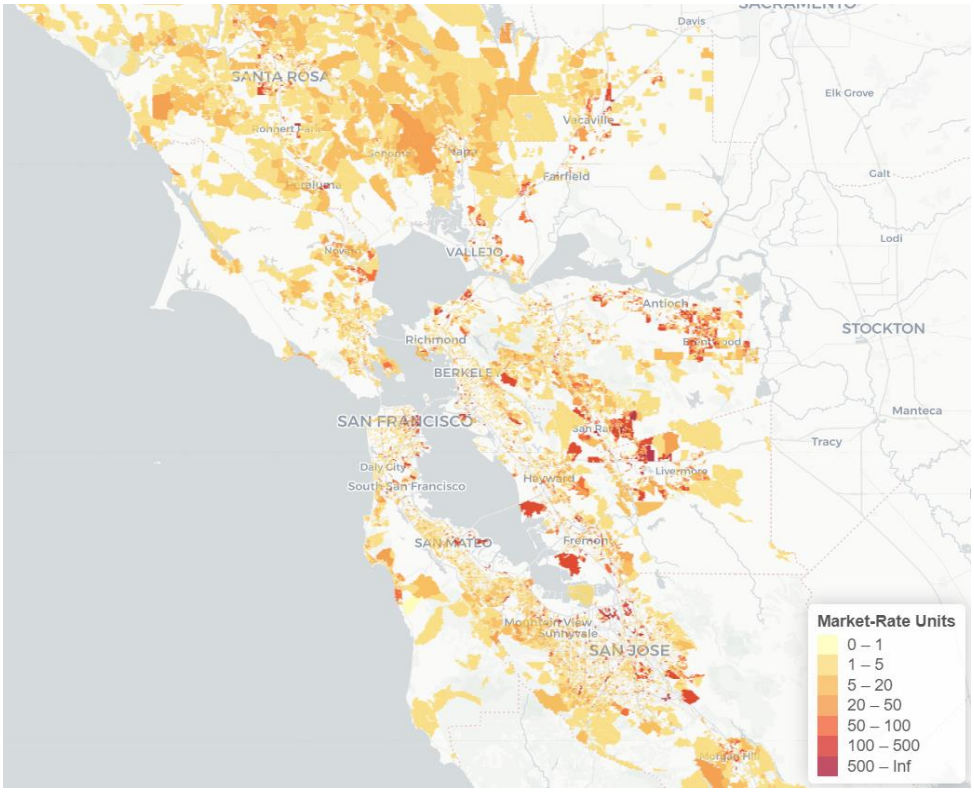
*Board of Governors of the Federal Reserve System, Community Reinvestment Act Resources, 2018. Accessed at https://www.federalreserve.gov/consumerscommunities/cra_resources.htm

IV. Results: the impacts of new production on mobility

New production in the Bay Area

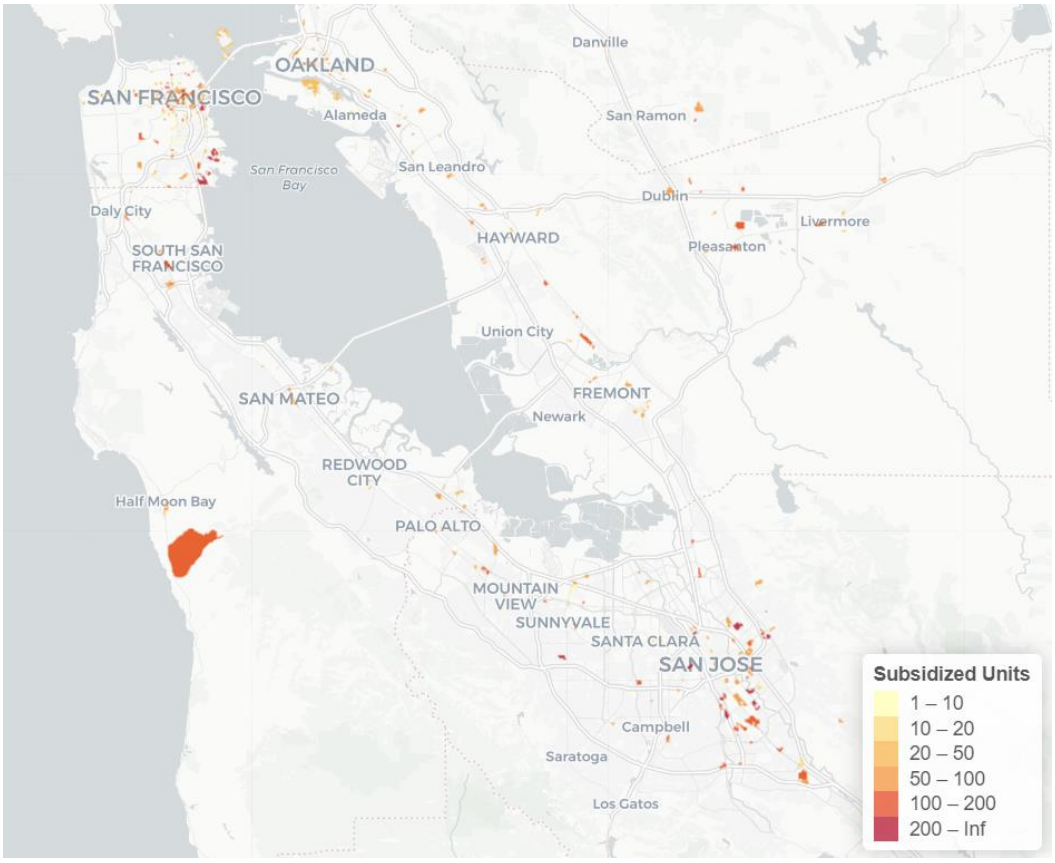
We begin by describing the distribution of housing units either newly constructed or subject to tenant protection across the San Francisco Bay Area. Figures 1 and 2 illustrate the distributions of new market-rate and subsidized construction. Between 2000 and 2019, there was significantly more market-rate than subsidized construction throughout the Bay Area (363,781 market-rate versus 34,647 subsidized units). Of note, this level of market-rate housing production is much lower than in previous decades, despite continued job growth, leading to increased market pressures and housing costs (Metropolitan Transportation Commission 2020). A high concentration of subsidized construction occurred in south San Jose, and many new market-rate units are clustered in the South Bay as well as parts of the East Bay such as San Ramon, Brentwood, and Livermore.

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



Source: UDP New Housing Production database

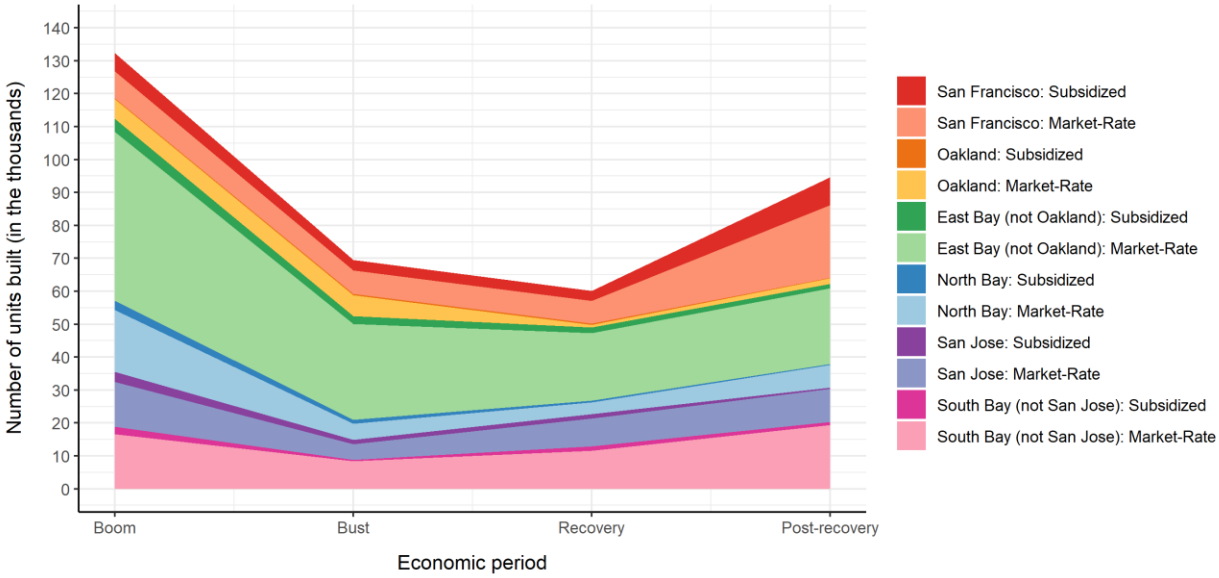
Figure 2: New Subsidized Unit Construction in the Bay Area by Census Block, 2000-2019



Source: UDP New Housing Production database

In the following figures, we examine trends in housing production over time. From 2000-2019, 356,610 new units were produced in the Bay Area, of which 13.1% were subsidized. Figure 3 displays the distribution of new housing production across different regions in the Bay Area and over time, distinguishing between market-rate and subsidized housing units. We group descriptive results into four economic housing periods based on market trends from the Standard & Poor Case-Schiller Home Price Indices for the San Francisco Bay Area (years represent the initial year of each annual sample): Boom (2000-2006), Bust (2007-2009), Recovery (2010-2012), and Post-Recovery (2015-2019). Across all periods, only a small share of newly produced housing is subsidized. Most new production, including subsidized housing, over the last two decades occurred during the housing boom period, and there has been an increase in the post-recovery period. 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.

Figure 3. Construction of New Housing Over Time by Subregion[20]



Source: Calculations by the authors with UDP New Housing Production database

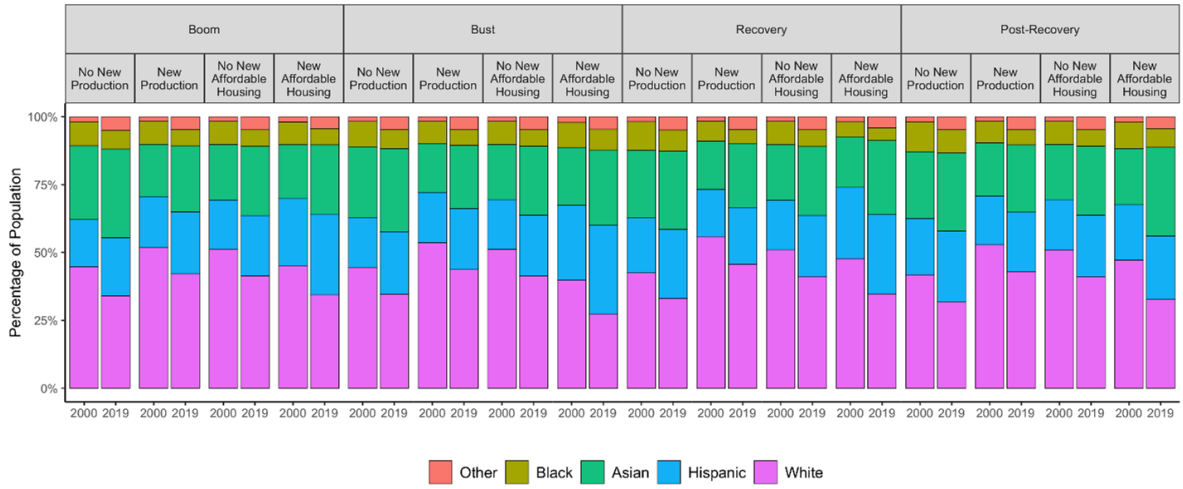
Figures 4 and 5 compare changes in census tract populations by race and ethnicity and changes in several other neighborhood characteristics, respectively, for census tracts with and without newly produced housing during the housing periods described above. The figures also compare tracts with and without newly produced subsidized housing. Most neighborhoods with new housing production had larger white populations, were more socioeconomically advantaged (lower poverty rates, higher educational attainment, higher incomes, higher homeownership rates), and had higher home values in the year 2000 compared to those where new housing was not built. By contrast, neighborhoods with new affordable housing began the period with smaller white populations, though these differences were less stark among neighborhoods when comparing places where new affordable housing was built during the recovery and post-recovery

[20] 'North Bay' includes Marin, Napa, Solano and Sonoma Counties. 'East Bay' includes Contra Costa and Alameda Counties, excluding Oakland. 'South Bay' includes Santa Clara and San Mateo Counties, excluding San Jose.

period. Neighborhoods with new affordable housing also began the period with more disadvantage (higher poverty, lower educational attainment, lower incomes, lower home values and rents, lower homeownership rates, more vacancies) compared to those without new affordable housing, but also more new construction over the last 20 years.

Over time, neighborhoods with new market-rate or subsidized production experienced similar increases in socioeconomic status and housing prices compared to neighborhoods that did not have newly produced housing. At the same time, they experienced similar declines in their shares of white residents as neighborhoods that did not have newly produced housing built in them.

Figure 4. Population Change by Race and Ethnicity for Census Tracts With and Without New Housing Production



Source: Calculations of the authors with UDP New Housing Production database, 2000 US Census, and 2015-2019 American Community Survey 5-year Estimates

Figure 5. Neighborhood Change for Census Tracts With and Without New Housing Production

Housing Period Ranges: Boom = 2002-2006, Bust = 2007-2009, Recovery = 2010-2014, Post-Recovery = 2015-2017

Source: Calculations by the authors with UDP New Housing Production database, 2000 US Census, and 2015-2019 American Community Survey 5-year Estimates

Figure 6 compares changes in the Federal Housing Finance Agency (FHFA)'s Tract-Level Housing Price Index (HPI) between census tracts that had new housing production and those that do not in each housing period. For each year in each tract in the Bay Area, we calculate the percent change between the HPI 2 years before and 2 years after, and the changes presented in the figure display the average changes over the housing period for tracts with new housing production compared to those without it. Counter to narratives that new production drives up housing prices, housing prices generally increased more in neighborhoods without new production, regardless of time period or geography. There were slightly larger increases in the HPI among tracts without new production, especially in the post-recovery period in Oakland and the rest of the East Bay. During the housing bust, neighborhoods with new production had smaller declines in the HPI compared to those without new production in most of the Bay Area, except in San Francisco.

Figure 6. Housing Price Index Change for Census Tracts With and Without New Housing by City/Subregion

Source: Calculations by the authors with UDP New Housing Production Database and the Federal Housing Finance Agency Developmental Tract-level Housing Price Index (https://www.fhfa.gov/DataTools/Downloads/Pages/House-Price-Index-Datasets.aspx)

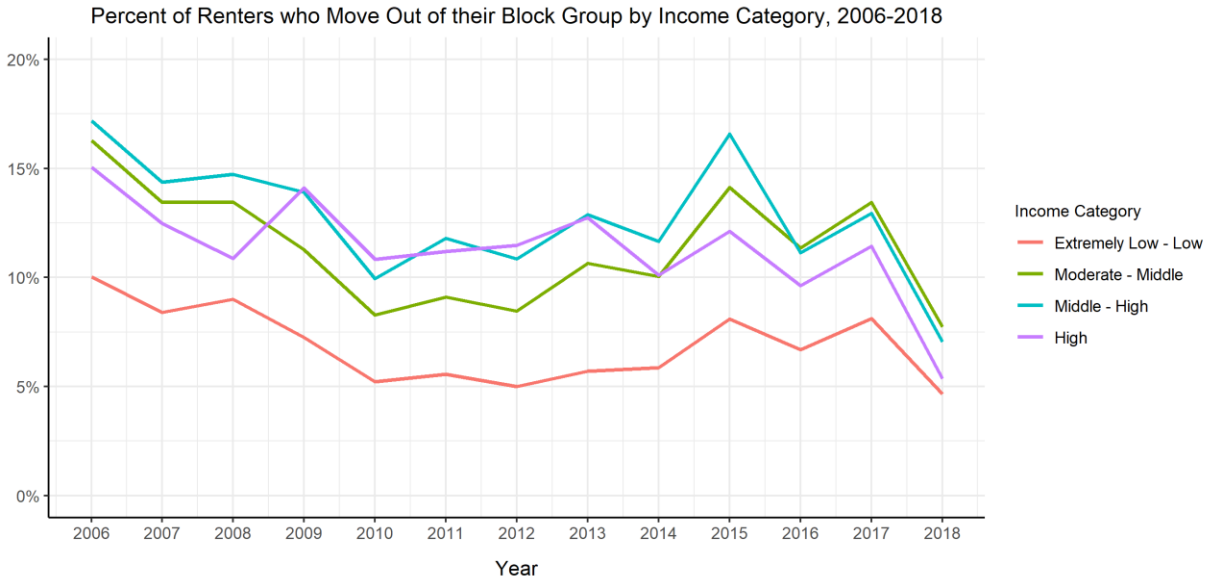
In the following sections, we present results from the Infogroup data conducted by the UC Berkeley team analysis using Infogroup data, followed by the model results using the CCP data based on analysis conducted by the Stanford team. The Infogroup results are for renters' household mobility, while the CCP results are for all individuals aged 25 to 84 due to the imprecise proxy for tenure status. We use both plots and regression models to determine impacts. While the predicted plots show the effect of new development on moving for specific groups, the regression models include interaction terms that identify significant differences in the effect of new units on outmigration between groups. In this report, we focus more on whether new development affects moving out for each SES group than on whether the differences between groups is significant.

New production and mobility: Infogroup results

Descriptive statistics for all moves

Figure 7 shows the percent of renter households in each SES who moved from their census block group from 2006 to 2018, based on the Infogroup data. In general, this pattern is consistent with Current Population Survey data, which shows declining migration rates and an overall (owner and renter) outmigration rate of about 10% in 2018.[21] Throughout the period, low-SES households consistently moved the least. Overall, the rates at which households move somewhat steadily declined until 2012, then fluctuated before dropping sharply in 2018. However, it is possible that the sharp decline in 2018 could be caused by a data quality issue.

Figure 7. Percent of Residents Who Move by SES

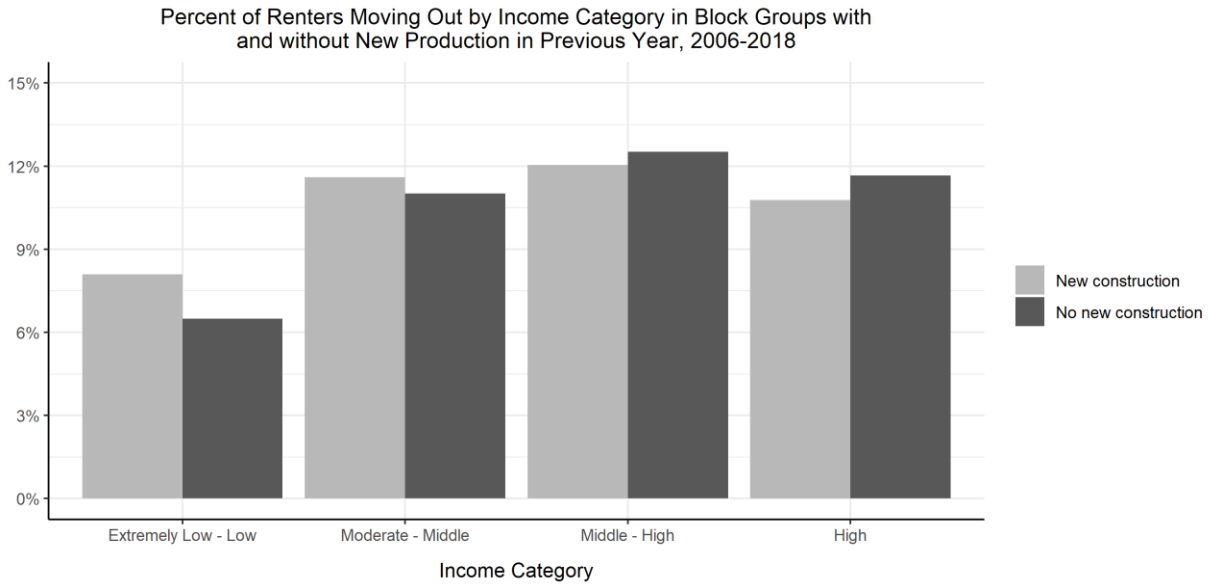


Source: Infogroup

[21] https://www.census.gov/library/visualizations/time-series/demo/historic.html

Approximately 18.7% of renters were living in a block group that had new housing produced in a given year. Figure 8 displays the percent of households who move from their block groups by SES in block groups with and without new housing production in the prior year. This figure shows that low-, moderate-, and middle-SES households moved out more in block groups with new housing built in the prior year, and this difference is largest among low-SES households. These descriptive results suggest that new production is associated with residential displacement among lower-SES residents.

Figure 8. Percent Moving by SES in Block Groups With and Without New Production

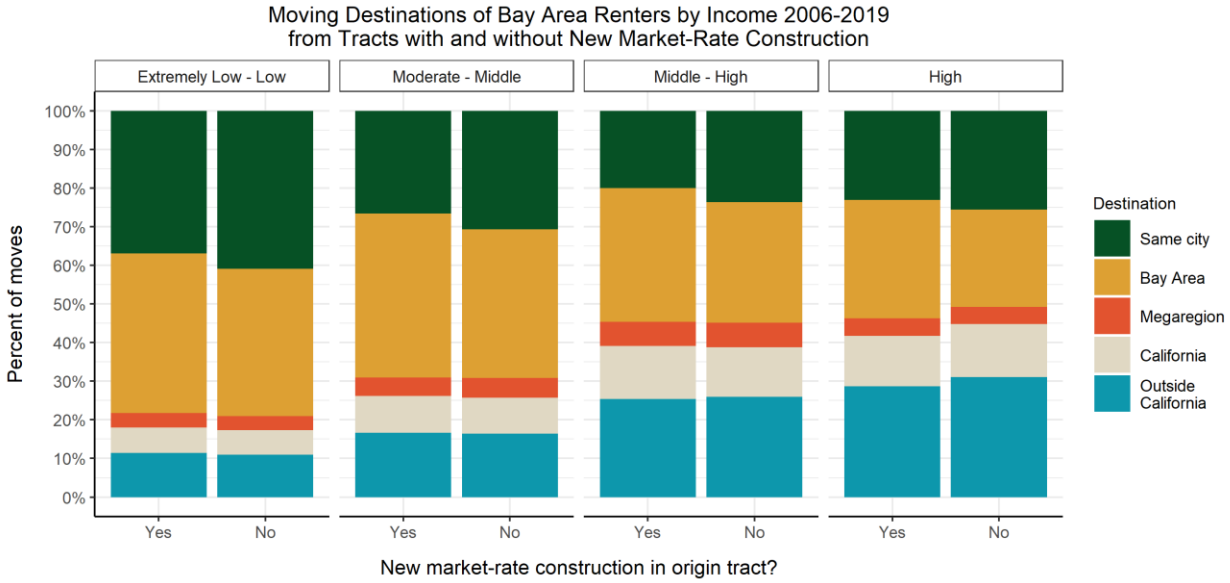


Source: Infogroup and UDP New Housing Production Database

Next, we examine where movers take up residence after departing from their neighborhood block group, looking specifically at areas that experience new housing production and/or tenant protections. Here we are interested in not just whether residents are displaced from the neighborhood, city, and region, but also if they move to higher- or lower-status neighborhoods– an outcome that can affect life chances.

The descriptive analysis separates moves into 5 categories: within the same city, out of the city but within the Bay Area, out of the Bay Area but within the megaregion, out of the megaregion but within California, and moving out of California entirely. The Bay Area megaregion is defined as the additional area outside of the Bay Area which encompasses Sacramento, San Joaquin, Santa Cruz, and Yolo counties. Figure 9 shows that although differences are minor, those moving from block groups with new market-rate housing production are slightly less likely to stay in their own city when they move, compared to those moving from blocks without new construction, although they do stay within the Bay Area. These patterns are similar from low-SES households through high-SES households.

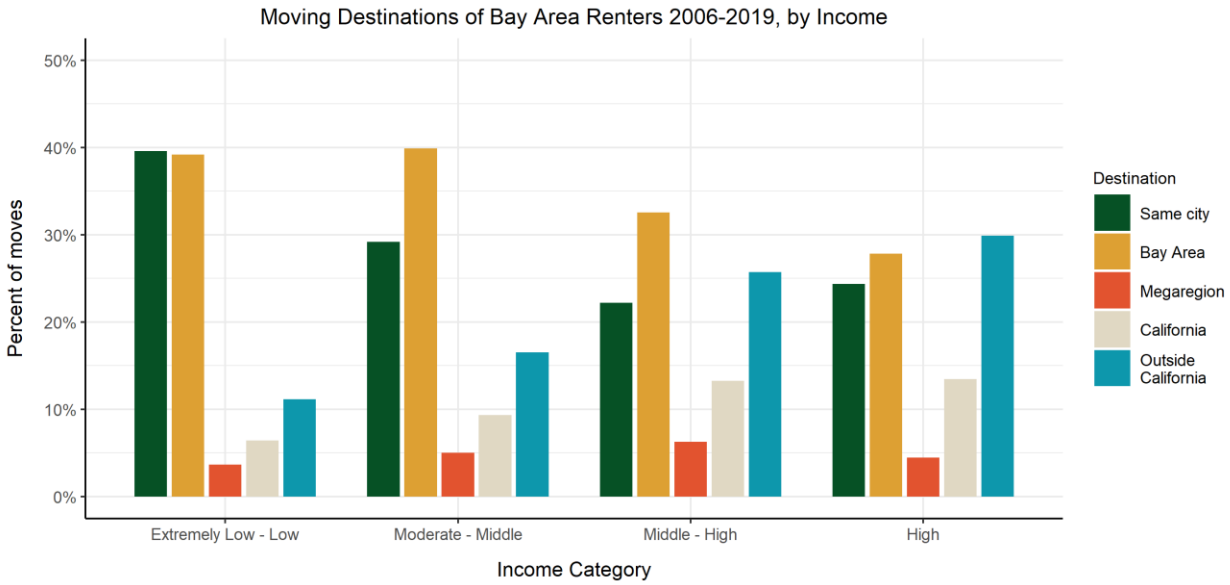
Figure 9. Destinations of Bay Area Renters by SES from Block Groups With and Without New Market-Rate Construction, 2006-2018



Source: Infogroup and UDP New Housing Production Database

Figure 10 shows the destinations of Bay Area movers who moved out of their origin city to another Bay Area location. For very low-income households, the largest share of movers ended up in Alameda, Santa Clara, Contra Costa, or San Mateo counties. Higher-SES groups were more likely to move to Santa Clara or San Francisco counties.

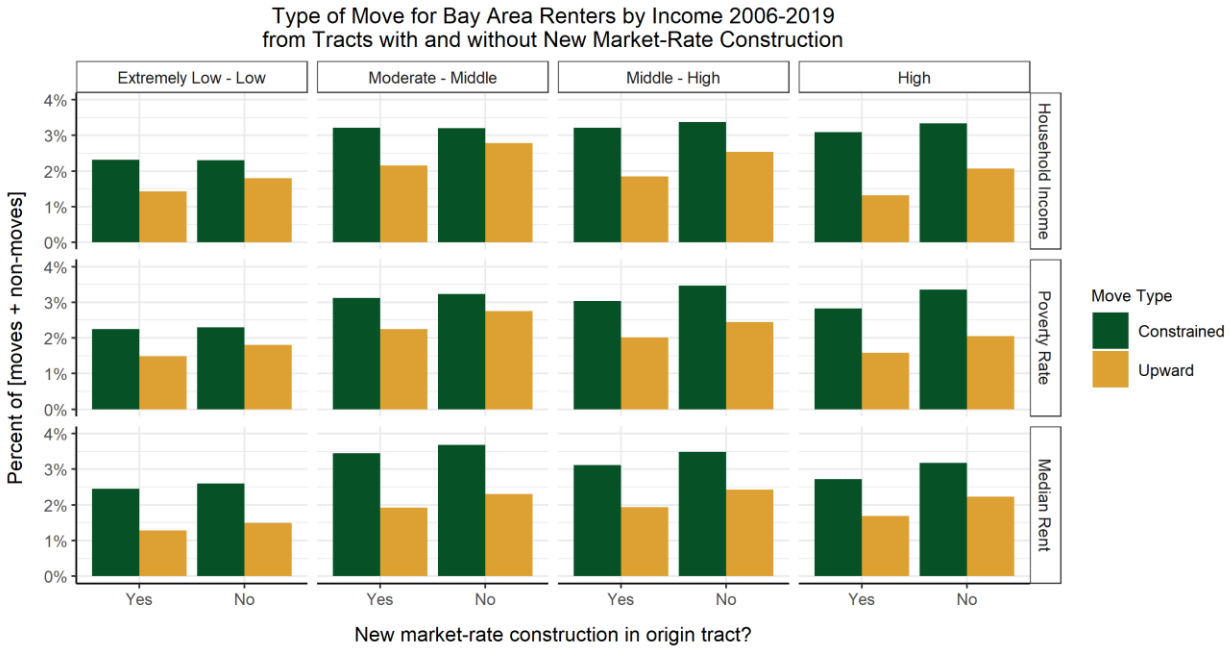
Figure 10. Destinations of Movers Moving Within the Bay Area, Not Within the Same City, 2006-2018



Source: Infogroup

For the regression analyses, we examine how new production affects residential mobility, in terms of the characteristics of mover destinations. We examine the destinations of movers by using a series of linear probability models, restricting the sample to movers only. Among those who move, we characterize their destinations in three ways—the within-county decile of the tract's median household income that year; the within-county decile of the tract's poverty rate that year; and the within-county decile of the tract's median rent that year. We select these indicators because they capture different components of neighborhood quality (and thus resident life chances). A downward or "constrained" move occurs if the destination decile is equal to or lower than the origin's for household income and rent, or if the destination decile is greater to or equal in terms of poverty. Across SES and neighborhood quality types, movers from block groups with new market-rate housing production are more likely to make constrained moves than those leaving neighborhoods without new construction (Figure 11).

Figure 11. Type of Move for Bay Area Renters by SES 2006-2019.



Source: Infogroup

Outmigration

Household-level probability models for all areas

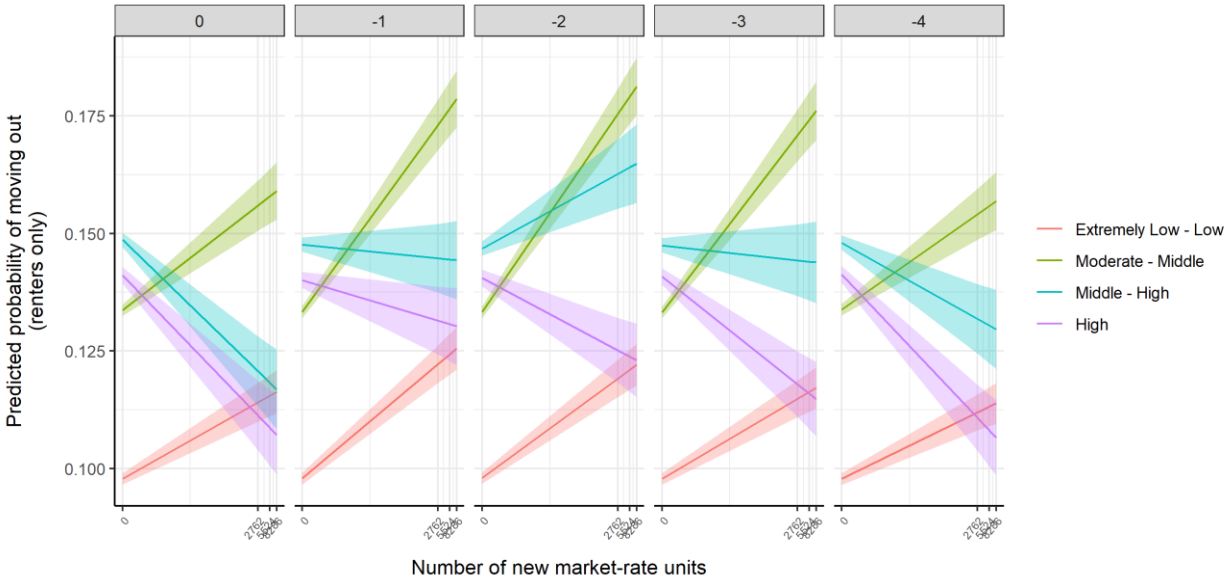
Next, we use statistical models to assess how new housing production is associated with whether residents have a higher probability of moving out of their neighborhoods, after accounting for various characteristics that affect mobility patterns.

Figure 12 presents the predicted probabilities of moving for renter households in the dataset having average characteristics for continuous variables and the mode for categorical variables.[22] These probabilities are based on the models with the full set of household, and neighborhood control variables presented in the tables. Renter households of low- and moderate-SES groups are more likely to move out of their block groups after production of new market-rate units, with effects decreasing after 2 years. Outmigration rates decrease sharply for high-SES households and are mixed for middle-SES households. The effects are more mixed for subsidized production–while moderate- and middle-SES groups generally experience increases in outmigration rates, both low- and high-SES households see decreases in outmigration as a result of new subsidized production.

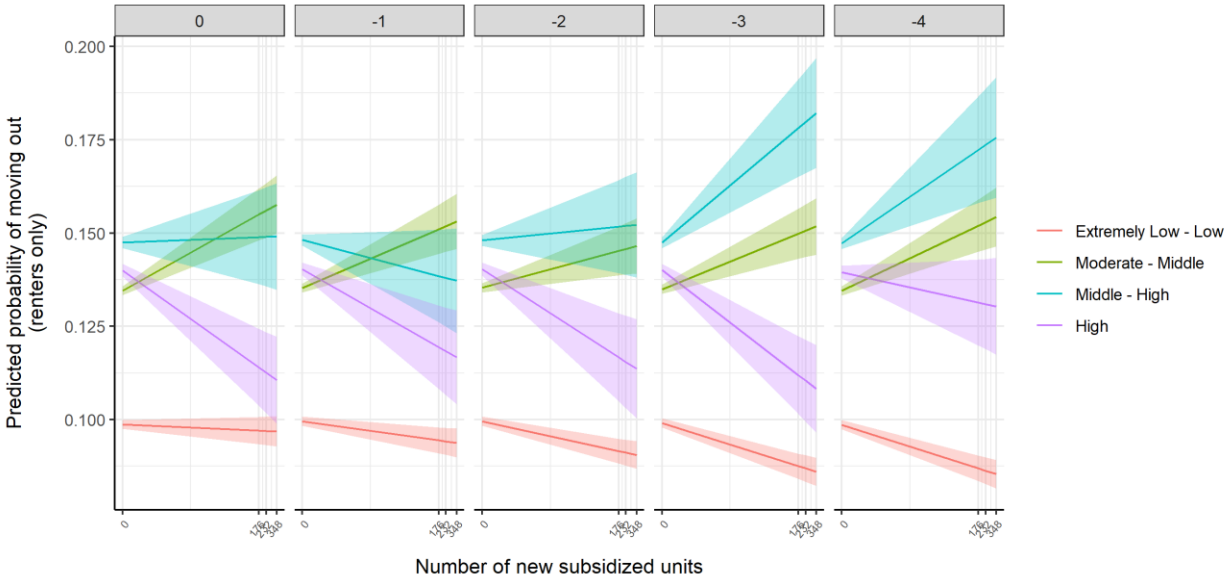
[22] Specifically, these are white households in San Francisco who have lived in their unit for 4.7 years, have 0.064 children (this number is so low likely because of the lack of large families in the city), and whose household head is 30-34 years old and unmarried. These households live in a census tract with a vacancy rate of 4.1%, 18.9% of units built in the past 20 years, and 41.7% ownership rate in 2000, and 145.9 subsidized units in 2016.

Figure 12. Predicted Probabilities by SES of Renters Moving Out of Block Groups by Number of New (a) Market-Rate and (b) Subsidized Units

(a) Market-Rate



(b) Subsidized



Source: Infogroup, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Appendix Table D1 presents the regression coefficients and standard errors from a series of linear probability models predicting the probability that a resident will move out of their census block group by the number of newly produced housing in the same year, 2 years prior, and 4 years prior. The models confirm that although new market-rate housing decreases outmigration rates in general, there is a positive and significant impact on displacement (outmigration rate) for low- and moderate-SES households that increases by Year 4. The controls reveal expected effects, with a few exceptions. In general, regional controls are positive, suggesting greater impacts in core cities, but outmigration is not significant in San Francisco. Interestingly, the coefficient for Latine is negative (reduced outmigration rates), while Black and White are positive. Tenant protections (including both just cause and rent stabilization ordinances) consistently reduce outmigration. The impacts occur despite previous churn patterns: outmigration is significant even controlling for outmigration rates in previous years.

Introducing new subsidized housing units generally reduces outmigration for low and high-SES households, though its impact is not consistently statistically significant. All controls had expected effects, in similar directions as the market-rate models.

Household-level probability models for gentrifying areas

Low-income areas with strong housing markets may experience growth dynamics that are different from 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 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?

To answer this question, we conduct a sensitivity analysis specific to gentrifying neighborhoods, subsetting our sample to gentrifying tracts in Oakland, San Francisco, and San Jose. We construct gentrification from the 2000 Census and 2006-2010 ("2010") ACS, defining tracts as 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 nongentrifying tracts–tracts where 1) the percentage increase in either the median rent or median home value was less than the subregion's 25th 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 25th percentile of the percent increases on either of those indicators.

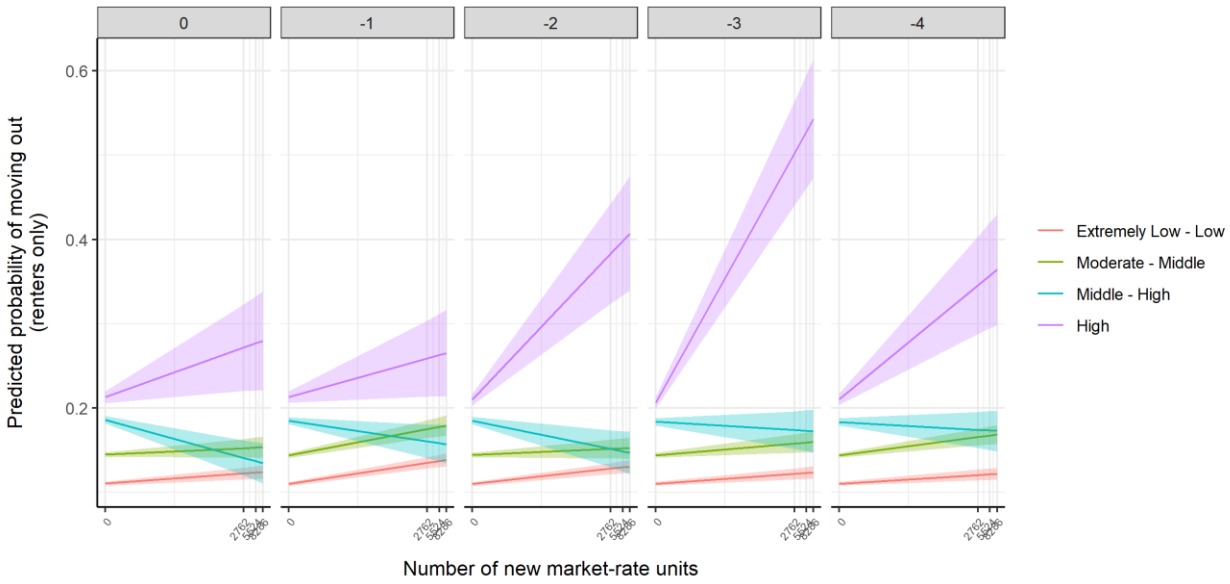
For the analysis, we remove tract-level controls that are collinear with the gentrification measures—median home value, median income, median rent, and percent college-educated. We include a control variable for the city and remove the regional control variable. Figure 13 shows the results from this model for San Francisco, the modal city in the dataset, with control variables plotted at San Francisco-specific mean and modal values.

Figure 13 presents predicted probabilities of outmigration by SES and the number of new market-rate units. Overall, these gentrifying neighborhoods reveal a tighter housing market than the region as a whole. Specifically, all groups except middle-SES have similar or higher probabilities of moving out when market-rate housing is built. New subsidized units do not

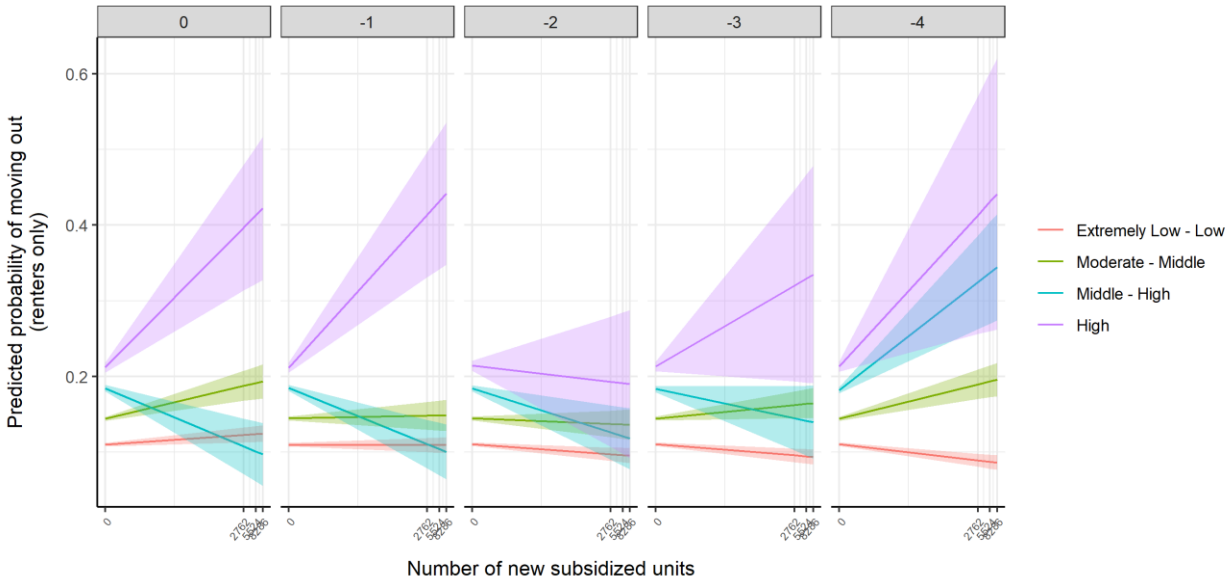
change the picture much, only reducing outmigration rates for middle-SES households. Whatever the type of production, move-out rates are particular steep for high-SES households.

Figure 13. Predicted Probabilities by SES of Moving Out of Block Groups by Number of New (a) Market-Rate and (b) Subsidized Units

(a) Market-Rate



(b) Subsidized



Source: Infogroup, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Constrained moves

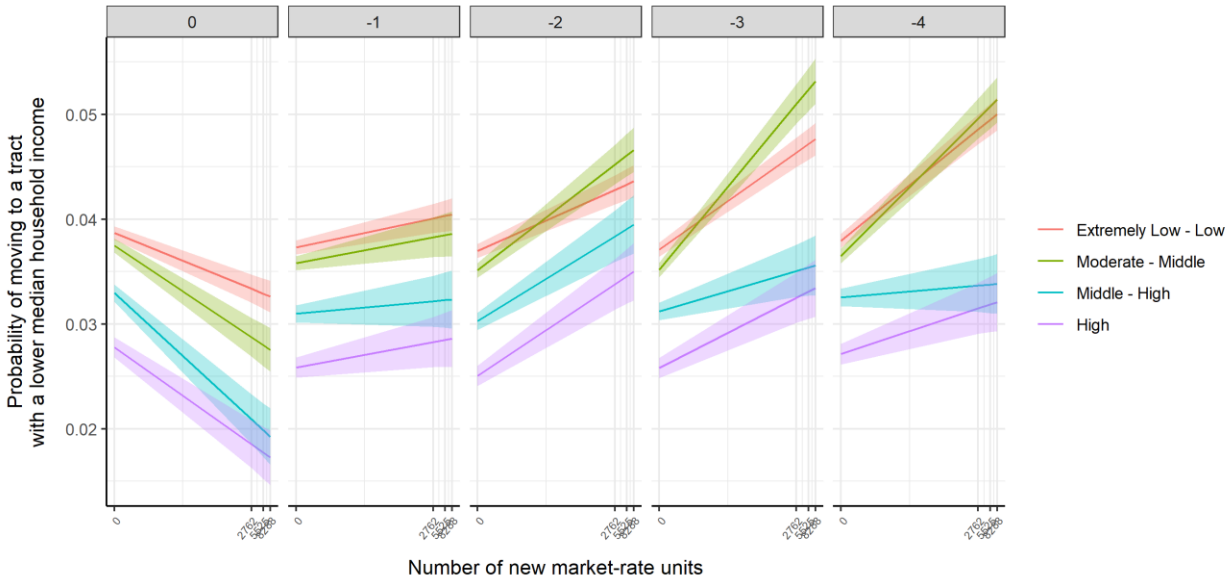
Figures 14 to 16 illustrate differences in the probabilities to make a constrained move by the number of newly produced market-rate and subsidized units and compare results for whether new housing is built up to 4 years prior and for the three ways constrained moves are measured. The figures present the predicted probabilities of making a constrained move for individuals in the dataset having average characteristics for continuous variables and the mode for categorical variables, which are the same values as in the outmigration models above. The following plots are for movers who did not move within their same tract.

Overall, new market-rate production increases the probability that households will make a constrained move for at least 4 years after the units are built (albeit not in the initial year), for all groups when looking at median household income deciles, and for low- and moderate-SES households when using poverty deciles; probabilities are generally highest for low-SES households and lowest for high-SES (Figures 19 and 20). The probability of a constrained move is also higher (after Year 0) based on the median rent decile, but only for low and moderate-SES households (Figure 21). (The figures, which are for movers who did not move within their tract, present the predicted probabilities of making a constrained move for individuals in the dataset having average characteristics for continuous variables and the mode for categorical variables, which are the same values as in the outmigration models above.)

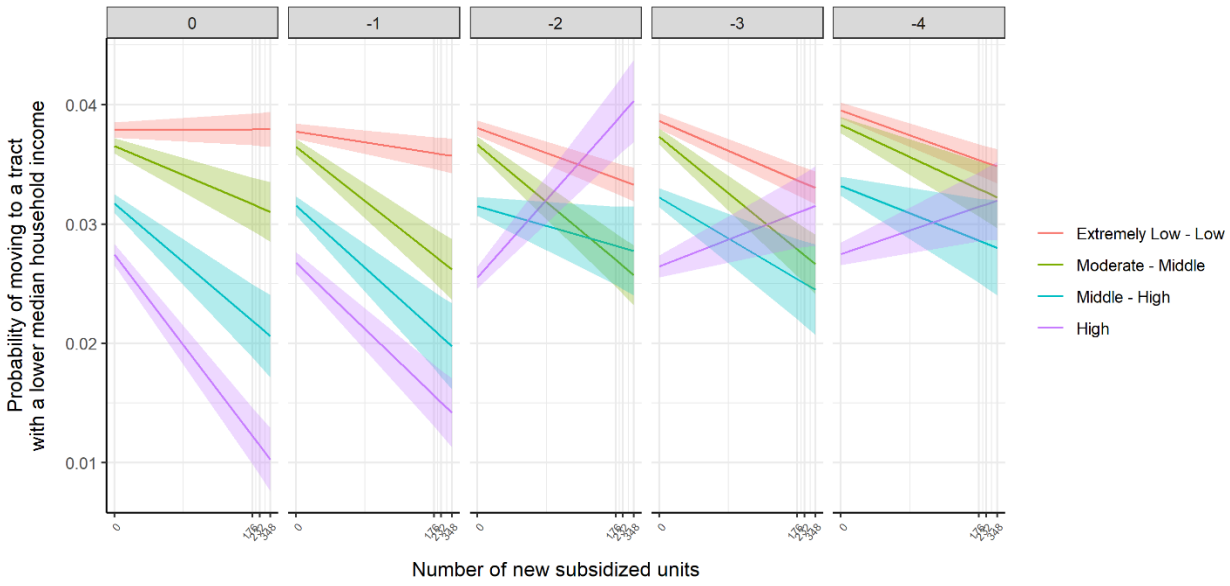
When measuring constrained moves according to the income and poverty indicators, new subsidized production decreases the probability of a downward move for all but the highest SES group, which experiences mixed results. New subsidized housing increases the probability of a constrained move for moderate-SES groups based on the rent indicator and generally decreases it for low-, middle-, and high-SES households.

Figure 14. Predicted Probability of Making a Constrained Move by SES from Block Groups with New Units (a) Market-Rate (b) Subsidized Using Median Household Income Deciles

(a) Market-Rate



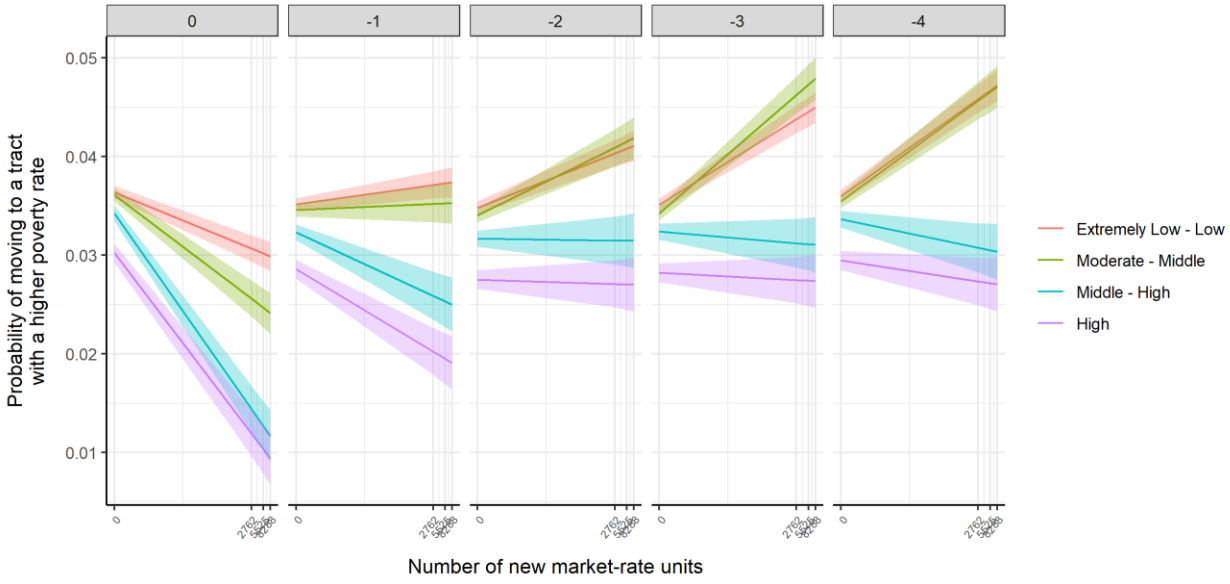
(b) Subsidized



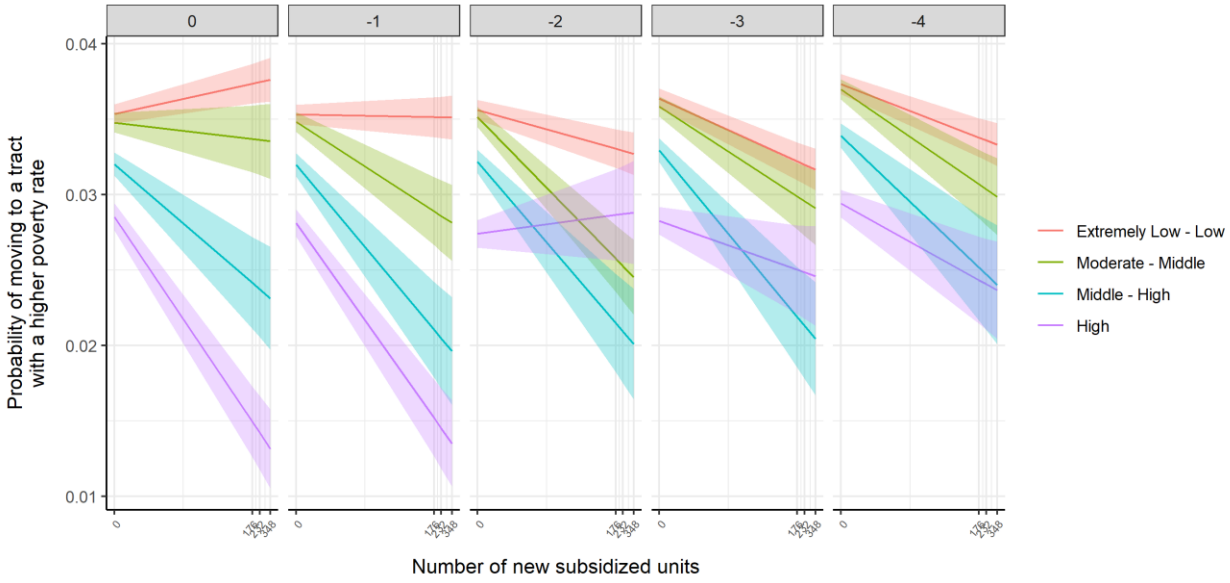
Source: Infogroup, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Figure 15. Predicted Probability of Making a Constrained Move by SES from Block Groups with New Units (a) Market-Rate (b) Subsidized, Using Poverty Rate Deciles

(a) Market-Rate



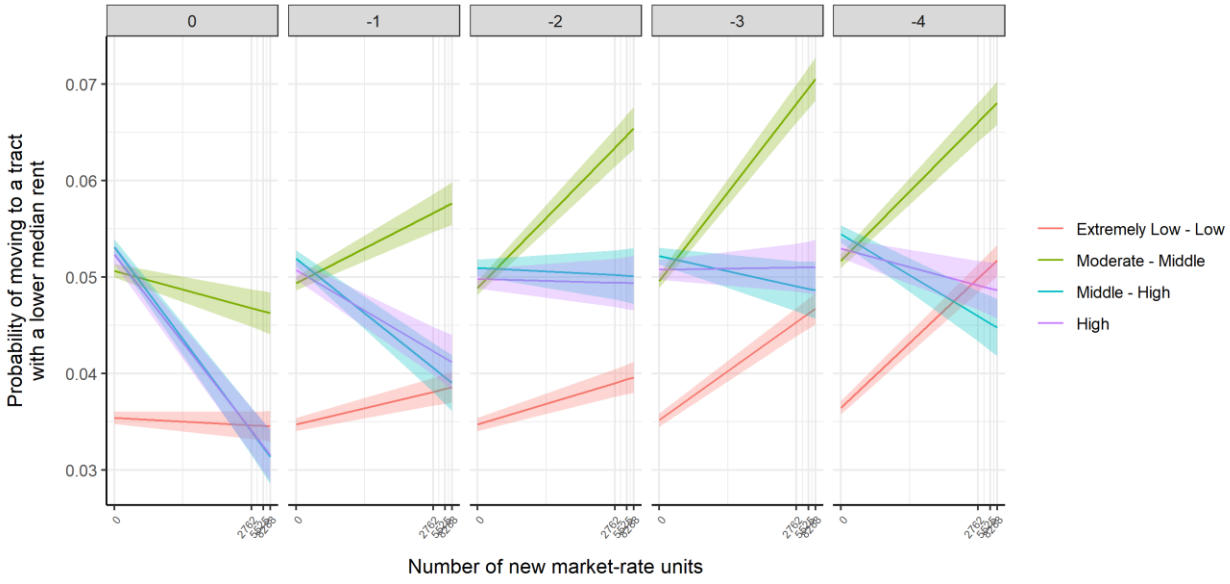
(b) Subsidized



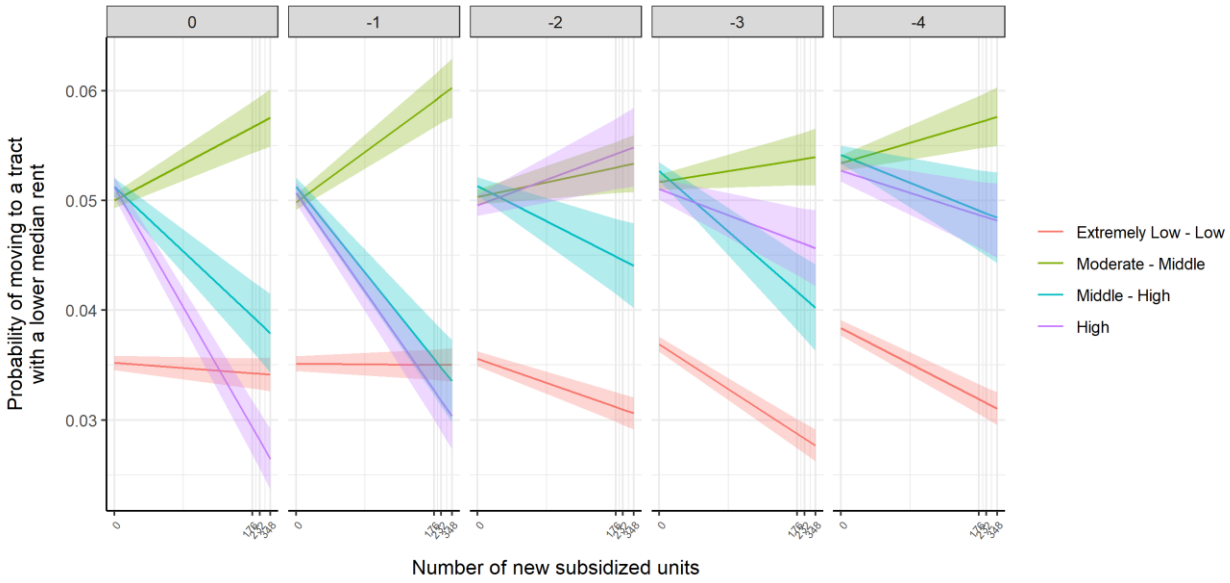
Source: Infogroup, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Figure 16. Predicted Probability of Making a Constrained Move by SES from Block Groups with New Units (a) Market-Rate (b) Subsidized, Using Median Rent Deciles

(a) Market-Rate



(b) Subsidized



Source: Infogroup, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Inmigration

Household-level probability models of effects of new production

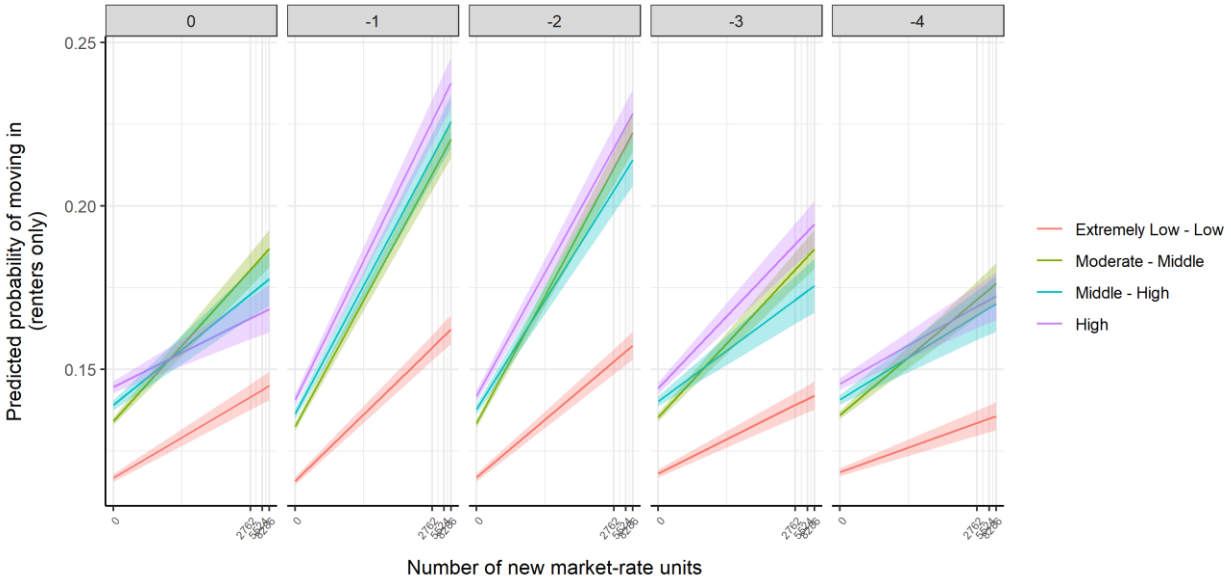
This next set of analyses examine how new housing production is shaping who moves into neighborhoods. First, we test if new production increases the probability that residents in different income groups will move into a block group. Second, we compare the likelihood that those moving into neighborhoods with and without new production are in each SES group. The first analysis sheds light on whether the probability that a household will move into a block group changes in neighborhoods with new production. We would expect that it would, given that there would presumably be more available units. The latter analysis only considers movers and sheds light on how new production changes the composition of households moving into neighborhoods.

Figure 17 illustrates the overall positive effect of new market-rate production on the probability that households from all SES groups will move into a neighborhood. High-SES households generally have the highest probability of moving into block groups with new market-rate production, and low-SES households have the lowest probability. The effects are strongest 1 to 2 years after production, but persist for up to 4 years afterwards.

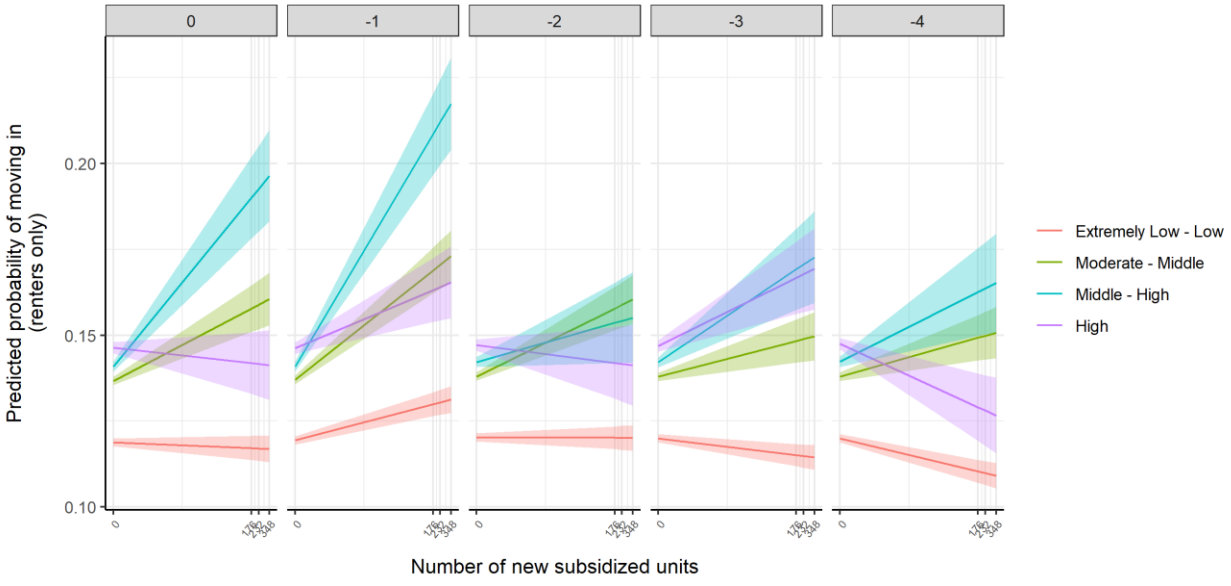
The effects of subsidized production are more mixed. All SES groups except high-SES households are more likely to move in up to 2 years after production, but impacts decay thereafter for low- and high-SES groups.

Figure 17. Predicted Probabilities by SES of Renters Moving into Block Groups by Number of New (a) Market-Rate and (b) Subsidized Units

(a) Market-Rate



(b) Subsidized



Source: Infogroup, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

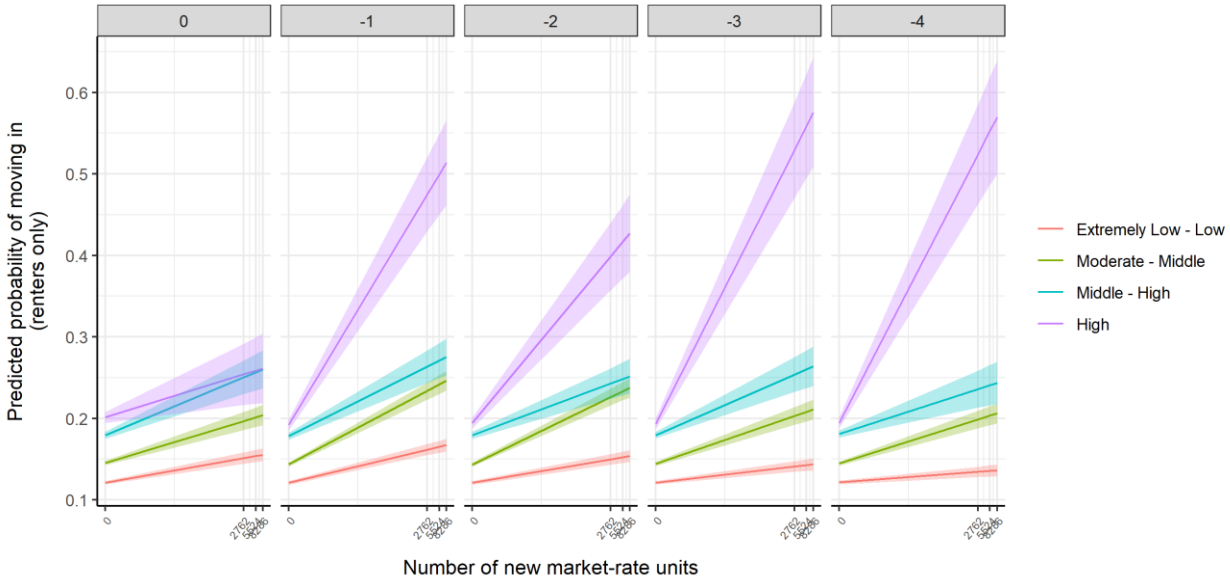
Appendix Table D2 presents the regression coefficients and standard errors from a series of linear probability models predicting the probability that a resident will move into a census block group by the number of newly produced housing units in the same year, 2 years prior, and 4 years prior. Overall, confirming the plots, inmigration is positive and significant in block groups with market-rate construction for all SES groups, with effects decreasing over time. In general, model controls follow expected patterns. However, the presence of both subsidized housing units and tenant protections decrease move-ins. Of note, Latine status is negative, i.e., less likely to move in, while Black and White households, as well as all of the core cities, are associated with more move-ins.

Household-level probability models of effects of new production on gentrifying areas

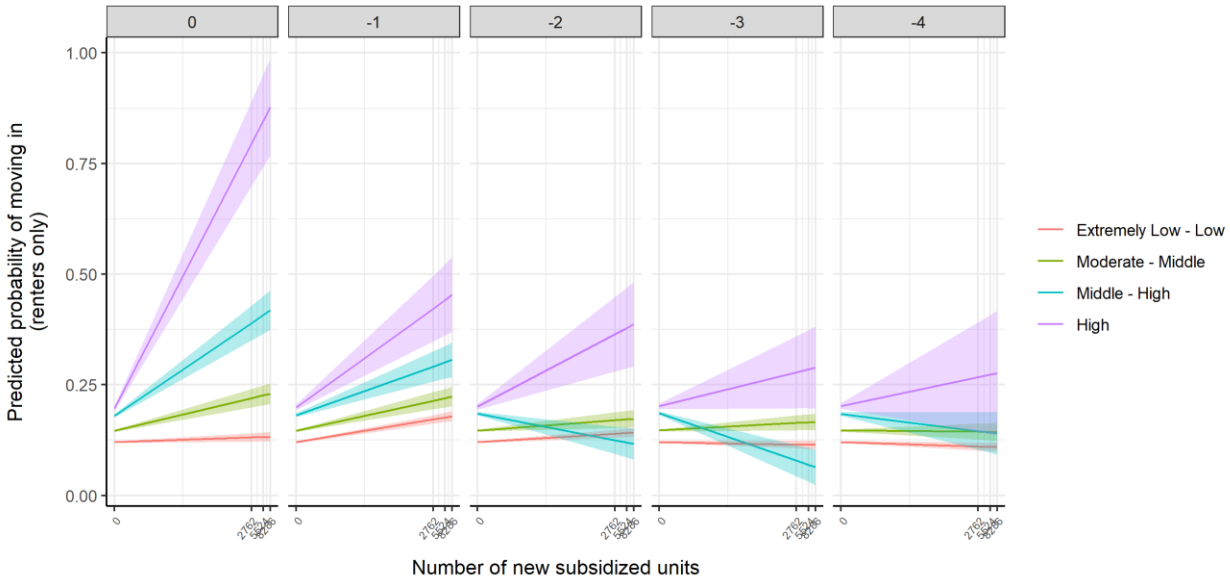
Figure 18 shows the results of inmigration models when subsetting the sample only to hot-market areas with high levels of gentrification, as discussed in Section V-A.3. The figure shows that move-in rates increase, suggesting again, with results for outmigration, that neighborhoods with new production tend to experience increased churn. Inmigration increases sharply for high-SES groups when market-rate production occurs, and also for moderate- and middle-SES groups. Low-SES households also experience inmigration at a higher rate than in the overall models (Figure 17), but at a lower rate than other SES groups. Subsidized housing is also associated with higher inmigration from all groups except middle-SES (beginning 2 years after construction).

Figure 18. Predicted Probabilities by SES of Moving Into Block Groups by Number of New (a) Market-Rate and (b) Subsidized Units

(a) Market-Rate



(b) Subsidized



Source: Infogroup, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

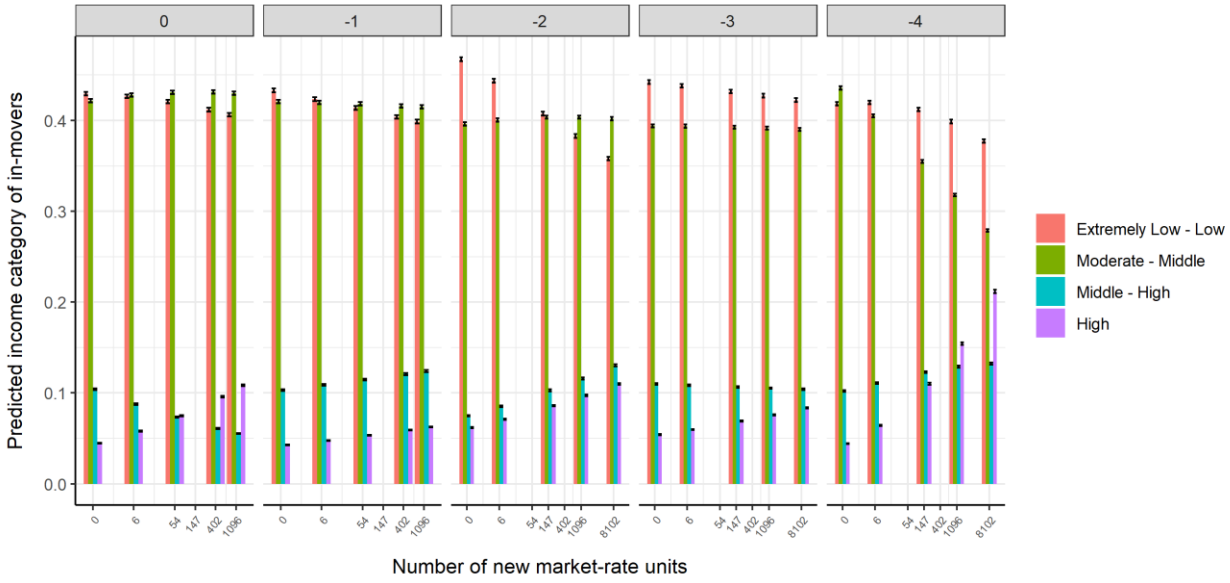
Predicted SES composition of inmovers in areas with new production

How does inmigration for different groups change with new housing production? We use multinomial logit models looking only at movers, to predict the likelihood that new residents (at the block group level) will belong to each economic group. As shown in Figure 19, results differ widely depending on household SES level, and tend to differ from the linear probability models. For low-SES households, new market-rate construction generally reduces inmigration. After an initial increase in the year of construction, moderate-SES households also are less likely to move in, with effects continuing through the fourth year. In contrast, middle-SES households are more likely to move in. High-SES households are also more likely to move in, with sharp increases in move-in rates by the third year after construction.

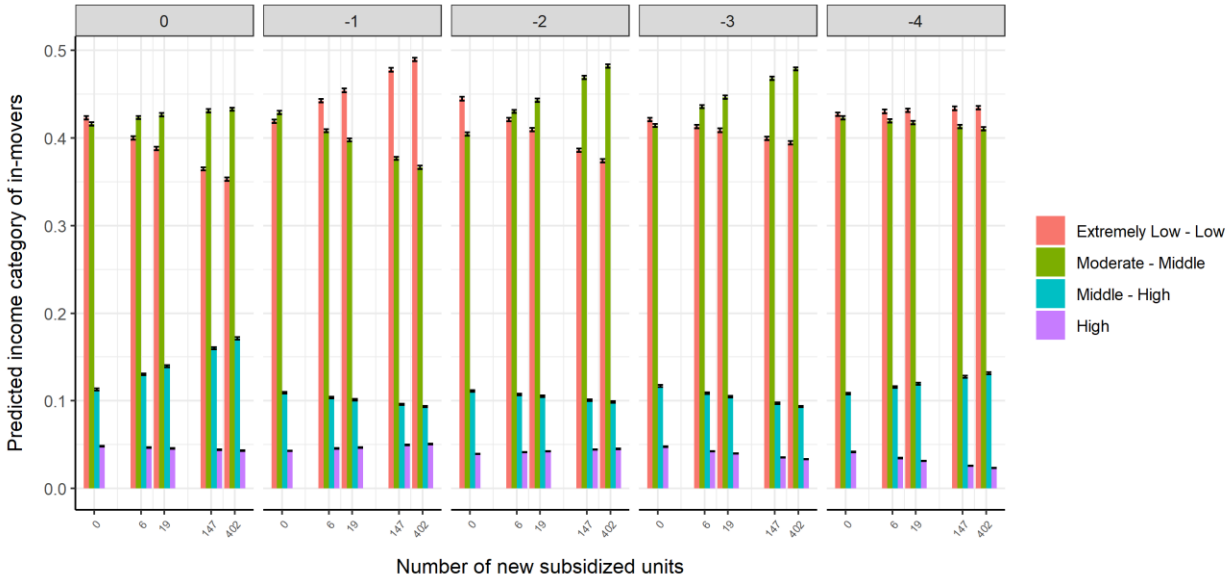
With new production of subsidized housing (Figure 19b), there are mixed results for low-SES households, while moderate-SES households are more likely to move in. In contrast, middle- and high-income households experience mixed results but more declining inmigration rates.

Figure 19. Predicted Composition of Movers into Block Groups With or Without New (a) Market-Rate and (b) Subsidized Units

(a) Market-Rate



(b) Subsidized



Source: Infogroup, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

New production and mobility: CCP results

Descriptive statistics for all moves

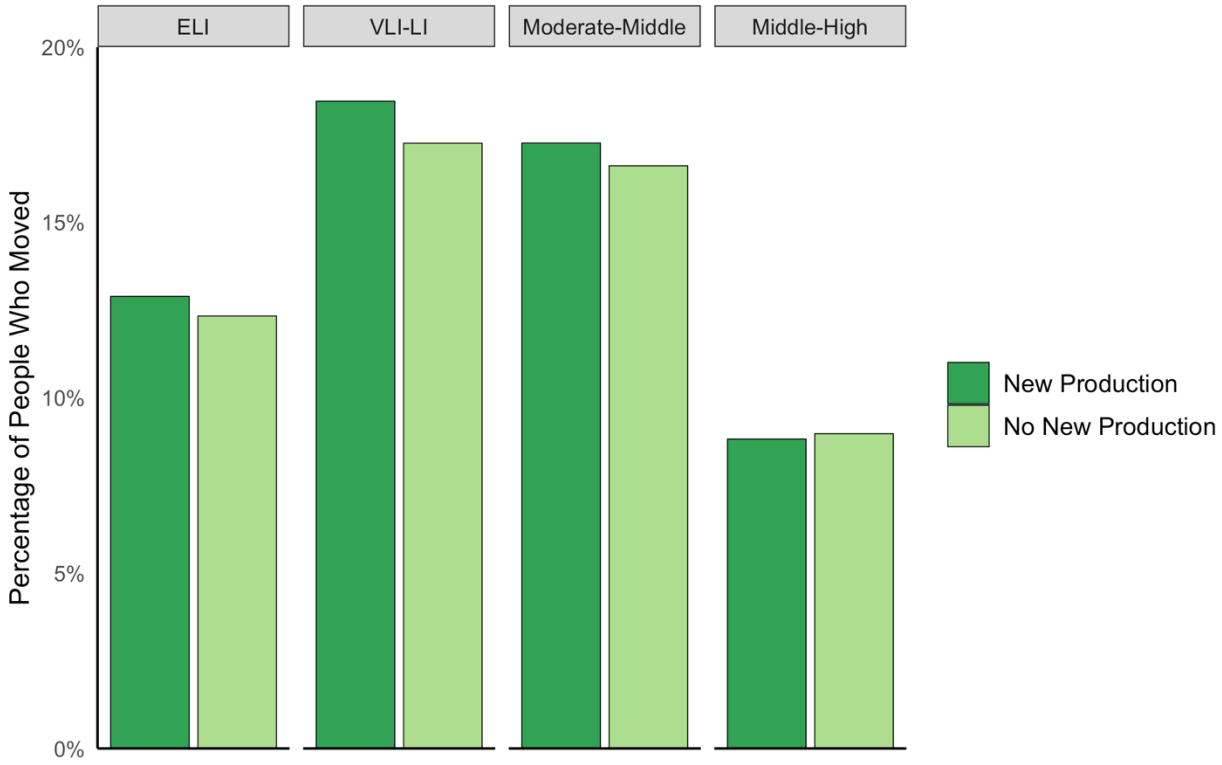
Figure 20 shows the percent of residents in each SES category who move from their census block group from 2002-2017. Throughout the period, very low-to-low-income ("VLI-LI") and moderate-middle SES residents move out of their census block group more than both extremely low-income- ("ELI") and high-SES residents, and high-SES residents move the least. After a peak in 2006, there is a steady decreasing trend, but their rates are generally increasing starting 2012, particularly among VLI-LI and moderate-middle SES residents.

Figure 20. Percent of Residents Who Move by SES

Source: FRBNY Consumer Credit Panel/Equifax Data

In our sample, about 23% of residents are living in a block group that had new housing produced in a given year. Figure 21 displays the percent of residents who move from their block groups by SES categories in neighborhoods with and without new housing production in the prior year. The figure shows that ELI, VLI-LI, and moderate-middle SES residents move out more in neighborhoods with new housing built in the prior year, and this difference is larger among VLI-LI residents. These descriptive results suggest that new production is associated with residential displacement among lower-SES residents, especially moderately poor individuals.

Figure 21. Percent Moving by SES in Block Groups With and Without New Production



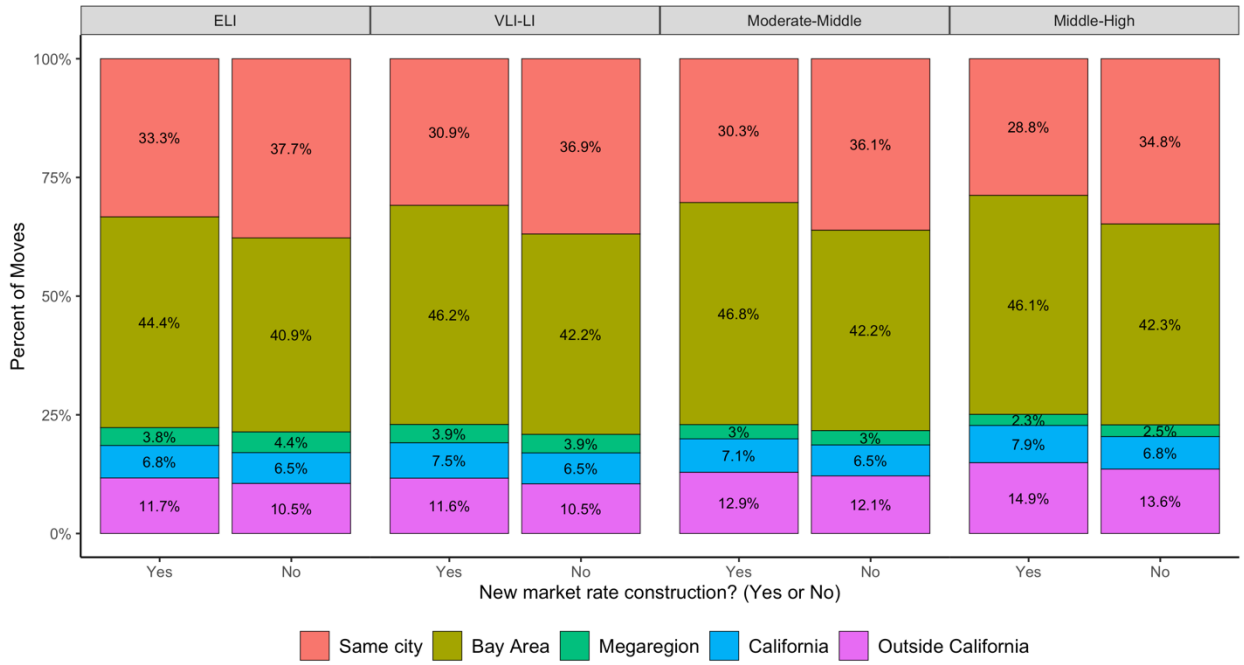
Source: FRBNY Consumer Credit Panel/Equifax Data and UDP New Housing Production Database

The following set of figures provide descriptions of where movers end up. Destinations are separated into 5 categories: within the same city, out of the city but within the Bay Area, out of the Bay Area but within the megaregion, out of the megaregion but within California, and moving out of California entirely. The Bay Area megaregion is defined as the additional area outside of the Bay Area which encompasses the Sacramento, San Joaquin, Santa Cruz, and Yolo counties.

Figure 22 shows that across all SES groups, those moving from block groups with new market-rate construction are slightly less likely to move out of their city and slightly more likely to move within the Bay Area than those moving from block groups without new market-rate construction. These differences are quite similar in magnitude across SES groups, but higher-SES movers are slightly more likely to leave their origin city but still stay within the Bay Area than are lower-SES movers, whereas lower-SES residents are more likely to stay within their origin city. The percent of movers moving out of the Bay Area and into the megaregion, and out of the megaregion and into elsewhere in California are similar across block groups with or without new market-rate construction, but ELI residents in block groups without new market-rate housing are more likely to move out of the Bay Area into the megaregion than similar residents in block groups with new market-rate housing. ELI and VLI-LI movers are slightly more likely to stay

within the megaregion compared to moderate-middle and middle-high SES movers, who are slightly more likely to move to elsewhere within California or out of California entirely.

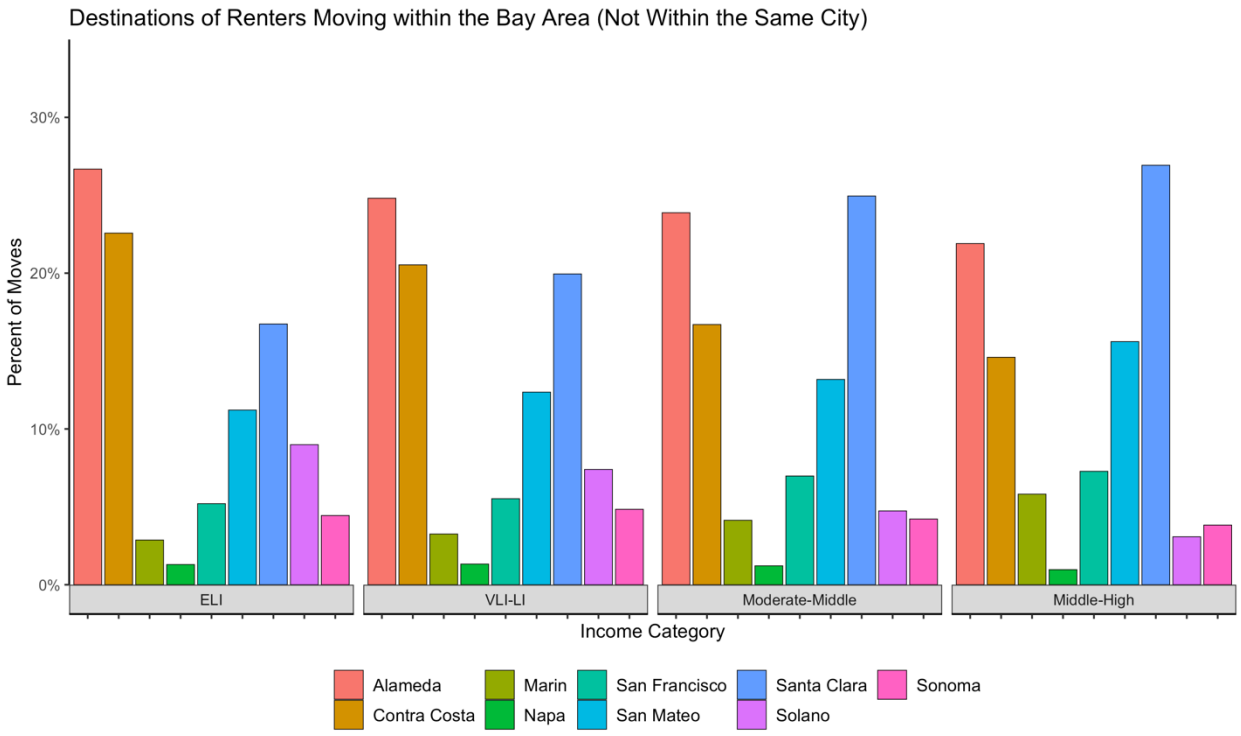
Figure 22. Destinations of Bay Area Renters by Income from Block Groups With and Without New Market-Rate Construction, 2006-2018



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

Figure 23 shows the destinations of Bay Area movers who move out of their origin city but nevertheless move to somewhere within the Bay Area. Among all SES groups, Sonoma county has a similar percent of movers in that SES group who move there. The percentage of movers who move to San Francisco, Marin, and Napa counties grows slightly as the SES group moves from extremely low-income ("ELI") to middle-high. The percentage of movers who move to Santa Clara and San Mateo counties also increases as the SES group moves from ELI to middle-high, whereas the percentage that moves to Alameda, Contra Costa, and Solano counties decreases.

Figure 23. Destinations of Movers Moving Within the Bay Area, Not Within the Same City, 2006-2018



Source: FRBNY Consumer Credit Panel/Equifax Data

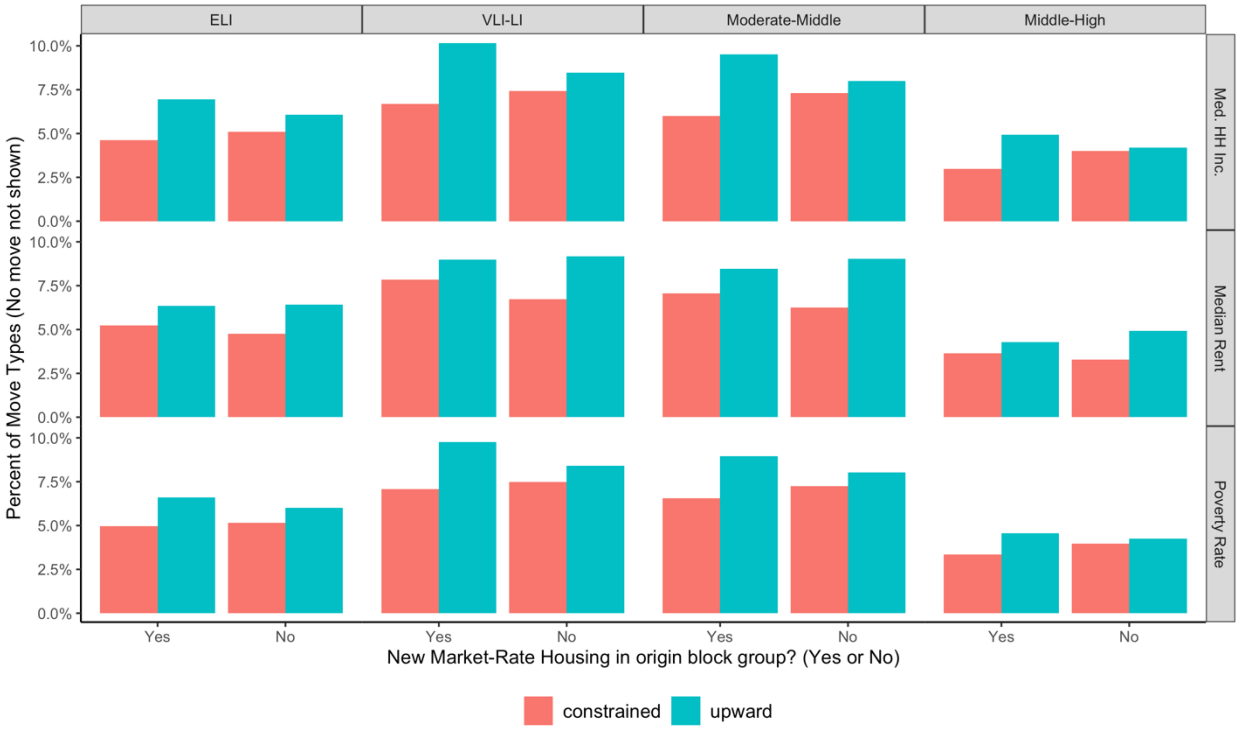
This next set of analyses focuses on studying how new production affects residential mobility beyond whether people move by also considering movers' destinations. We examine the destinations of movers by using a series of linear probability models. Among those who move, we characterize their destinations in three ways—the within-county decile of the tract's median household income that year; the within-county decile of the tract's poverty rate that year; the within-county decile of the tract's median rent that year. A move is considered constrained if the destination decile is equal to or lower than the origin's for household income and rent, or if the destination decile is greater to or equal to the origin for poverty. Upward moves are the opposite of constrained moves—where the destination decile is greater than the origin's for household income and rent, or lower than the origin's for poverty.

Figure 24 shows the percentages of all residents making a constrained or upward move for each SES group and measure (household income, rent, poverty), by the presence of newly constructed market-rate units that year. The percent of people not making a move is not shown on the graph. Overall, middle-high SES residents have the lowest probabilities to make a constrained move across all measures, but they also have the lowest probabilities to make an upward move across all measures. This is likely because middle-high SES residents are most likely to not move at all. VLI-LI residents are most likely to make constrained and upward moves, followed by moderate-middle SES residents and ELI residents, in that order.

Presence of new market-rate construction is not uniformly associated with higher probabilities of making a constrained move. For example, when moves are assessed with household income and

poverty rate, residents living in block groups without new market-rate housing are more likely to make a constrained move than similar residents living in block groups with new market-rate housing, but the opposite is true for rent.

Figure 24. Percent of Residents Making a Constrained or Upward Move by SES and Presence of New Market-Rate Construction, 2005-2017.



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

Outmigration

Individual-level probability models

With the CCP data, we use statistical models to assess how new housing production is associated with whether residents have a higher probability of moving out of their neighborhoods, after accounting for various characteristics that affect mobility patterns. Appendix Table C2 presents the regression coefficients and standard errors for the primary variables of interest from a series of linear probability models predicting the probability that a resident will move out of their census block group by the logged number of newly produced housing in the same year, 2 years prior, and 4 years prior. Statistically significant coefficients for the interaction terms indicate significantly different effects of the logged number of new units on the probability of moving out between SES groups. The figures presented below illustrate these differences but also illustrate the effects of new units on the probability of moving out for each SES group. We compare these

results against logistic regression models for robustness and only note where results differ in the footnotes.

The baseline models show that very low-to-low-income ("VLI-LI") and moderate-middle SES residents move more than extremely low-income ("ELI") residents, and middle-high SES residents move less than ELI residents. The number of new units of any kind is associated with higher rates of moving when it is built, 2 years later, and 4 years later. The subsequent models examine whether the effects of new production on moving differ across SES groups by including interaction terms.

We find different effects across SES groups: VLI-LI and moderate-middle SES residents are more likely to be displaced by new market-rate production, while it allows middle-high SES residents to stay in place. We find positive effects for the lowest-SES residents 2 years after new subsidized housing is built and in the year that new market-rate housing is built. Figure 25 illustrates these differences for the number of newly produced market-rate units and subsidized, and compares results for whether units are built up to 4 years prior. The figures present the predicted probabilities of moving for individuals in the dataset having average characteristics for continuous variables and the mode for categorical variables.[23] These probabilities are based on the models with the full set of individual, household, and neighborhood control variables presented in the tables (Model 3). The results for subsidized units exhibit larger standard errors because there are fewer neighborhoods in which there are subsidized units.

Figure 25 shows that VLI-LI and moderate-middle SES residents are more likely to move out of their neighborhood as more market-rate housing is built, and these effects last up to 1 year after the units are built for moderate-middle SES residents and 3 years after for VLI-LI residents. However, middle-high SES residents are less likely to move out of neighborhoods as more market-rate housing is produced in it all years. ELI residents are more likely to move out in the year new market-rate units are built.[24] ELI residents are more likely to move out 2 years after production of new subsidized units. Moderate-middle SES residents are more likely to move out in the same year, 2, and 4 years after, and middle-high SES residents are more likely to move out in the same year and up to 2 years after.[25]

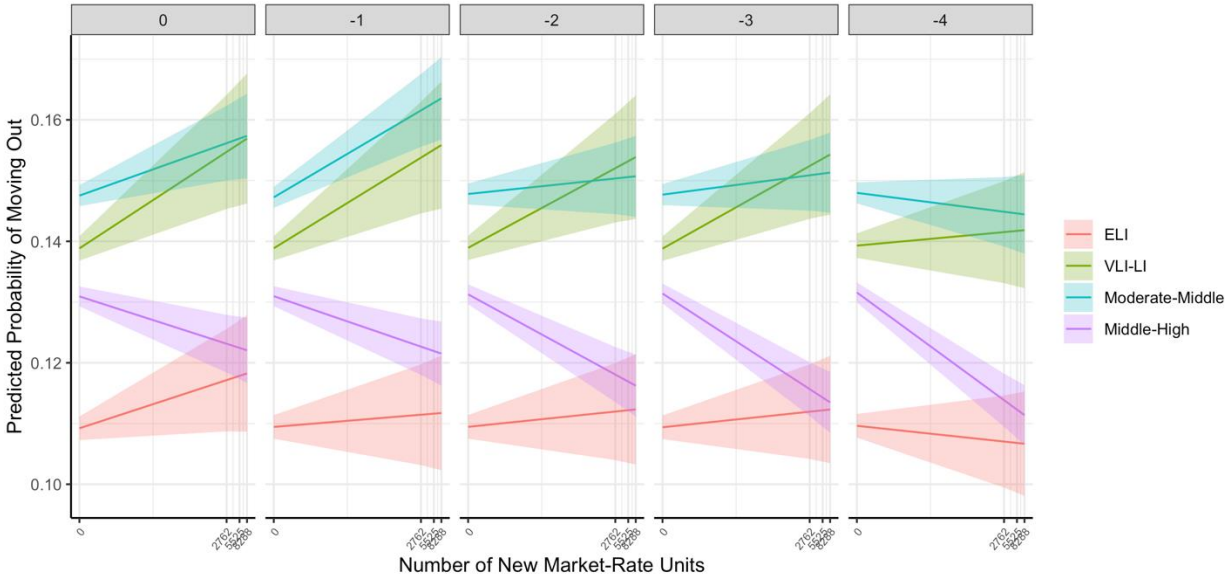
[23] Specifically, these are individuals of age just under 49, in year 2017, in a household size of 2, that is not delinquent and has a mortgage, living in an East Bay (not Oakland) neighborhood, with a vacancy rate of 3% in 2000, 25.6% units built in the past 20 years, ownership rate of 60.5%, 75 subsidized units, 52% non-Hispanic white, 38% college-educated, 27% foreign-born, median household income of $68,887, 8% poverty, median home value of $372,819, median rent of $1,039, 61% owner-occupied, with an average outmigration rate of 12.2% and inmigration rate of 16% in the past 3 years.

[24] In logistic regression models, results for ELI residents are the same and there are no longer any effects for VLI residents. Moderate-middle SES residents are only more likely to move out 1 year after but are actually less likely to move out by 4 years later. There are no negative effects for middle-high SES residents until 2 years after.

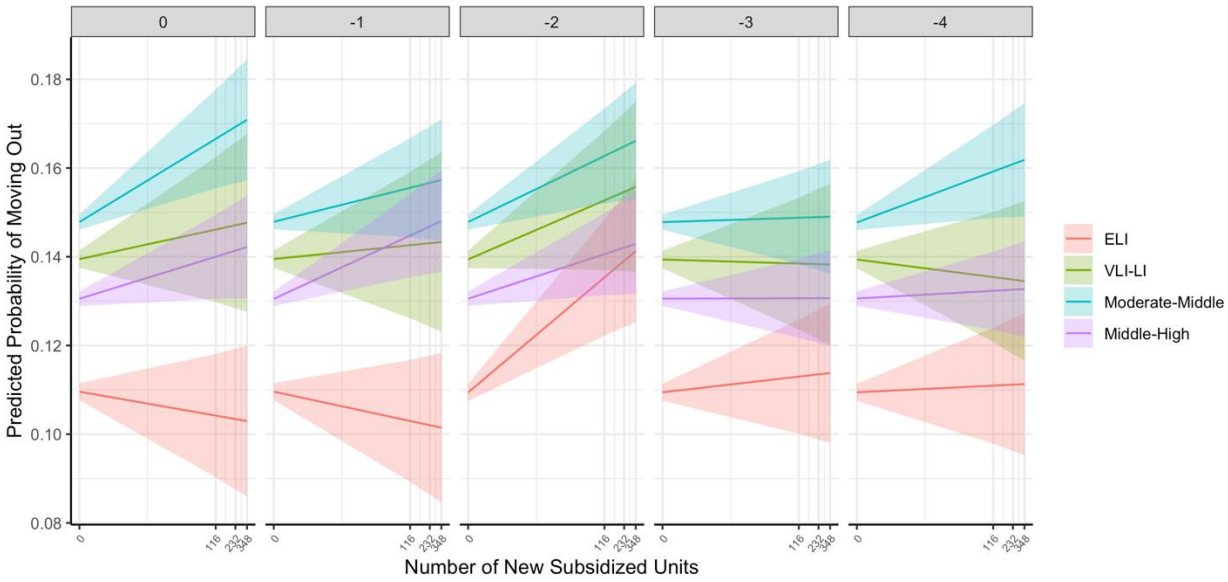
[25] In logistic regression models, the results are the same for ELI and middle-high SES residents, but there are no longer any effects for moderate-middle SES residents.

Figure 25. Predicted Probabilities of Moving Out from Block Groups by SES and Number of New Units (a) Market-Rate, and (b) Subsidized

(a) Market-Rate



(b) Subsidized



Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database.

Individual-level probability models in gentrifying areas

Next, we compare mobility patterns only among gentrifying tracts in Oakland, San Francisco, and San Jose to better understand migration pressures in strong market areas. Gentrification measures are constructed 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 be nongentrifying only if 1) the percentage increase in either the median rent or median home value was less than the subregion's 25th 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 25th percentile of the percent increases on either of those indicators. Tracts are considered to be gentrifying otherwise.

In this analysis, we subset our data to only gentrifying tracts in San Francisco, San Jose, and Oakland. We remove tract-level controls that are collinear with the gentrification measures—median home value, median income, median rent, and percent college-educated. We include a control variable for the city and remove the regional control variable. Figure 26 shows the results from this model for San Francisco, the modal city in the dataset, with control variables plotted at San Francisco-specific mean and modal values.

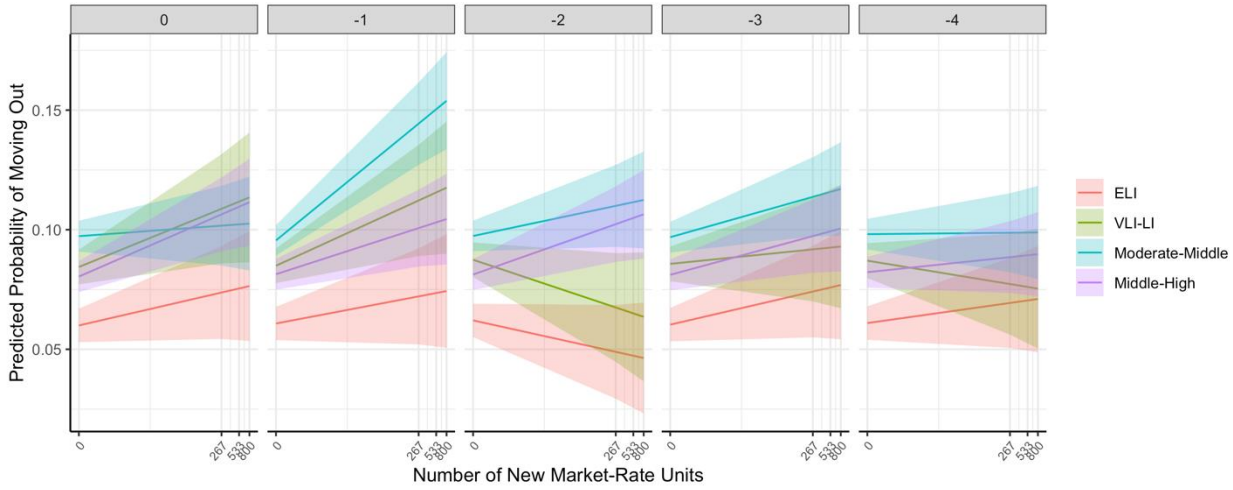
Figure 26 presents predicted probabilities of outmigration by SES and the number of new market-rate and subsidized units**.**

Overall, new market-rate production encourages middle-high SES residents to move out, while new subsidized production in gentrifying tracts allows lower-SES residents in stay in place in the immediate years after units are built.

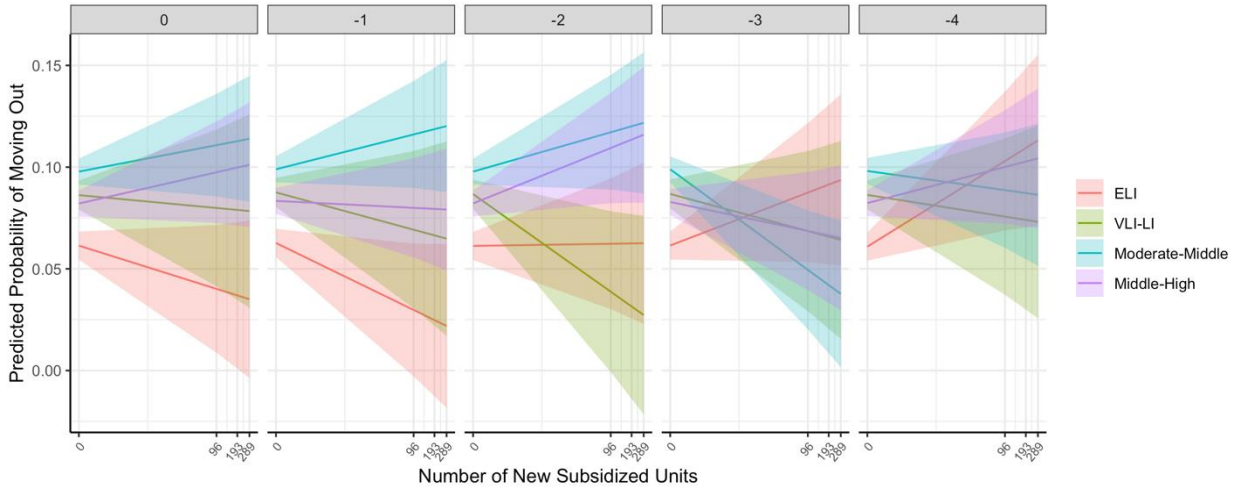
Figure 26 shows that the new construction of market-rate units has no effects on ELI residents. VLI-LI residents are more likely to move out in the same year and the year after units are built, but are less likely to do so 2 years after. Moderate-middle SES residents are more likely to move out 1 year and 3 years after units are built, and high-SES residents are more likely to move out in all years except 4 years after where there are no effects. New construction of subsidized units discourages ELI residents to move out in the year after units are built but encourages them to do so 4 years after. VLI-LI residents are less likely to move out 2 years after units are built, and moderate-middle SES residents are less likely to move out 3 years after. Middle-high SES residents are more likely to move out 2 years after.

Figure 26. Predicted Probabilities by SES of Moving Out of Block Groups by Number of New (a) Market-Rate and (b) Subsidized Units

(a) Market-Rate



(b) Subsidized



Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Constrained Moves

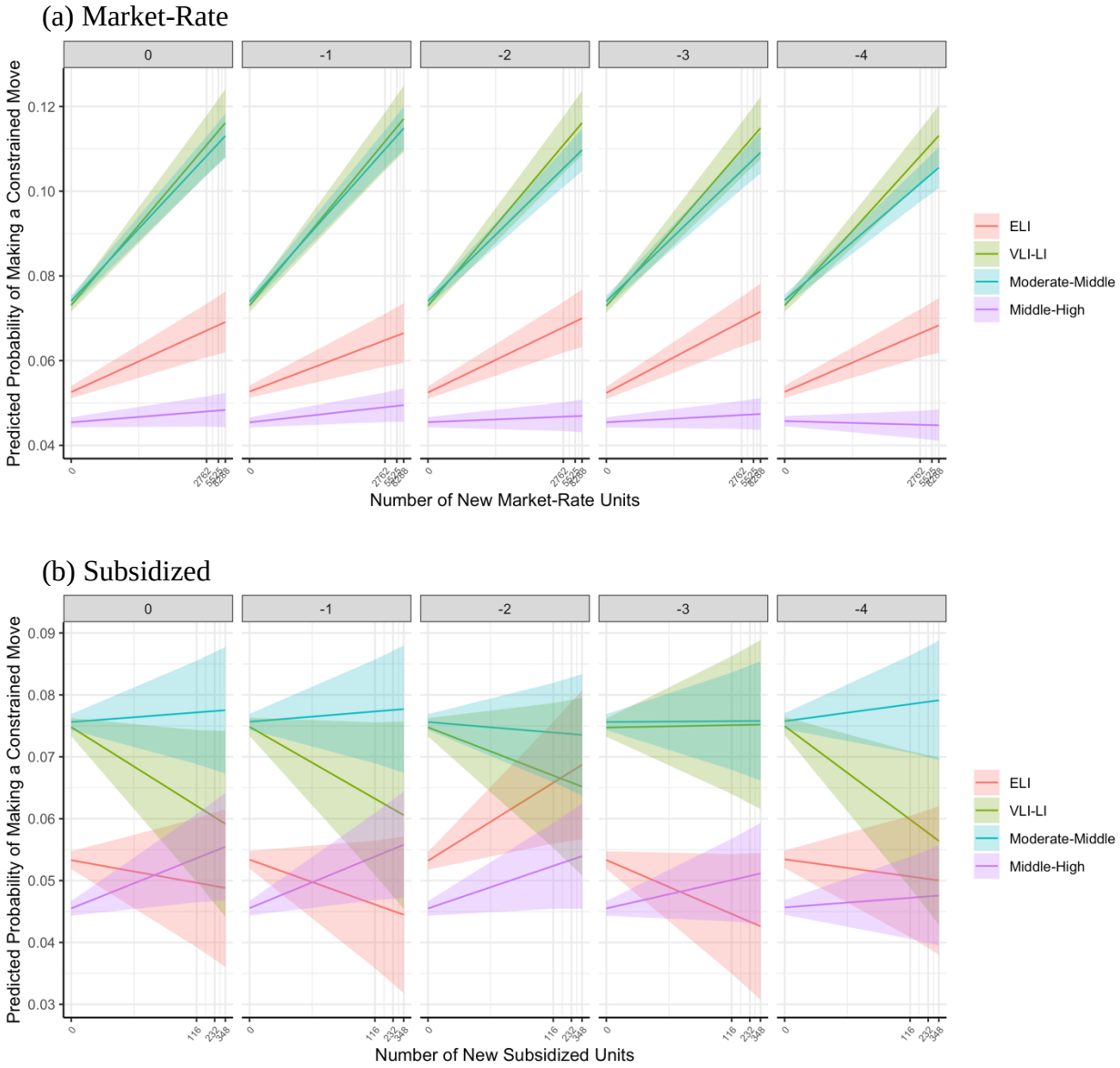
In the following section, we present results from linear probability models predicting the probabilities to make a constrained move by SES. This analysis sheds light on whether new production affects the probability that a resident has to make an undesirable move. We expect that effects should vary by SES groups, with lower-SES groups having to make constrained moves more often.

Overall, new market-rate production increases the probability that all movers will make a constrained move. This is consistent across the measures based on household income and poverty rate, and are more muted based on neighborhood rents. New subsidized production decreases the probability, especially for lower-SES residents, of making a constrained move based on household income and poverty rate deciles but increases it for higher-SES residents based on rents.

Figures 27 to 29 illustrate these differences by the number of newly produced subsidized and market-rate units and compare results for whether new housing is built up to 4 years prior and for the three ways constrained moves are measured. The figures present the predicted probabilities of making a constrained move for individuals in the dataset having average characteristics for continuous variables and the mode for categorical variables, which are the same values as in the outmigration models above. The following plots are for movers who did not move within their same tract.

For constrained moves defined with median household income deciles, Figure 27 illustrates how increases in the number of market-rate units increase the probability of making a constrained move for everyone, with effects lasting only 1 year after for middle-high SES residents and at least 4 years for everyone else. However, middle-high SES residents have significantly lower probabilities than other residents to make constrained moves, with the gap between middle-high SES movers and everyone else widening over time. Middle-high SES residents are also the only group to experience a decreasing probability 4 years after. Increases in subsidized housing production reduce the probability of making a constrained move for ELI residents starting the year units are built, with effects lasting 1 year and 4 years after. VLI-LI residents are more likely to make a constrained move 2 years after units are built but there were no effects otherwise. There were positive effects for middle-high SES residents in the same year and the year after, and there were no significant effects for moderate-middle SES residents.

Figure 27. Predicted Probability of Making a Constrained Move by SES from Block Groups with New Units (a) Market-Rate (b) Subsidized, Using Median Household Income Deciles

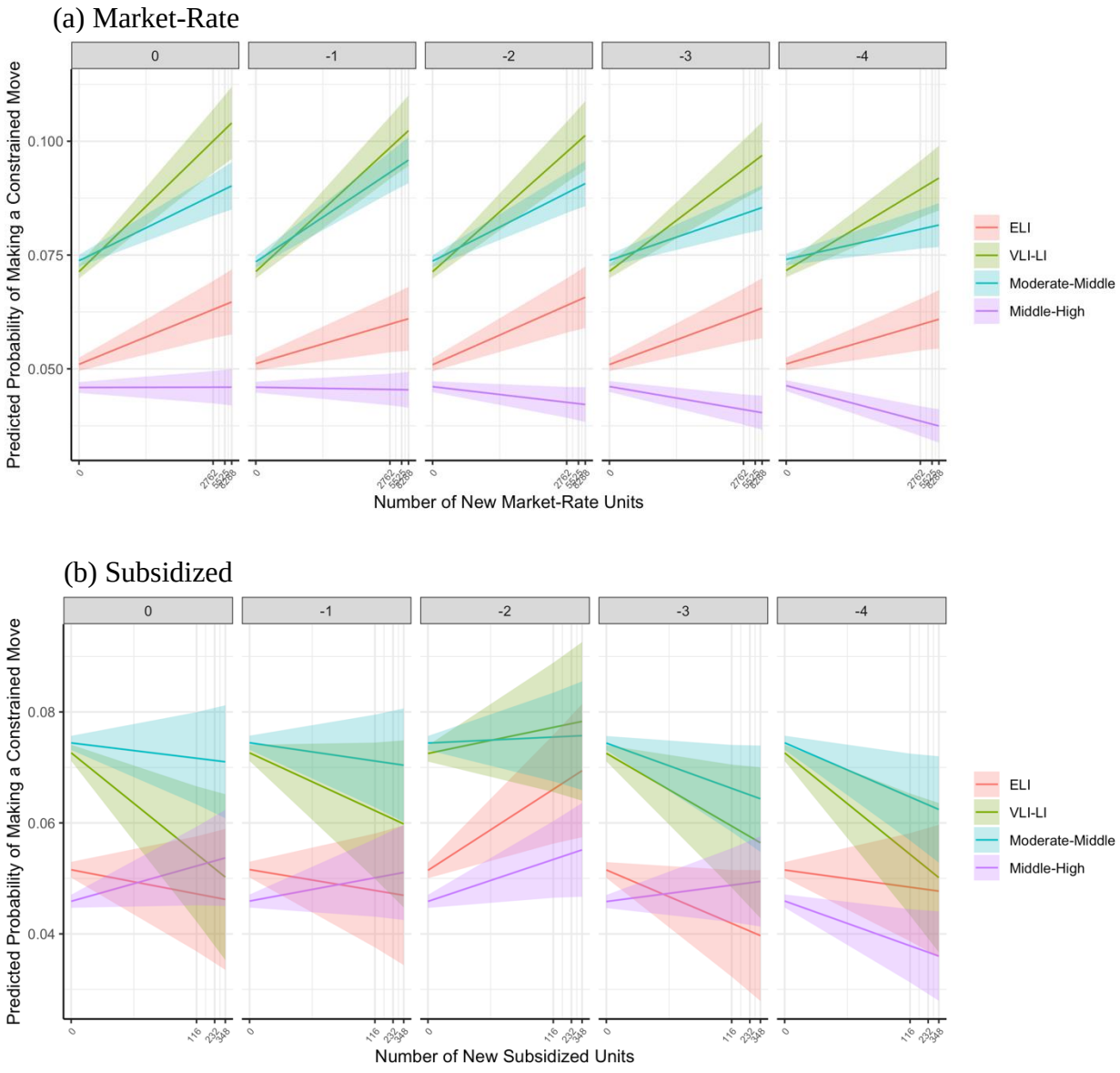


Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Figure 28 illustrates that new market-rate housing production increases the probability of making a constrained move for ELI, VLI-LI, and moderate-middle SES residents in all years. While there are no effects for middle-high SES residents in the same year and the year after units are built, there are negative effects starting 2 years after units are built, with effects lasting at least 4 years.

New subsidized housing reduces the probability of making a constrained move, defined as a higher or equal poverty rate decile at the destination than at the origin, for ELI residents in all years except 2 years after units are built. It increases the probability of making a constrained move for VLI-LI movers 2 years after units are built but decreases it 3 years after units are built. Moderate-middle SES movers are less likely to make a constrained move 3 and 4 years after new subsidized housing is built, whereas high-SES movers are more likely to make a constrained move after units are built but less likely to do so 4 years after.

Figure 28. Predicted Probability of Making a Constrained Move by SES from Block Groups with New Units (a) Market-Rate (b) Subsidized, Using Poverty Rate Deciles

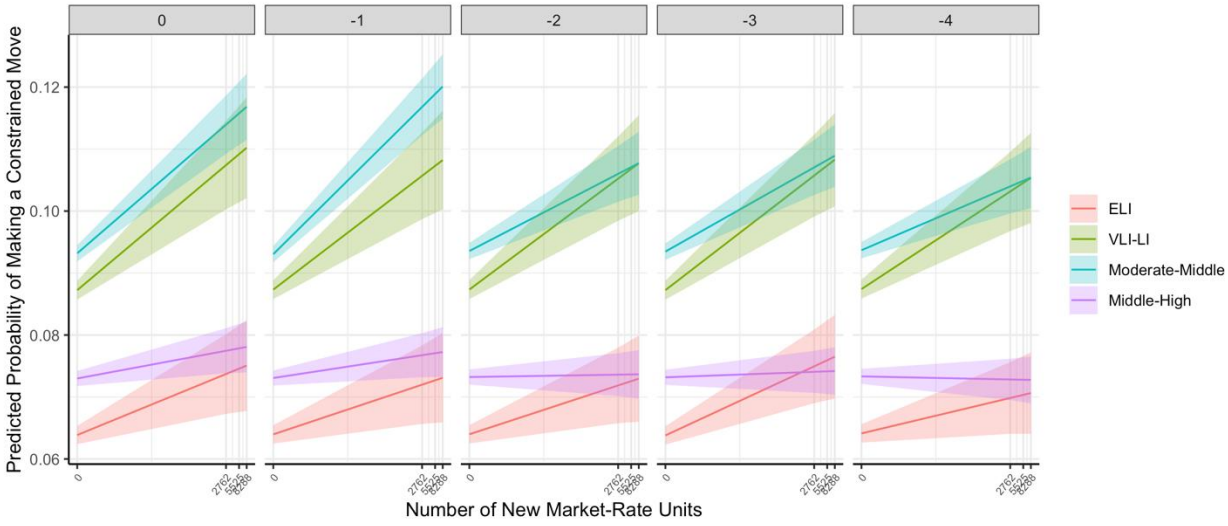


Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

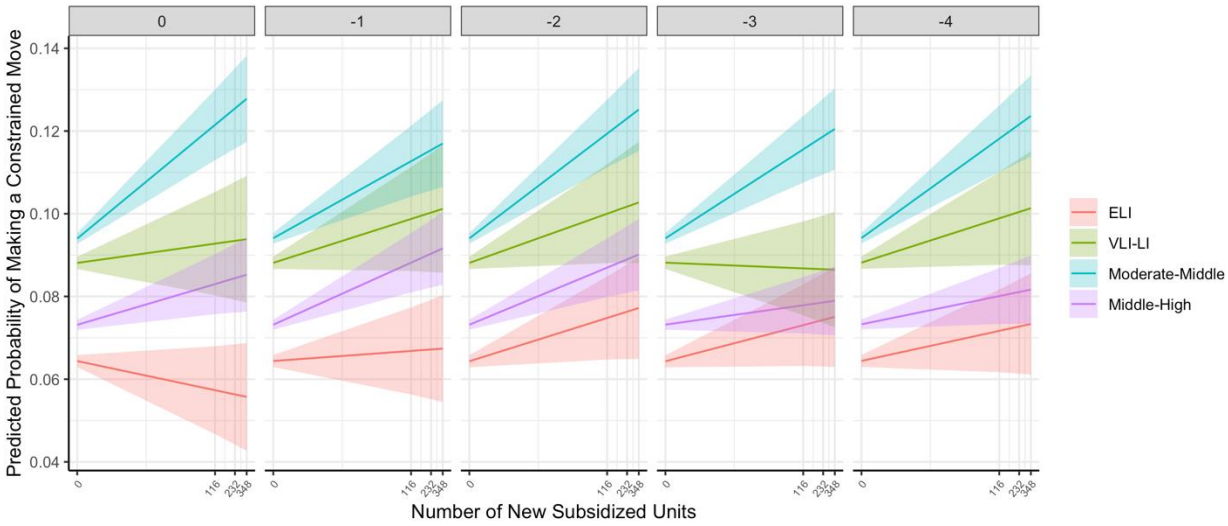
Figure 29 shows predicted probabilities to make a constrained move when defined as moving to a neighborhood with an equal or lower median rent decile for their metropolitan area. Market-rate housing increases the probability of making a constrained move for ELI, VLI-LI, and moderate-middle SES residents in all years, and for middle-high SES residents in the same year and the year after units are built. New subsidized units have no effects for ELI residents except a very weak positive effect 4 years after units are built. Increases in new subsidized units have a weak positive effect for VLI-LI residents 2 years after but had no effects otherwise. There are positive effects in all years for moderate-middle SES residents, and a positive effect for middle-high SES residents in all years except 3 years after. Since figure 29 shows trends for people who did not move within the same tract, the results are not necessarily driven by a reduction in rent in the tract due to new subsidized housing.

Figure 29. Predicted Probability of Making a Constrained Move by SES from Block Groups with New Units (a) Market-Rate (b) Subsidized, Using Median Rent Deciles

(a) Market-Rate



(b) Subsidized



Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Inmigration

Individual-level probability models

Appendix Table C3 presents the regression coefficients and standard errors for the main variables of interest from a series of linear probability models predicting the probability that a resident will move into a census block group by the logged number of newly produced housing units in the same year, 2 years prior, and 4 years prior. The baseline models reflect the general trends of movers, with VLI-LI and moderate-middle SES residents moving into block groups more than ELI residents, and middle-high SES residents moving into them less. Further, the number of new units of any kind is associated with higher rates of inmigration when it is built, 2 years later, and 4 years later. The subsequent models examine whether the effects of new production on moving into neighborhoods differ across SES groups by including interaction terms. Similar to above, we only note where results differ when compared against logistic regression models in footnotes.

Overall, new market-rate production increases the probability that people will move into a neighborhood across all SES groups for at least 4 years after the units are built, and the probabilities are highest for middle-SES residents. New subsidized production increases the probability that people will move into a neighborhood for a few years, except for ELI residents. Figure 30 illustrates these differences by the number of newly produced market-rate and subsidized units, and compares results for whether new housing is built up to 4 years prior. The figures present the predicted probabilities of moving into a block group for individuals in the dataset having average characteristics for continuous variables and the mode for categorical variables, which are the same values as in the outmigration models above.

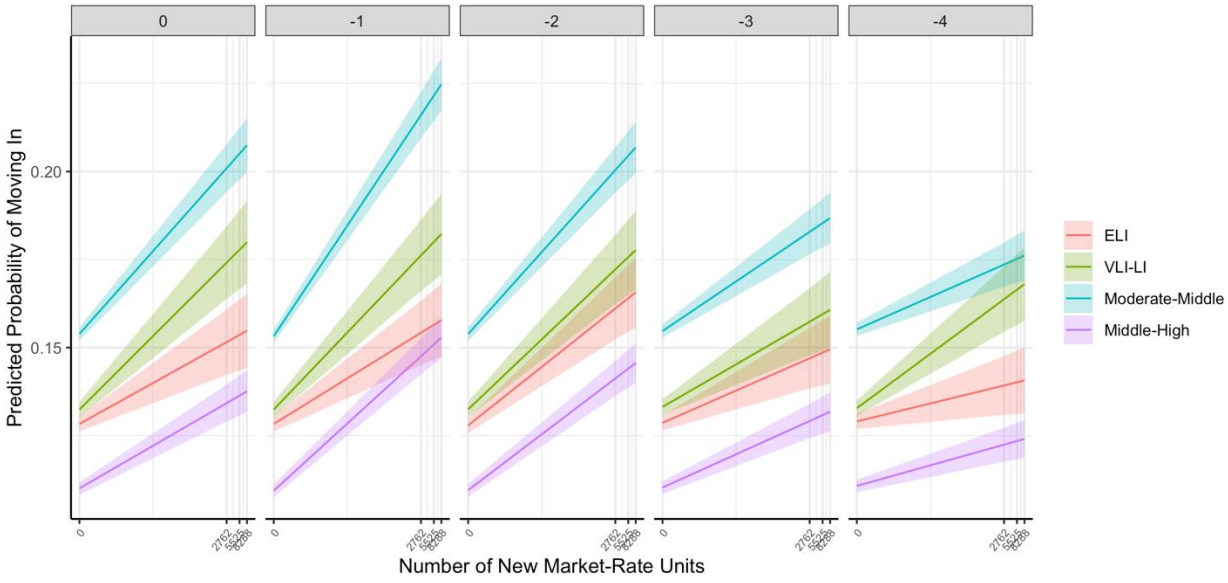
Figure 30 illustrates the overall positive effect of new market-rate housing, which attracts everyone for at least 4 years after the units are built. Once again, we find that moderate-middle SES residents have the highest probability of moving into neighborhoods with new market-rate units, followed by VLI-LI, ELI, and middle-high SES residents, although the differences between SES groups narrow slightly over time.[26] Subsidized production increases the probability that people will move into a neighborhood, though this is inconsistent for different SES groups across years. While moderate-middle SES residents have the highest probability of moving into neighborhoods with new subsidized production, middle-high SES residents generally have the lowest. Subsidized production is associated with the increased probability that VLI-LI and moderate-middle SES residents will move into neighborhoods in the same year, 1, and 2 years after, as well as 3 and 4 years after for moderate-middle SES residents. It is also associated with the increased probability that high-SES residents will move into neighborhoods, with effects lasting up to 3 years after new units are built. There are no effects for ELI residents, however.[27]

[26] In logistic models, the effects for middle-high SES residents are much stronger, with middle-high SES residents having the second highest probability to move in at the higher distribution of new units the year after new units are built.

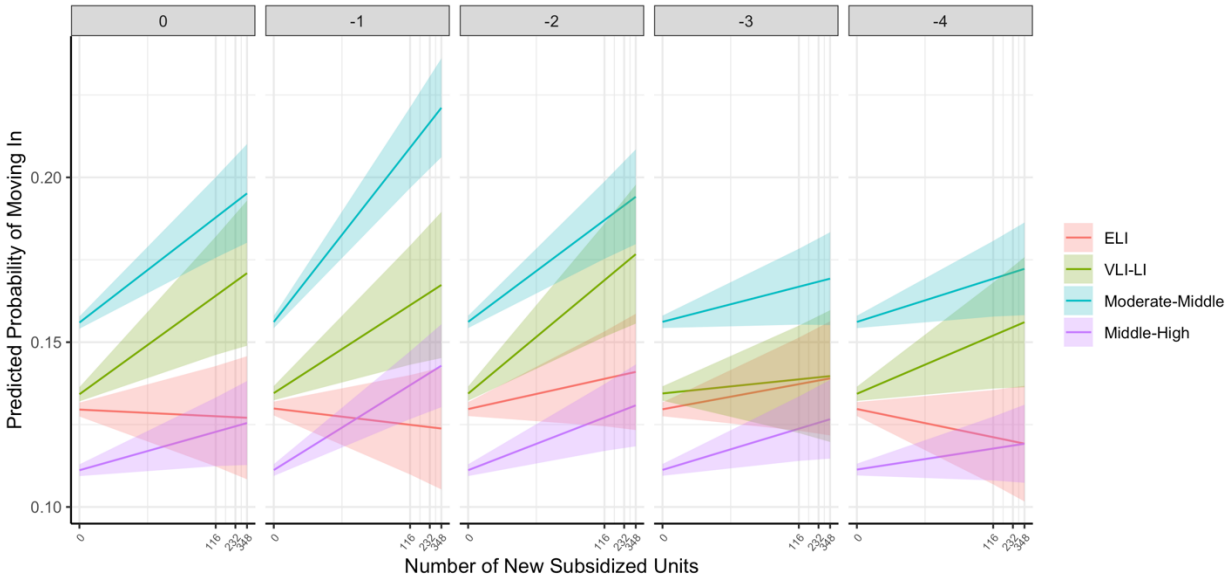
[27] In logistic regression models, results for ELI and moderate-middle SES residents are the same. VLI-LI residents are only more likely to move in 2 years after, and middle-high SES residents are more likely to move in with effects lasting at least 4 years.

Figure 30. Predicted Probabilities by SES of Moving into Block Groups by Number of New (a) Market-Rate Units, and (b) Subsidized

(a) Market-Rate Units



(b) Subsidized Units



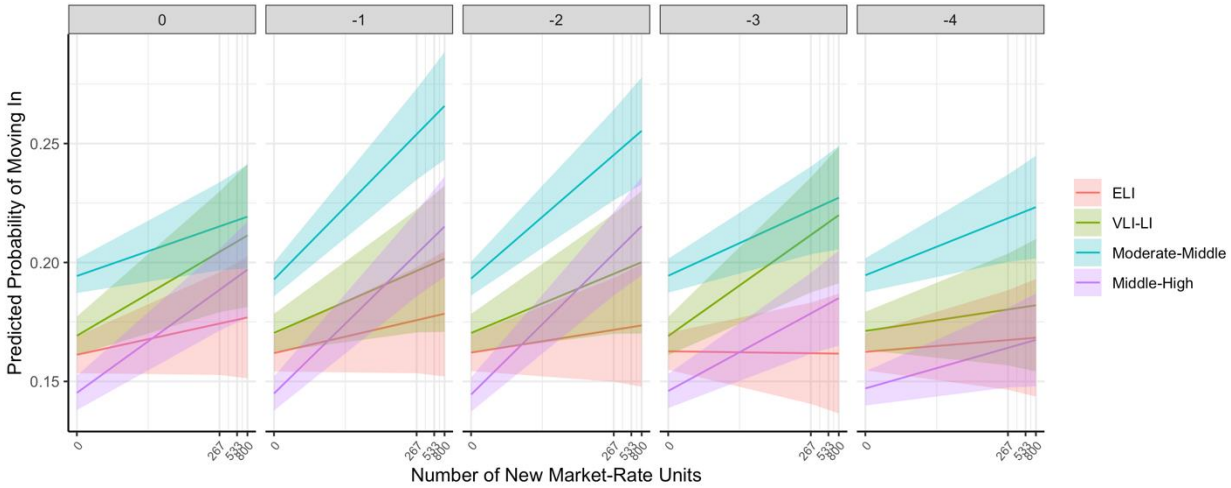
Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database.

Individual-level probability models in gentrifying areas

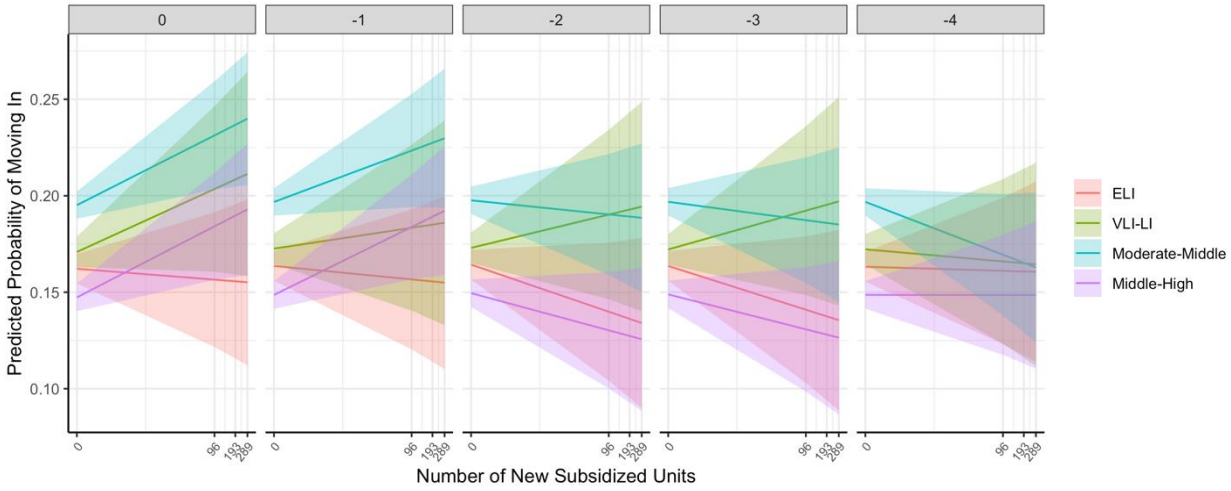
Figure 31 shows the results of inmigration models when subsetting the sample only to hot-market areas with high levels of gentrification, as discussed in Section V-C.3. We examine the effects of new construction on the likelihood of moving in for each SES group. Figure 31 shows that ELI residents in particular do not take advantage of newly constructed market-rate units, and that lower SES groups are not able to take advantage of newly constructed subsidized units. First, for market-rate units, there are no effects for ELI residents. Everyone else is more likely to move in in all years, except for VLI-LI residents for whom effects only last up to 3 years after. Next, for subsidized units, there are no effects for ELI and VLI-LI residents. Moderate-middle SES residents are more likely to move in in the same year and the year after units are built, but are less likely to do so 4 years after. Middle-high SES residents are more likely to move in in the same year and the year after.

Figure 31. Predicted Probabilities by SES of Moving Into Block Groups by Number of New (a) Market-Rate (b) Subsidized Units

(a) Market-Rate



(b) Subsidized



Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Predicted SES composition of inmovers

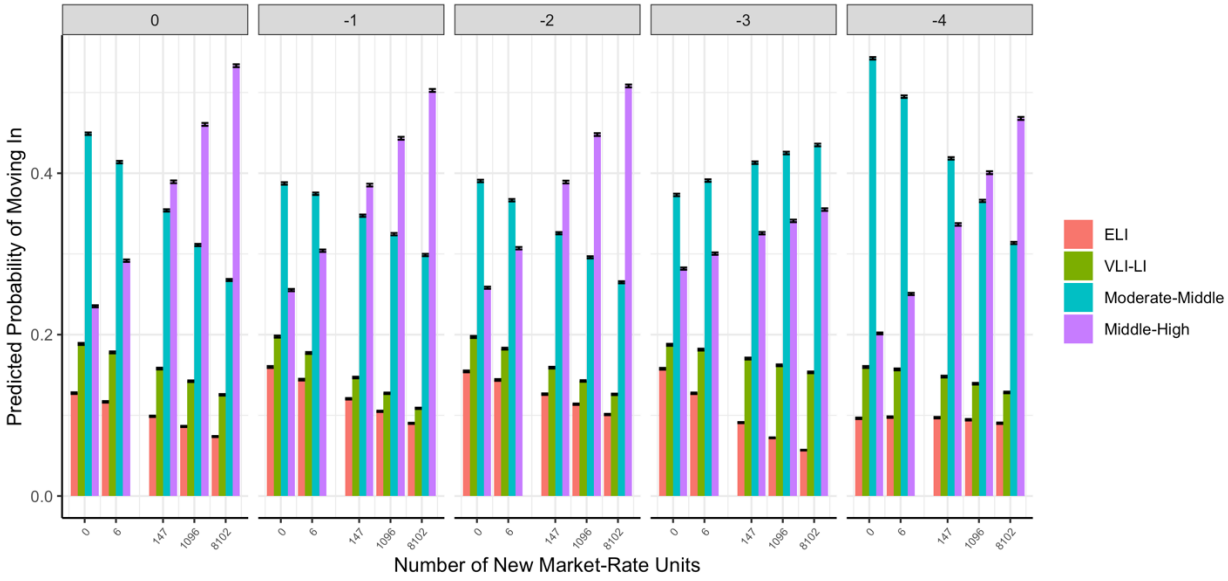
Next, we compare how the likelihood that movers into a block group are in each SES group changes with new housing production using multinomial logit models. These results are based on movers only. Figure 32 presents predicted likelihoods that new residents in neighborhoods are each SES. These results are based on multinomial logistic regression models predicting whether ELI, VLI-LI, or moderate-middle SES residents relative to middle-high SES residents move into neighborhoods.

Overall, new market-rate housing production provides more opportunities for middle-high SES residents, while new subsidized housing production makes neighborhoods accessible for moderate-o-middle-SES residents in the short-term but more accessible for middle-high SES residents in subsequent years.

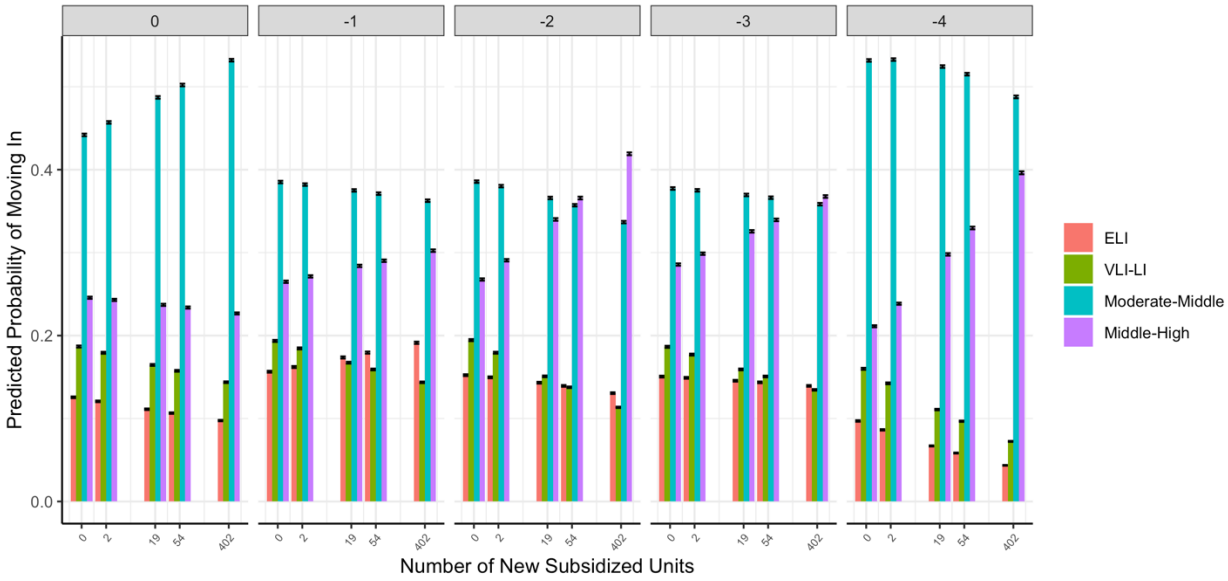
When considering the number of new market-rate units, figure 20 shows that the results exhibit negative trends for ELI, VLI-LI, residents, as well as for moderate-middle SES residents except for 3 years after units are built. The likelihood that inmovers are middle-high SES residents increases in neighborhoods with higher numbers of new market-rate units in all years, and middle-high SES residents are the most likely group to be inmovers. Moderate-middle SES residents are less likely to move into the neighborhood as the number of new subsidized units increases, in all years except in the same year units are built. Middle-high SES residents are actually less likely to move in as the number of new subsidized units increases in the year units were built, but more likely to starting the year after. Finally, VLI-LI and ELI residents comprise similarly low shares of the residents moving into any neighborhood, and ELI residents are only more likely to be move as the number of subsidized units increases the year after.

Figure 32. Predicted Composition of Movers into Block Groups by Number of New (a) Market-Rate Units, and (b) Subsidized

(a) Market-Rate



(b) Subsidized



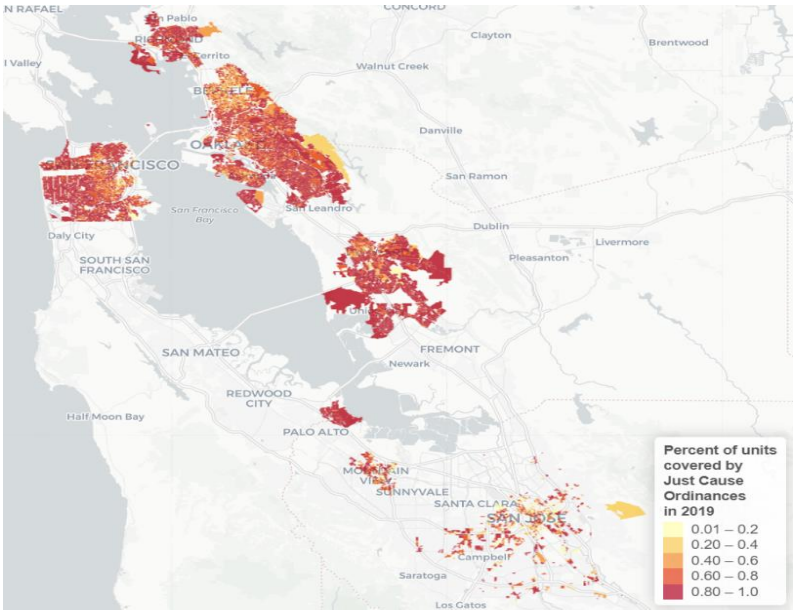
Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database.

Results: the impacts of tenant protections on mobility

Tenant protections in the Bay Area

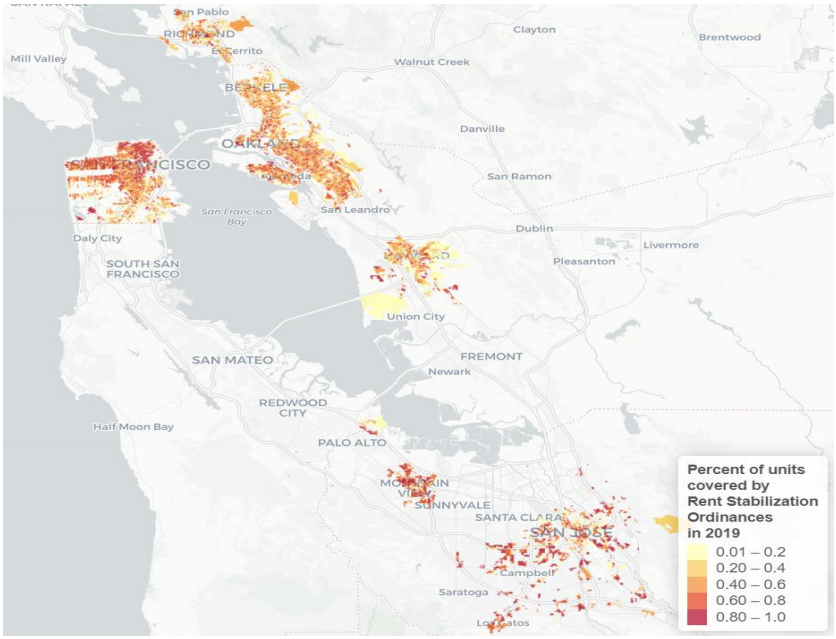
In general, coverage by just cause ordinances tends to be much more comprehensive than rent stabilization (Figures 33 and 34). San Francisco houses the greatest share of units with tenant protections, while protections are more sporadic in the South Bay.

Figure 33: Percent of Units Subject to Just Cause for Evictions Ordinances in 2019 by Census Block



Source: UDP Tenant Protection Database

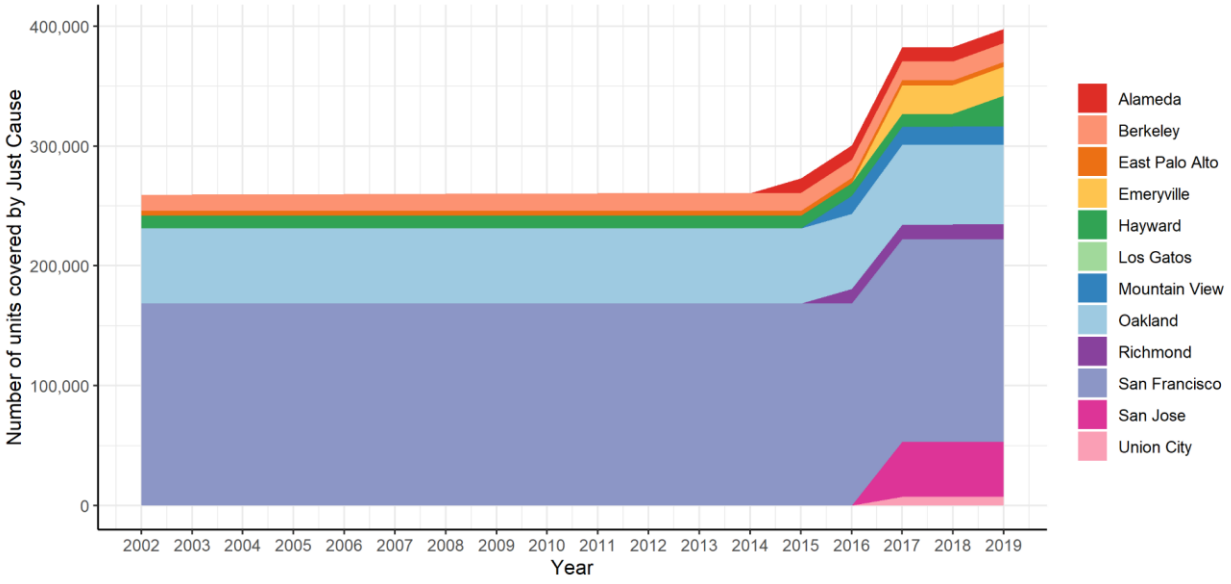
Figure 34: Percent of Units Subject to Rent Stabilization Ordinances in 2019 by Census Block



Source: UDP Tenant Protection Database

In the following figures, we examine trends in tenant protections over time.

Figure 35. Number of Units Subject to Just Cause for Evictions Ordinances by Jurisdiction

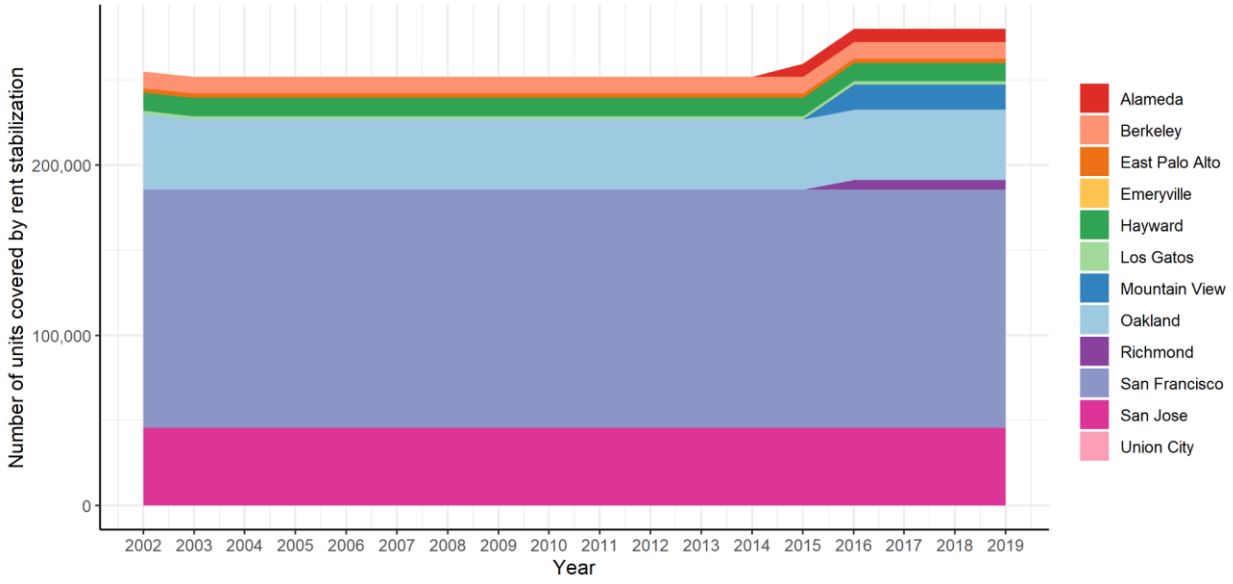


Source: UDP Tenant Protection Database

Figures 35 and 36 display the number of units covered by just cause for evictions and rent stabilization ordinances, respectively, for each jurisdiction in the Bay Area where these tenant protections existed between 2002 to 2019. Since tenant protection ordinances in most jurisdictions include both just cause for evictions and rent stabilization protections, there is significant overlap between the two. In general, however, more units in each jurisdiction are subject to just cause than rent stabilization.

Between 2014 and 2017, there was an increase in the number of units covered by both types of protections. During this time, multiple jurisdictions either amended or adopted ordinances that expanded coverage to more types of units. Of all the jurisdictions, San Francisco consistently has the highest number of units subject to both types of tenant protections. San Jose and Oakland have the next highest coverage for rent stabilization, although San Jose did not adopt just cause for evictions protections until 2017.

Figure 36. Number of Units Subject to Rent Stabilization Ordinances by Jurisdiction



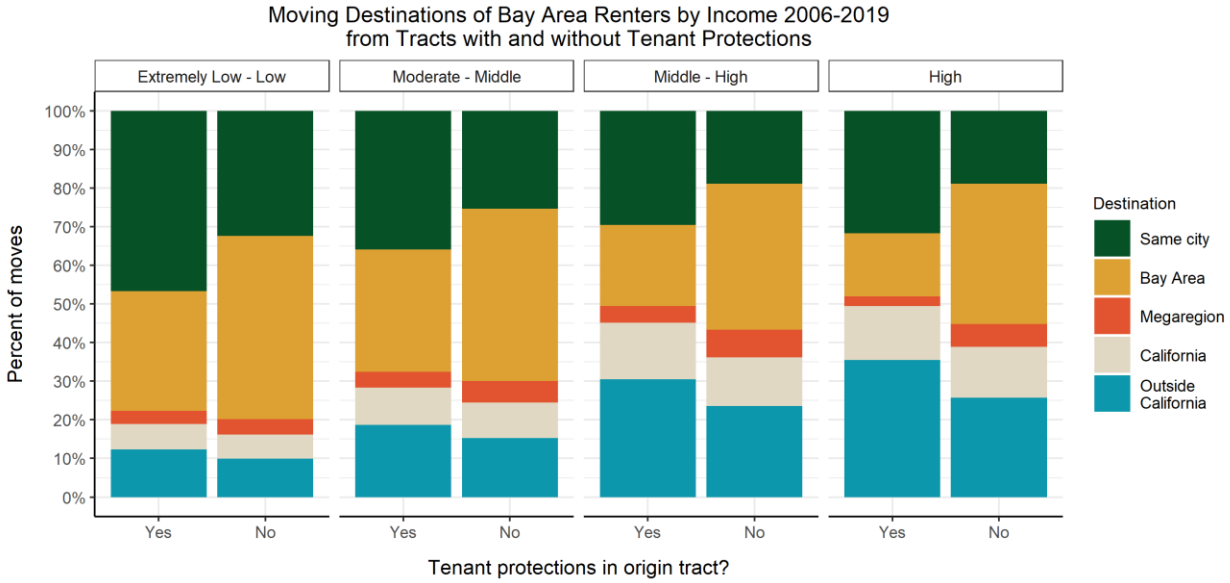
Source: UDP Tenant Protection Database

Tenant protections and mobility: Infogroup results

Descriptive Statistics

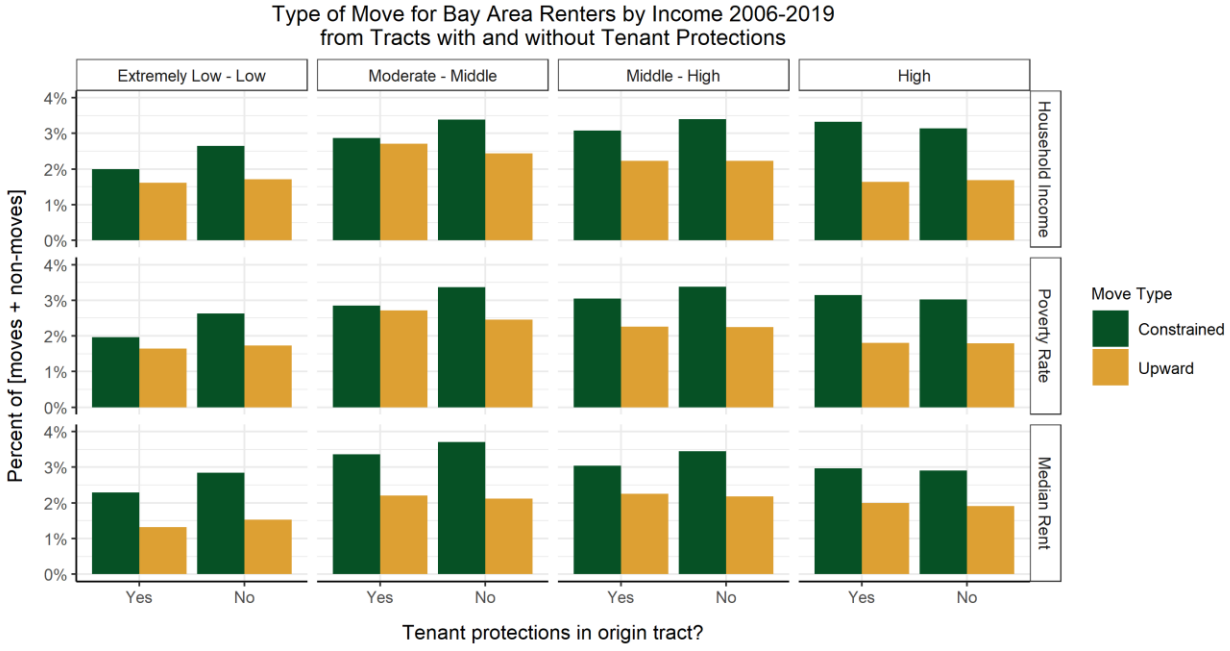
Across SES groups, households moving from block groups with tenant protections were disproportionately likely to land somewhere in their original city (Figure 37). The higher the SES, the more likely generally that movers ended up outside of the Bay Area, in California or outside the state altogether. Across SES groups and neighborhood types, movers out of block groups with tenant protections were more likely to experience constrained moves (Figure 38). This may occur because tenant protections were keeping them in neighborhoods as they became unaffordable, and they are unable to find comparable neighborhoods to move into.

Figure 37. Moving Destinations of Bay Area Movers by SES, 2006-2018, from Block Groups with and without Tenant Protections



Source: Infogroup and UDP Tenant Protection Database

Figure 38. ***Type of Move for Bay Area Renters by Income 2006-2019.***



Source: Infogroup and UDP Tenant Protection Database

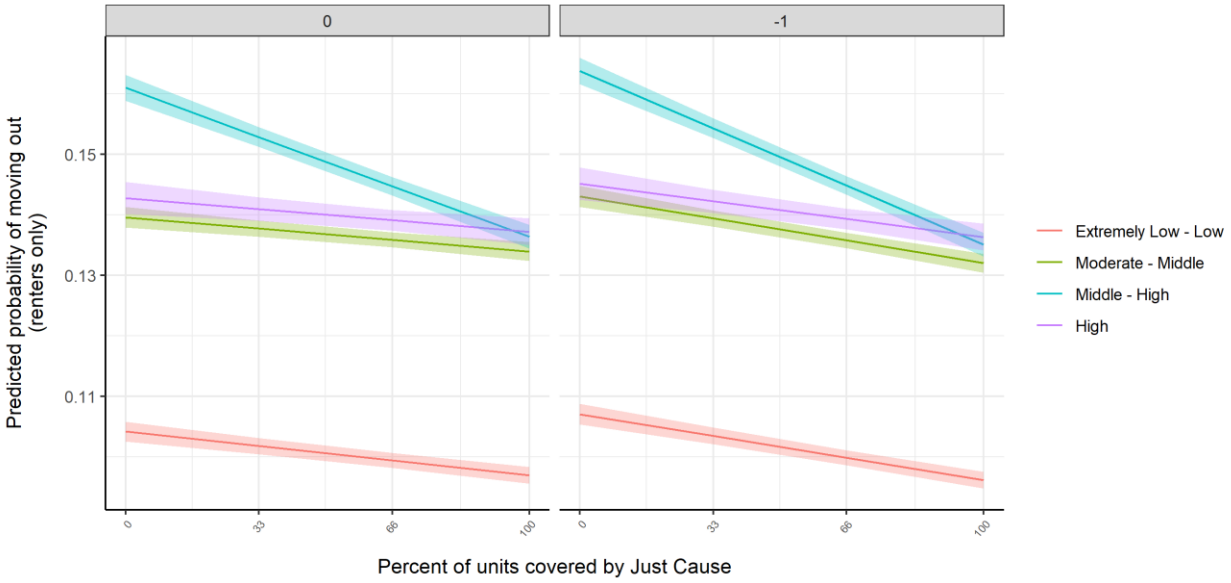
Outmigration

Household-level probability models

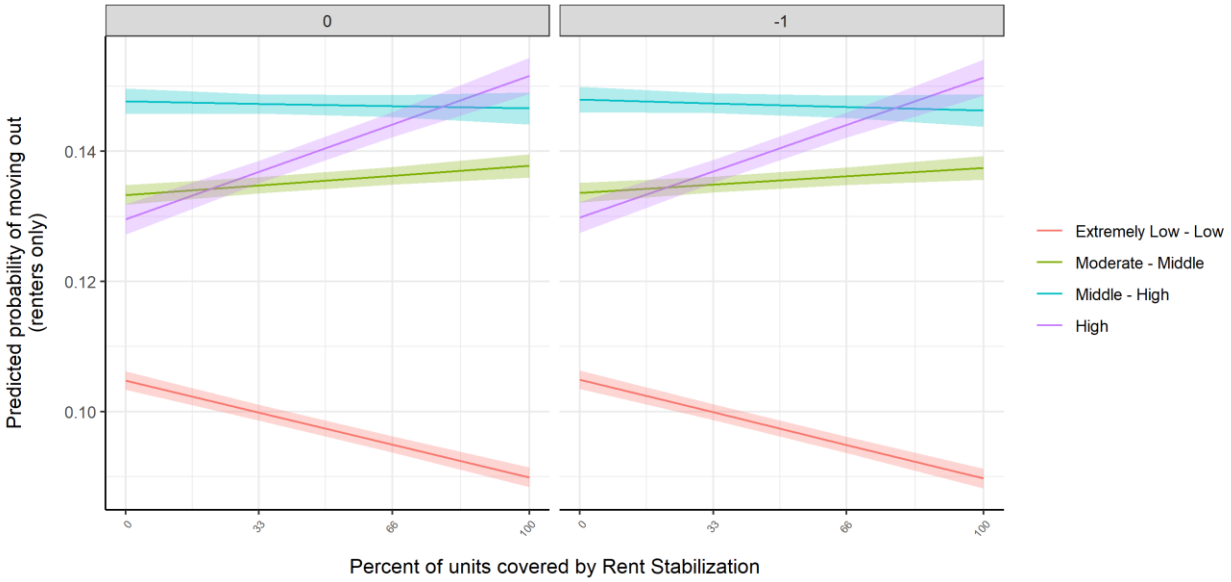
The following figures illustrate the relationship between tenant protections and the probability of renter households moving out of their block group. A higher percentage of units in a block group covered by just cause for evictions is associated with fewer move-outs at all SES levels, both the same year and 1 year after, with the biggest impacts for middle-SES groups. Rent stabilization decreases outmigration for low-SES households, increases outmigration for moderate- and high-SES households, and has no effect on move-outs for middle-SES households.

Figure 39. Predicted Probability of Moving Out by SES and Percent of Units Covered by (a) Just Cause and (b) Rent Stabilization

(a) Just Cause for Evictions



(b) Rent Stabilization



Source: Infogroup, UDP Tenant Protection Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

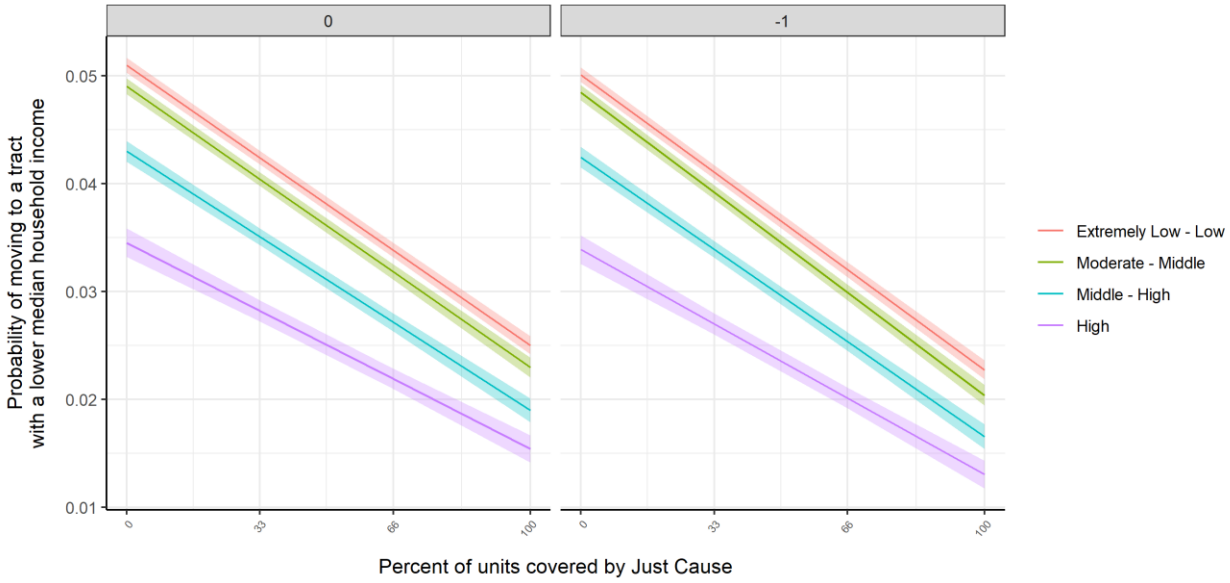
Regression results support the plot findings (Appendix Table D3). Just cause for eviction ordinances decrease outmigration across income groups and a variety of household characteristics, including Black and Latine race/ethnicity, and in core cities. Rent stabilization ordinances lower outmigration rates for low income groups only, and also for San Francisco households only. These ordinances are associated with increased outmigration among other income groups and in other core cities, as well as for both Black and White race/ethnicities.

Constrained Moves

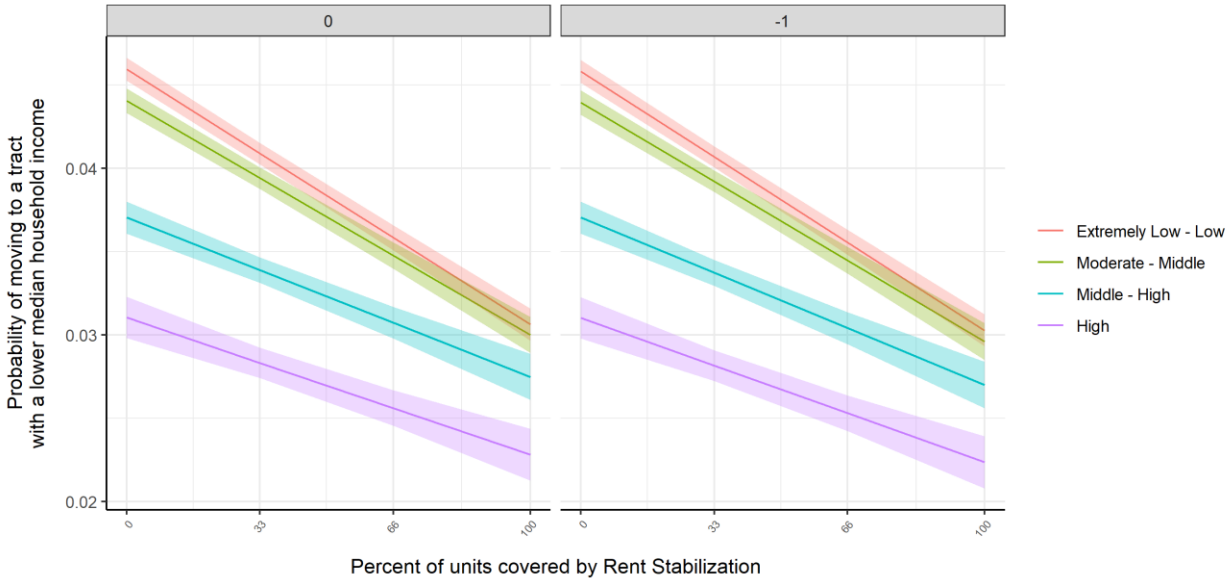
Increases in units covered by just cause for eviction ordinances decrease the probability of making a constrained move, as assessed with median household income or poverty deciles, for households across all SES groups in both the year units are covered and the year after; results are similar for rent stabilization except that using the poverty measure, high-SES households experience increased probabilities of a constrained move (Figures 40 and 41). Looking at destination neighborhoods by rent decile (Figure 42) reveals similar patterns, except that probabilities are lowest (rather than highest) for low-SES households and minimal for high-SES groups.

Figure 40. Predicted Probability of Making a Constrained Move by SES by Percent of Units Covered by (a) Just Cause (b) Rent Stabilization, Using Median Household Income Deciles

(a) Just Cause for Evictions



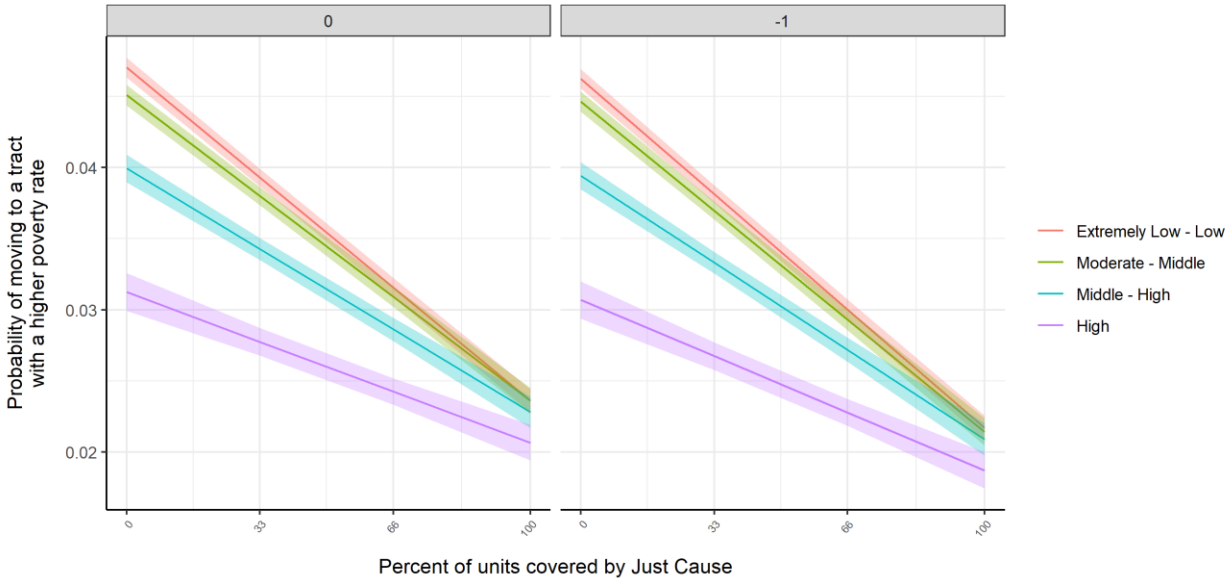
(b) Rent Stabilization



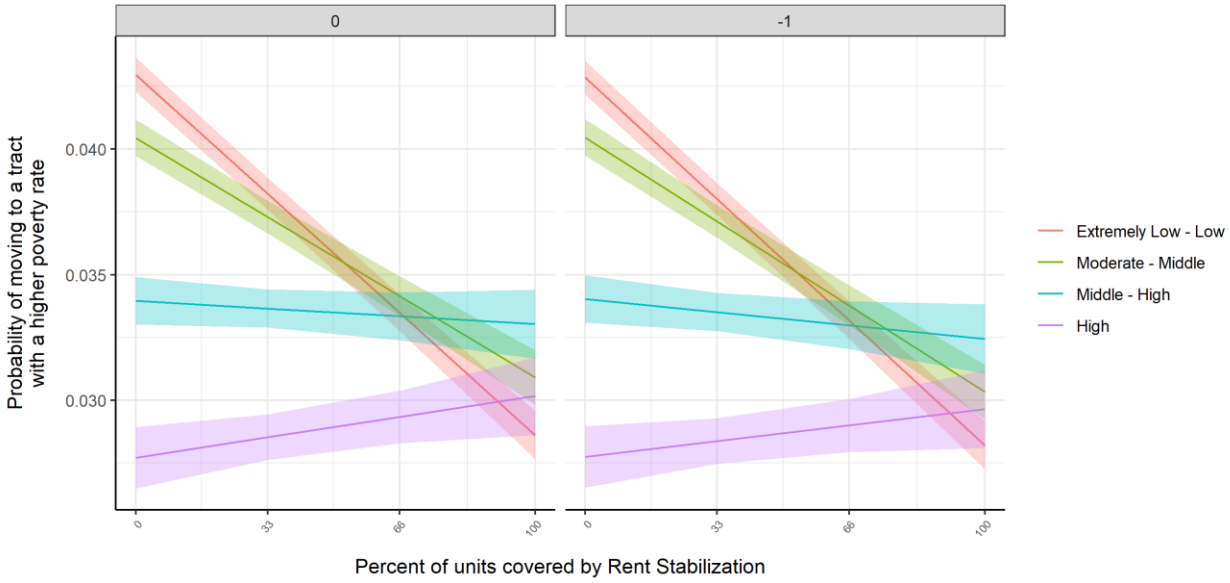
Source: Infogroup, UDP Tenant Protection Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Figure 41. Predicted Probability of Making a Constrained Move by SES by Percent of Units Covered by (a) Just Cause (b) Rent Stabilization, Using Median Poverty Rate Deciles

(a) Just Cause for Evictions



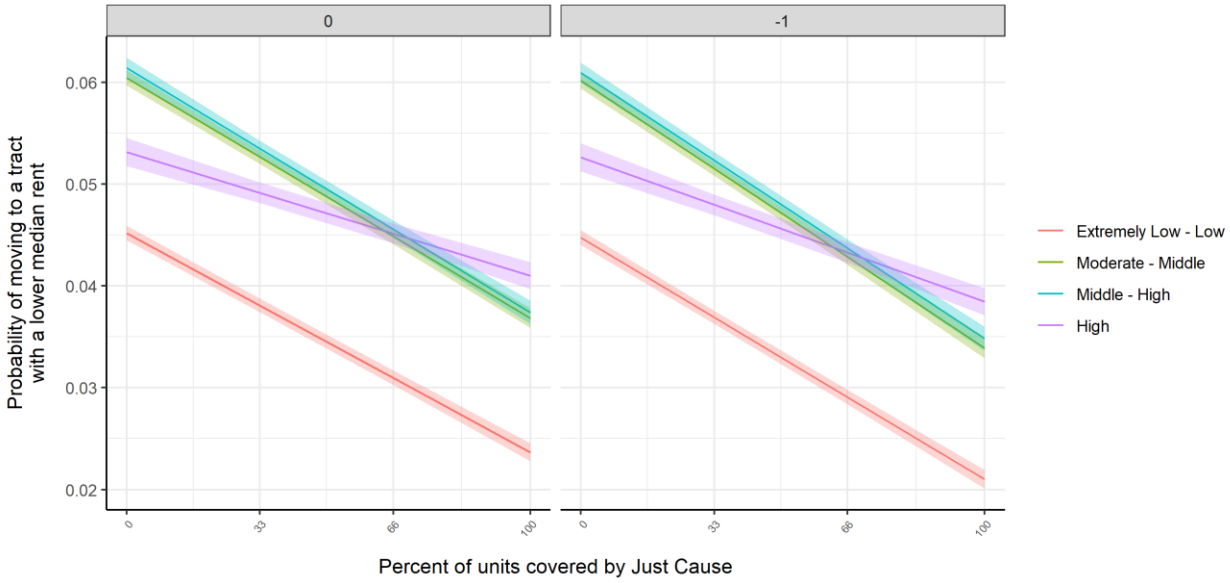
(b) Rent Stabilization



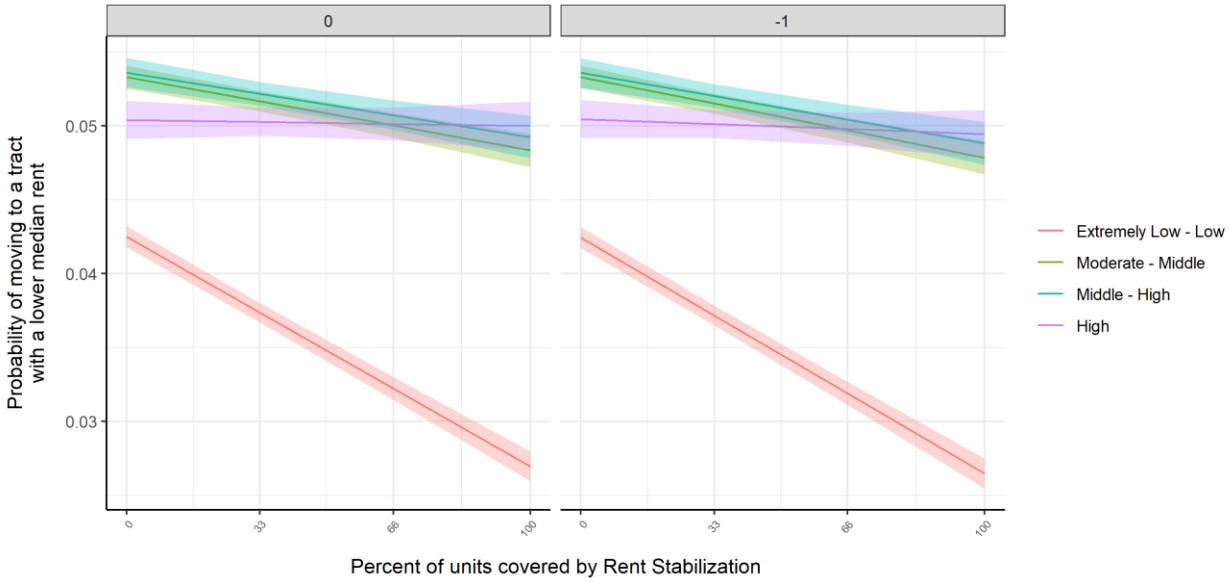
Source: Infogroup, UDP Tenant Protection Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Figure 42. Predicted Probability of Making a Constrained Move by SES by Percent of Units Covered by (a) Just Cause (b) Rent Stabilization, Using Median Rent Deciles

(a) Just Cause for Evictions



(b) Rent Stabilization



Source: Infogroup, UDP Tenant Protection Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

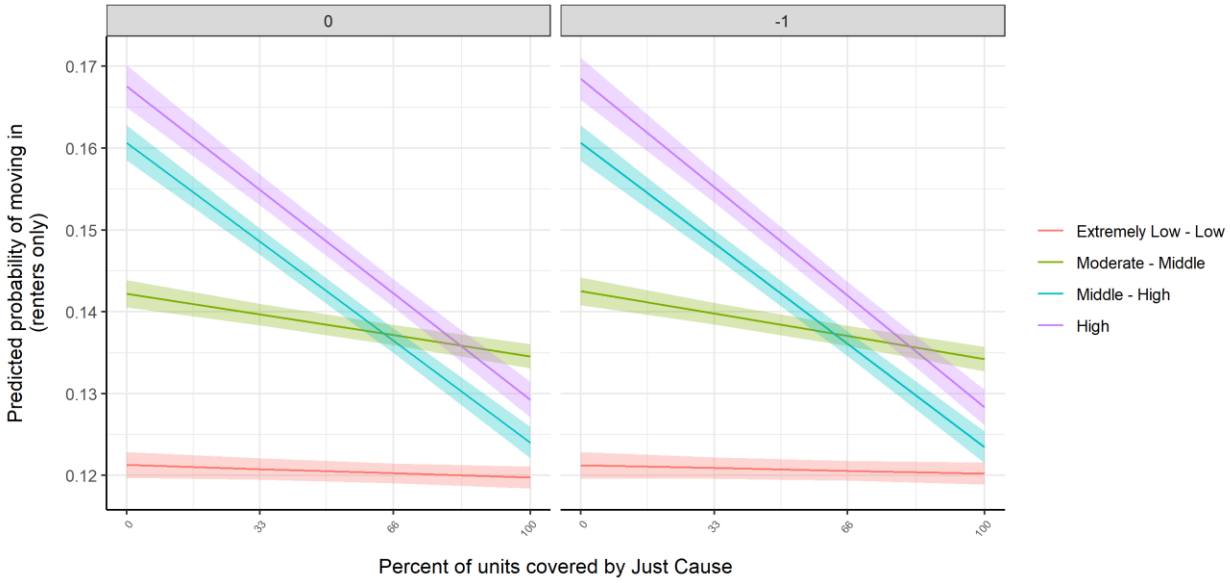
Inmigration

Household-level probability models

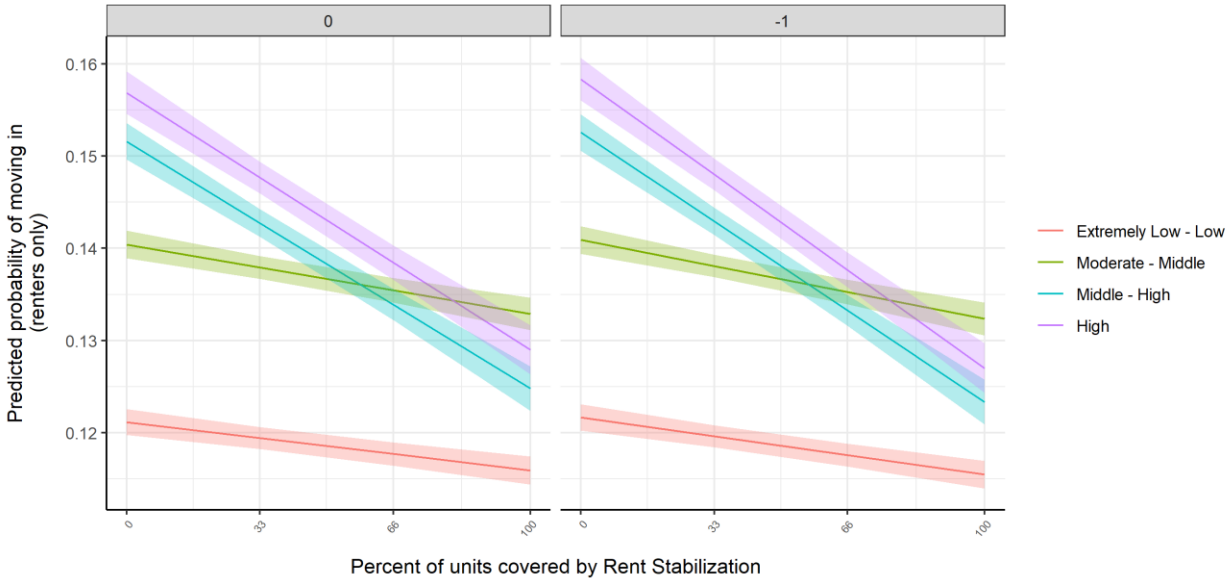
The effects of tenant protections on inmigration vary by SES, but generally reduce inmigration (Figure 43). Just cause ordinances are associated with slight declines in inmigration by moderate-SES households but have minimal impact on inmigration by low-SES groups. Rent stabilization reduces inmigration for both low- and moderate-SES households. The higher the share of units protected by either just cause or rent stabilization, the steeper the reduction in inmigration by middle- and high-SES households.

Figure 43. Predicted Probability of Moving In by Income and Percent of Units Covered by (a) Just Cause and (b) Rent Stabilization

(a) Just Cause for Evictions



(b) Rent Stabilization



Source: Infogroup, UDP Tenant Protection Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

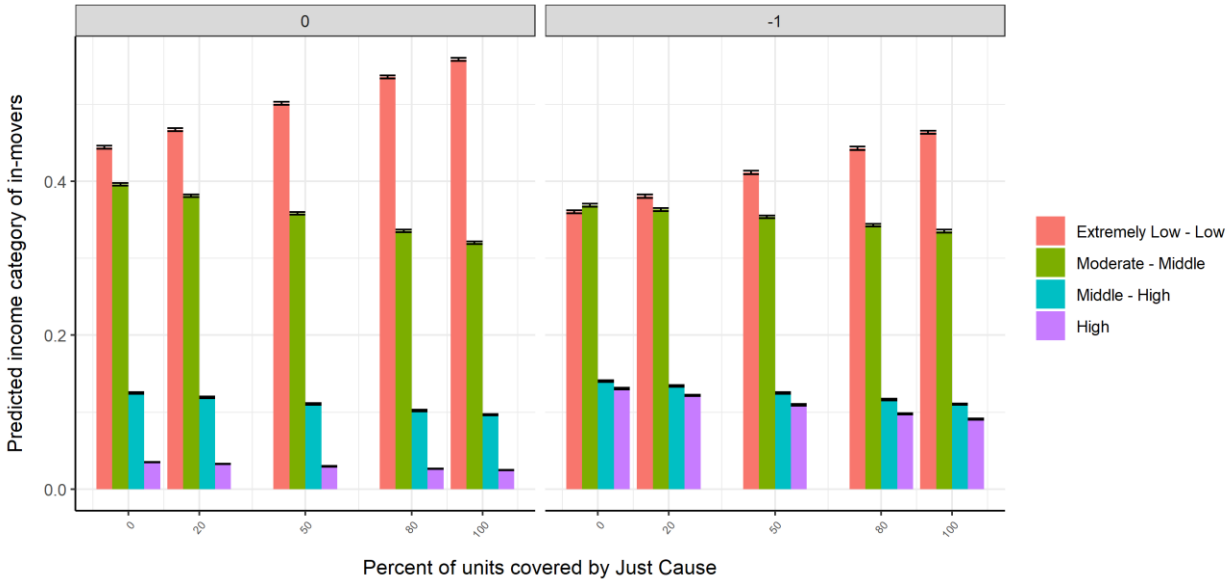
Regression results confirm these impacts (Appendix Table D4). In general, both just cause and rent stabilization decrease move-in rates for low- and moderate-SES households and to San Francisco generally; however, in other core cities, both types of ordinances increase inmigration. For both forms of tenant protections, inmigration increases for Black and White households and decreases for Latine households. The coefficient for recent market-rate and subsidized housing construction is positive for both forms of tenant protections, suggesting that new production works in conjunction with tenant protections to make neighborhoods less exclusive.

Predicted SES composition of inmovers

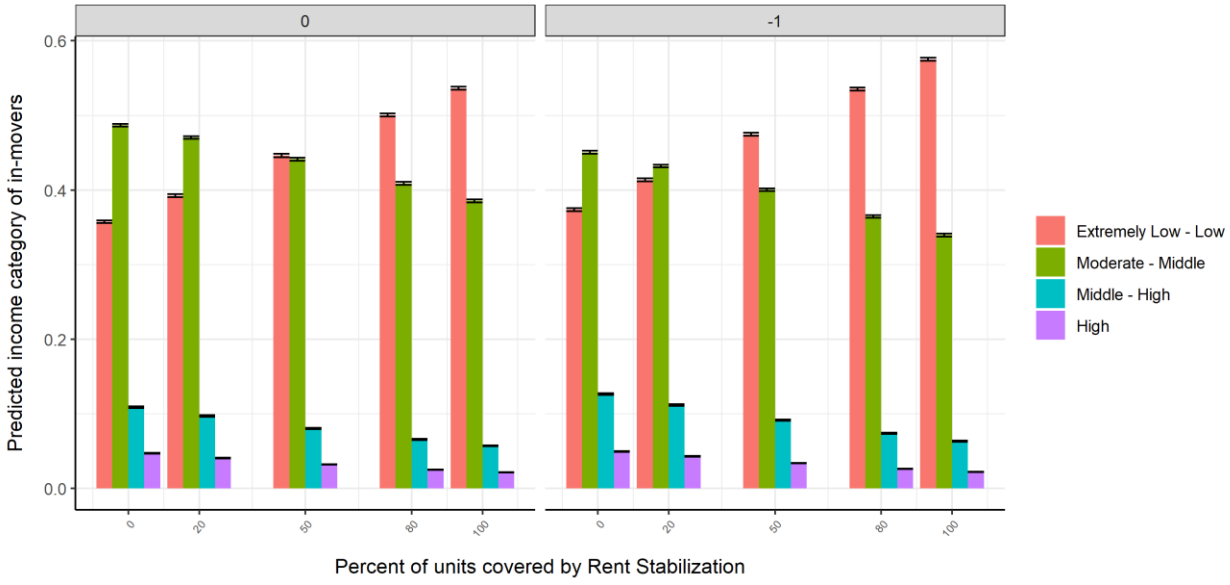
Looking again at likelihood of moving in by income group (Figure 44), this time for units covered by just cause and rent stabilization, results again vary depending on household SES. For low-SES households, just cause generally increases inmigration, but for moderate-SES households, just cause decreases inmigration slightly. Middle- and high-SES households are slightly less likely to move in when more units are covered by just cause, all things being equal. Similarly, with more units covered by rent stabilization, inmigration increases for low-SES households but decreases for all other SS groups.

Figure 44. Predicted Composition of Movers into Block Groups by Percent of Units Covered by (a) Just Cause and (b) Rent Stabilization

(a) Just Cause for Evictions



(b) Rent Stabilization



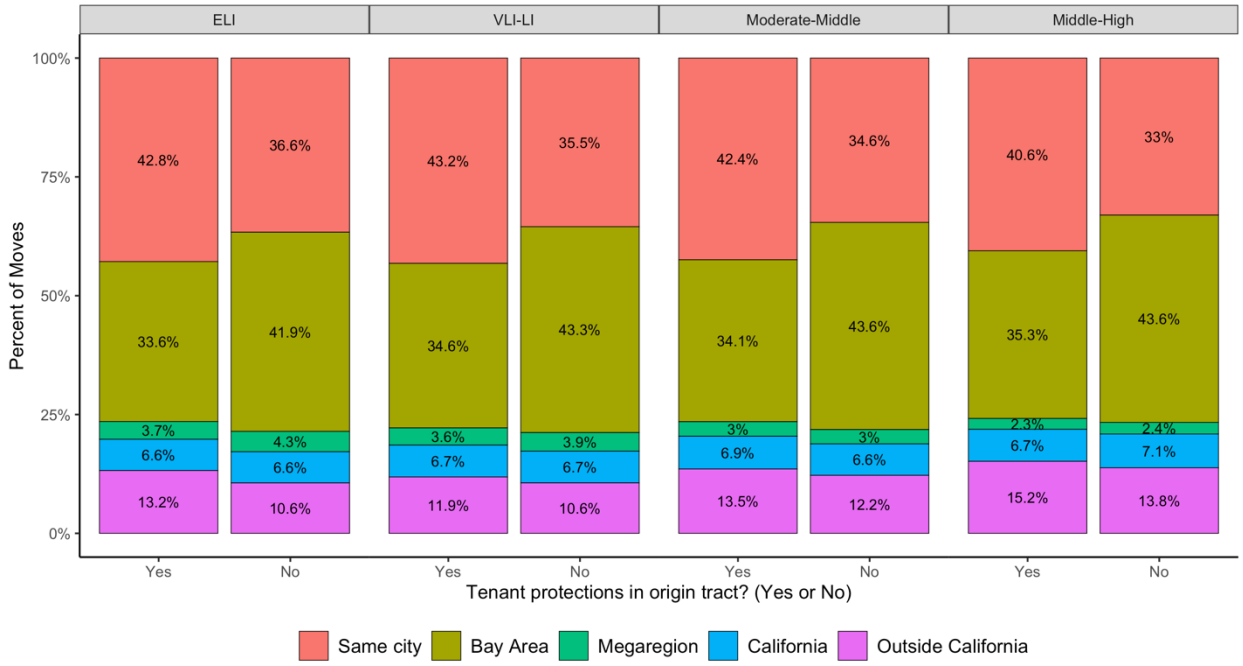
Source: Infogroup, UDP Tenant Protection Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Tenant protections and mobility: CCP results

Descriptive statistics for all moves

We compare destinations for movers by SES and by whether their block group had any units covered by rent control or just cause ordinances. Figure 47 shows that movers moving from block groups with tenant protections coverage are slightly more likely to stay within the same city than movers moving from block groups without such protections. The differences in magnitude of frequency of destinations between movers moving from block groups with or without tenant protections are relatively equal across SES groups, but higher-SES movers are slightly less likely to move within their origin city and more likely to move out of California entirely. Across SES groups, those moving from block groups without tenant protection are more likely to move out of their origin city and into the Bay Area. The relative frequencies of movers staying within the megaregion or out of the megaregion but still within California are equal across block groups with or without tenant protections.

Figure 47. Moving Destinations of Bay Area Movers by SES, 2006-2018, from Block Groups With and Without Tenant Protections

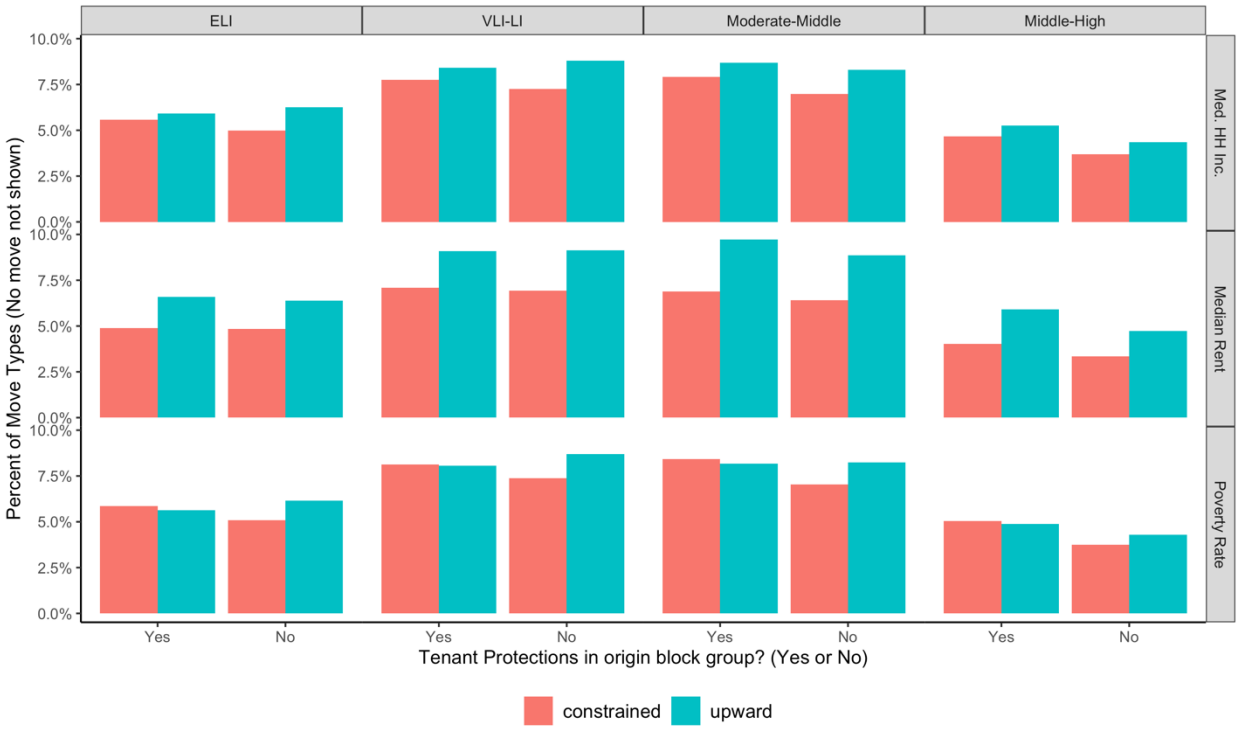


Source: FRBNY Consumer Credit Panel/Equifax Data and UDP New Housing Production Database

Figure 48 shows that middle-high SES residents are least likely to make both constrained and upward moves, since they are most likely to not move at all. It is consistently the case that residents from block groups with tenant protections are more likely to make a constrained move than similar residents from block groups without them, across all SES groups and all measures (household income, rent, poverty). However, the trends for making an upward move vary. For moves assessed with household income deciles, moderate-middle and middle-high SES residents are more likely to make an upward move from block groups with tenant protections but the

reverse is true for ELI and VLI-LI resident. For moves assessed with rent deciles, everyone except VLI-LI resident is more likely to make an upward move from block groups with tenant protections. Finally, for moves assessed with poverty rate deciles, everyone except middle-high SES residents is more likely to make an upward move from block groups without tenant protections.

Figure 48. Percent of Bay Area Residents Making a Constrained or Upward Move by SES, 2005-2017, from Block Groups With and Without Tenant Protections



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

Outmigration

Individual-level linear probability models

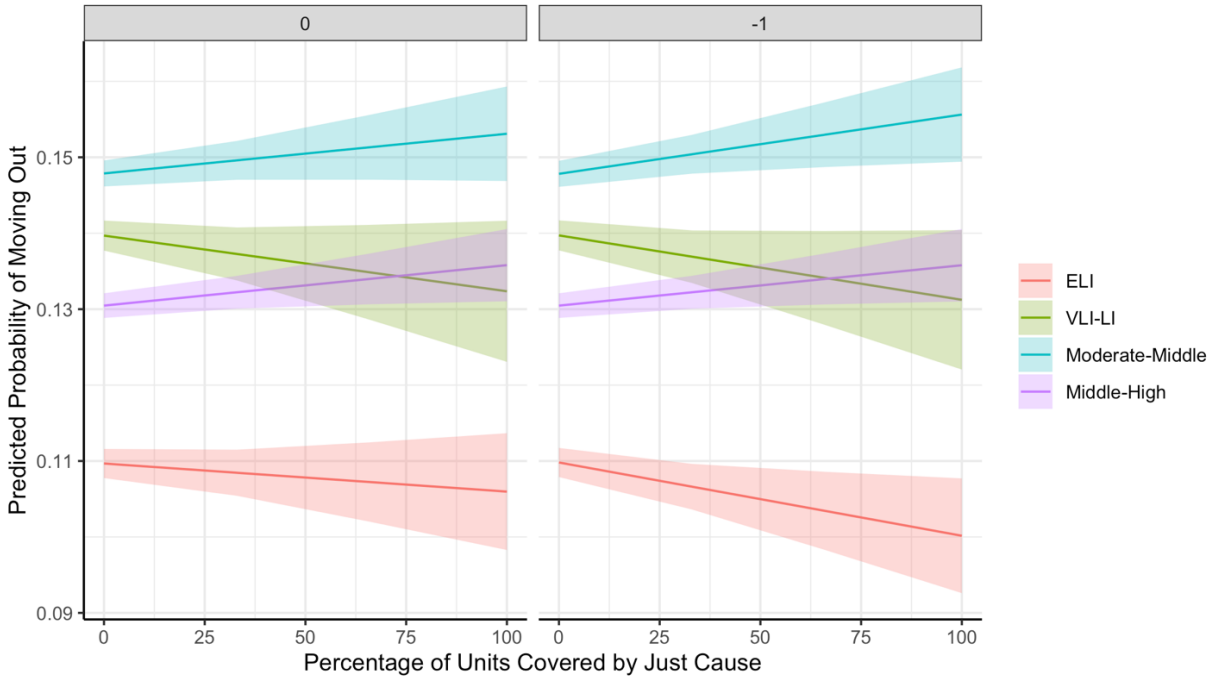
Overall, we found that just cause and rent stabilization seemed to prevent displacement of lower-SES residents and encourage outmigration among higher-SES residents.

Figure 49 illustrates the relationship between tenant protections and the probability of households moving out of their block group. We only show results in the year in which tenant protections are measured and 1 year later in case there is a lag for policy changes to take effect. Increases in rent stabilized units reduce the probability that ELI residents will move out in both years but only in the year after for increases in just cause-protected units. Rent stabilization and just cause protections increase the probability of moving out for moderate-middle and middle-high SES residents in both years. Rent stabilization decreases the probability of moving out for VLI-LI residents the year after the share of covered units is measured and just cause reduces it very slightly in both years.[28]

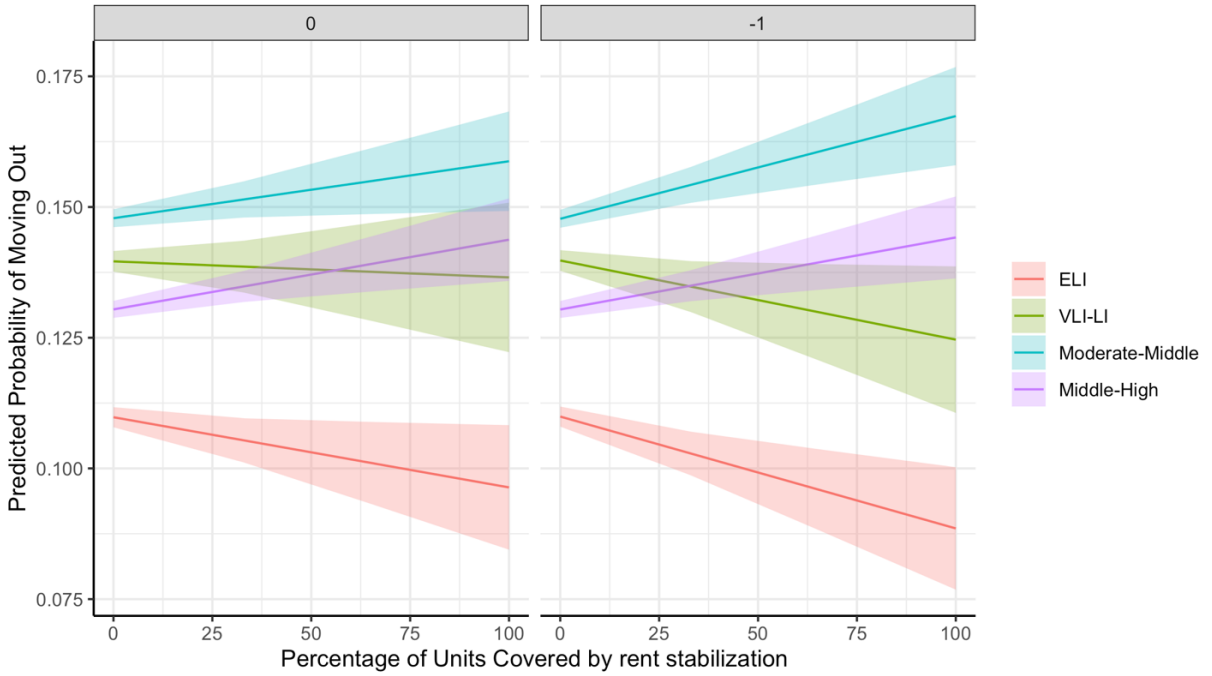
[28] In logistic regression models, results are the same for ELI and VLI-LI residents. There are no longer any effects for moderate-middle SES residents. Middle-high SES residents are more likely to move out in both years for both measures, and the effect is stronger.

Figure 49. Predicted Probability of Moving Out by SES and Percent of Units Covered by (a) Just Cause; and (b) Rent Stabilization

(a) Just Cause for Evictions



(b) Rent Stabilization



Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database.

Constrained moves

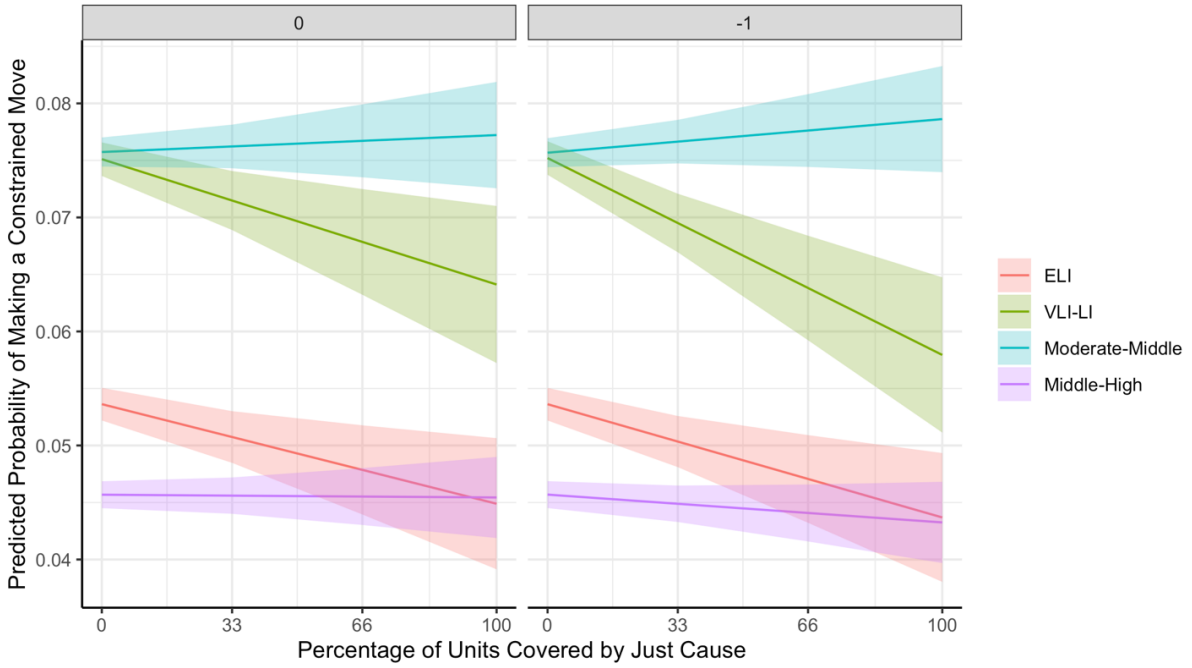
Figures 50-52 show the predicted probabilities to make a constrained move among movers using linear probability models for just cause for evictions and rent stabilization.

Overall, tenant protections appear to be effective at preventing lower-income movers from making constrained moves across all three measures; increases in percent of units covered by rent stabilization in particular increase the probability of making a constrained move for high-SES residents.

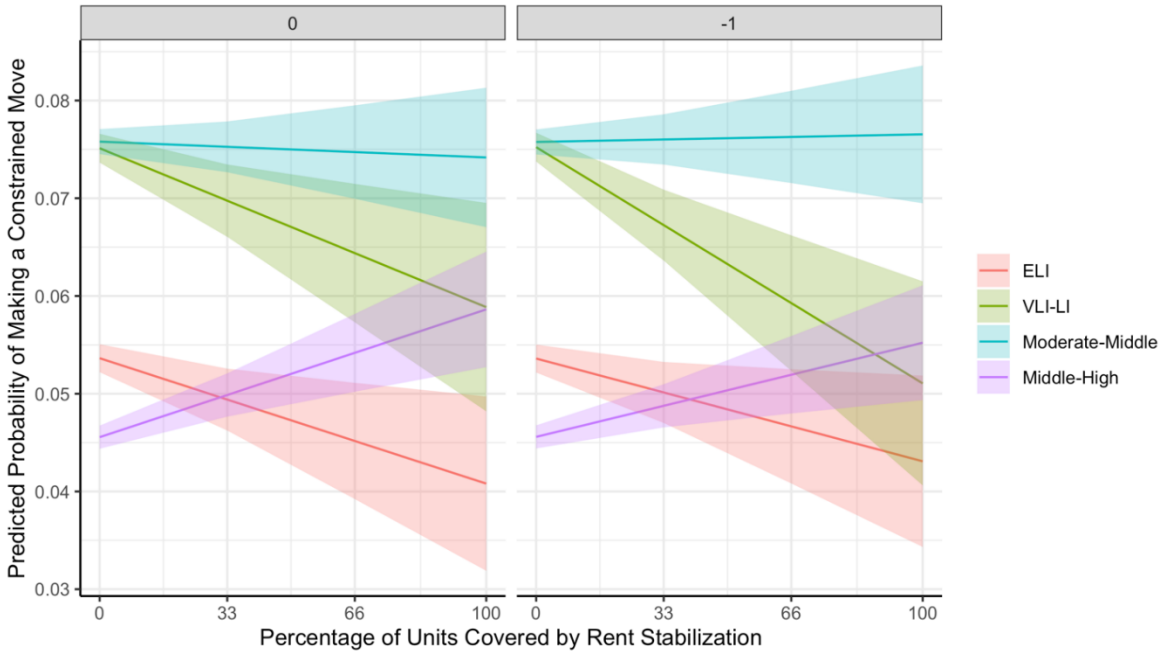
Figure 50 shows that increases in units covered by just cause for eviction protections decrease the probability of making a constrained move for ELI and VLI-LI residents in the same year and the year after units are covered. The probability for middle-high SES residents decreases very slightly the year after units are covered, and there are no effects for moderate-middle SES residents. Rent stabilization has different effects by SES on the probabilities to make constrained moves, as assessed with median household income deciles. Increases in units covered by rent stabilization decrease the probability of making a constrained move in the same year and in the year after units are covered for ELI and VLI-LI residents and increases it in both years for middle-high SES residents. There are no significant effects for moderate-middle SES residents.

Figure 50. Predicted Probability of Making a Constrained Move by SES by Percent of Units Covered by (a) Just Cause (b) Rent Stabilization, Using Median Household Income Deciles

(a) Just Cause for Evictions



(b) Rent Stabilization

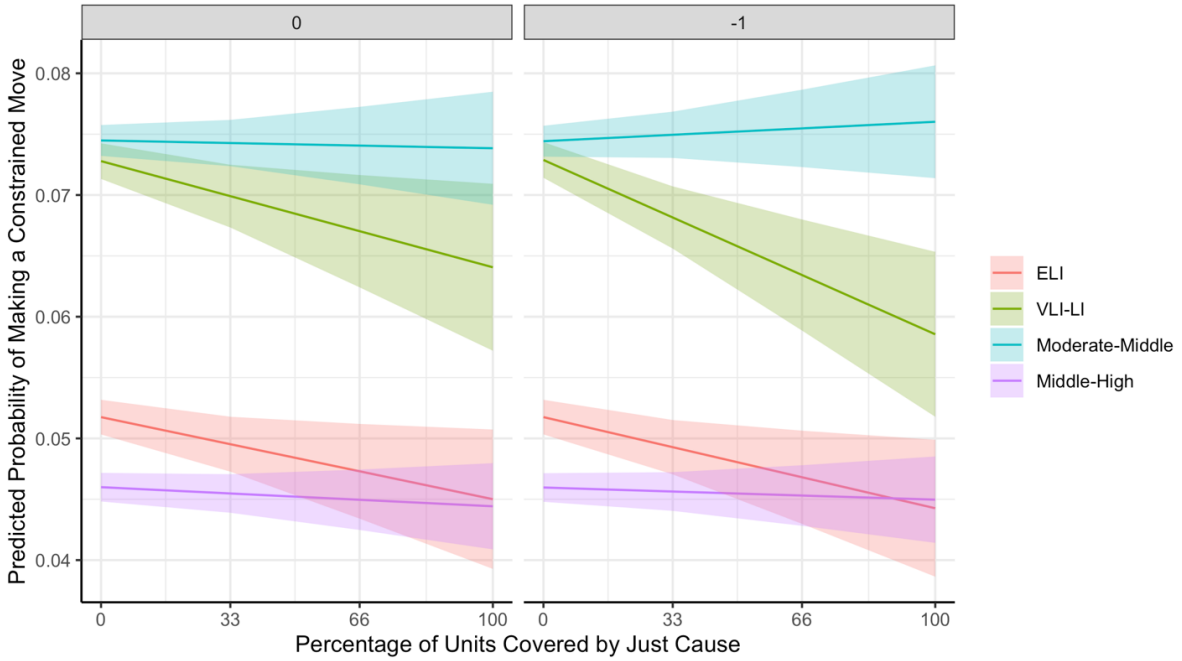


Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database.

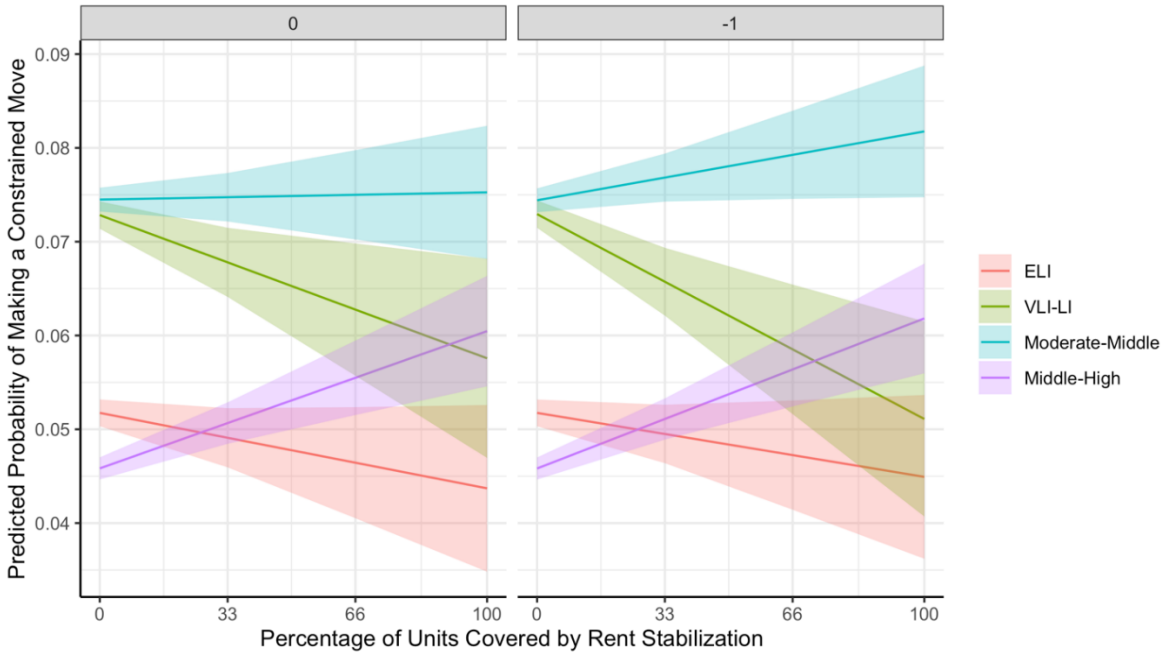
Figure 51 shows a similar picture when constrained moves are assessed using destination poverty deciles. The larger the share of units covered by just cause, the less the probability of making a constrained move for ELI and VLI-LI residents in both years. There are no significant effects for moderate-middle and middle-high SES residents. Increases in units covered by rent stabilization decrease the probability of making a constrained move for ELI and VLI-LI residents in both years. The probability increases for moderate-middle SES residents the year after units are covered, and for middle-high SES residents in both years.

Figure 51. Predicted Probability of Making a Constrained Move by SES by Percent of Units Covered by (a) Just Cause (b) Rent Stabilization, Using Poverty Rate Deciles

(a) Just Cause for Evictions



(b) Rent Stabilization

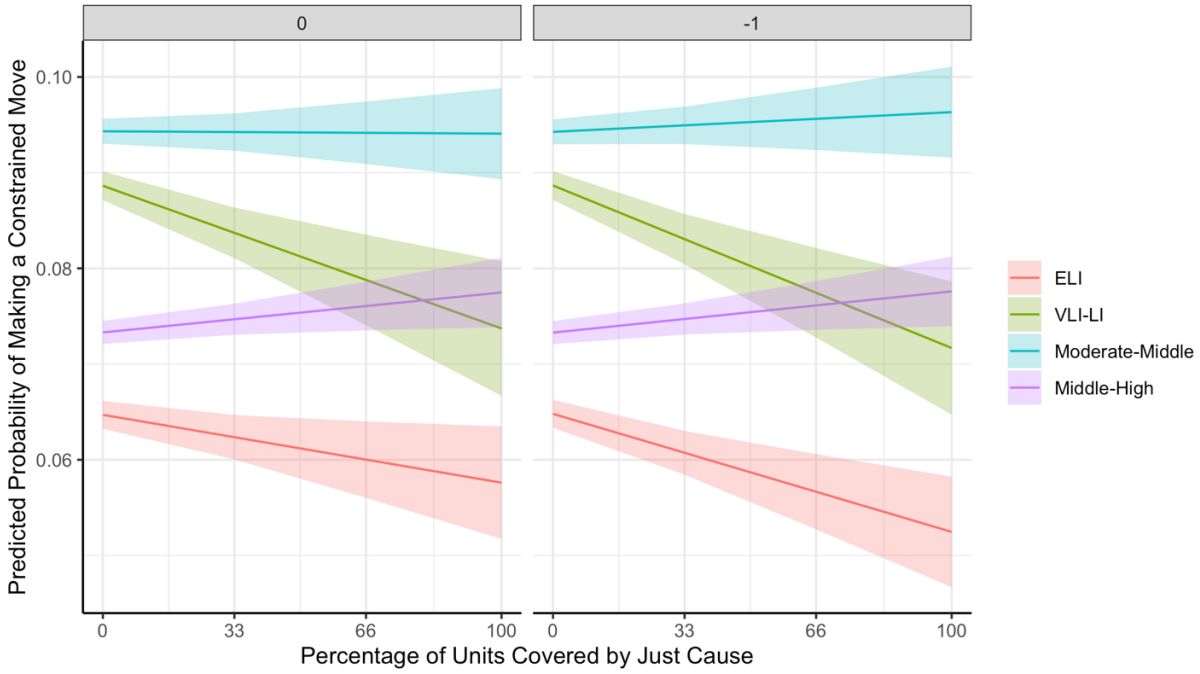


Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database.

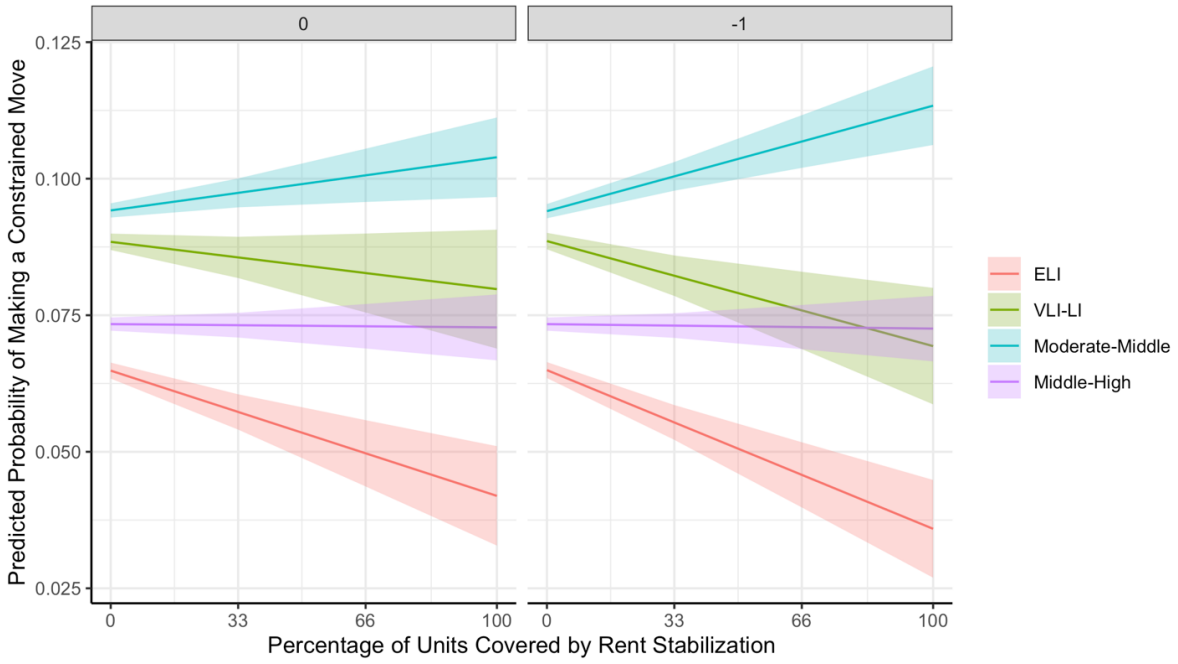
Finally, Figure 52 shows how increases in the percent of units covered by just cause protections reduce the probability to make a constrained move for ELI and VLI-LI residents in both years. The probability increases in both years for middle-high SES residents, and there are no effects for moderate-middle SES residents. Rent stabilization reduces the probability of making a constrained move when assessed with destination median rent, for ELI residents in the year after units are counted and for VLI-LI residents in both years. The probability increases for moderate-to-midddle-SES residents in both years, and there are no effects for middle-high SES residents.

Figure 52. Predicted Probability of Making a Constrained Move by SES by Percent of Units Covered by (a) Just Cause (b) Rent Control, Using Median Rent Deciles

(a) Just Cause for Evictions



(b) Rent Stabilization



Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database.

Inmigration

Individual-level probability models

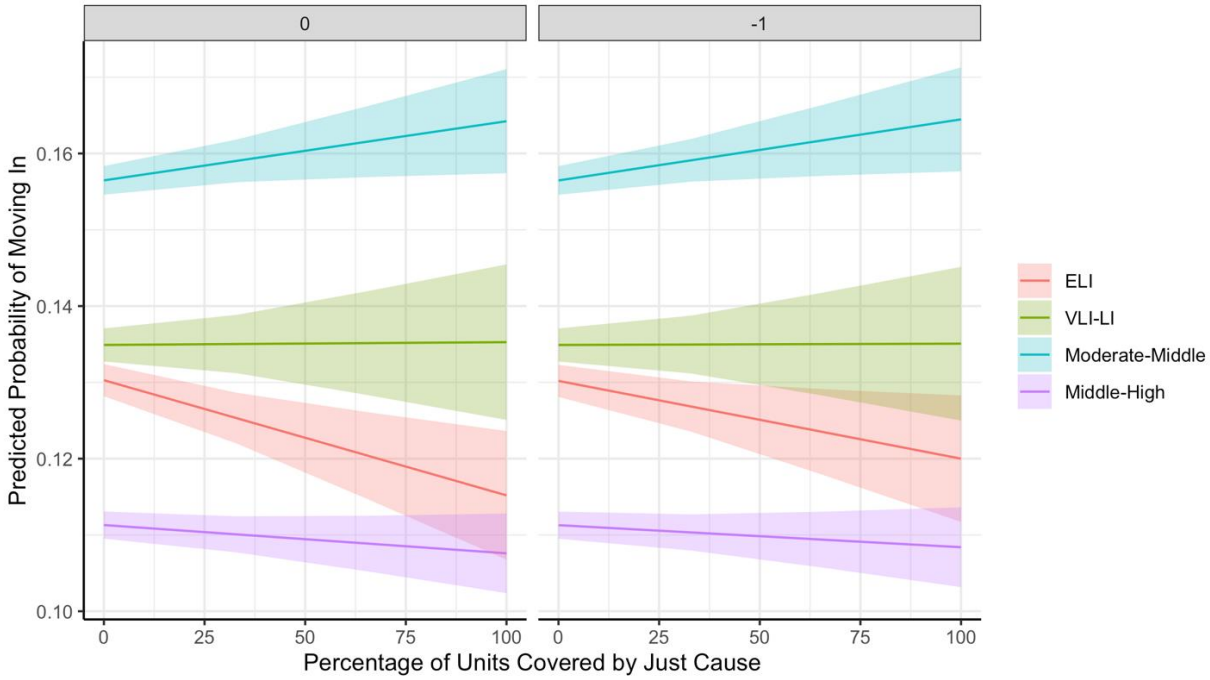
Overall, we found that just cause protections and rent stabilization increase the inmigration of moderate-middle SES residents but discouraged inmigration for ELI residents.

We examined how tenant protection policies affect the likelihood of moving into neighborhoods by SES using linear probability models. Increases in both types of units decrease the probability of moving in for ELI residents but increase them for moderate-middle SES residents both the year of and the year after. There are no effects for VLI-LI residents and a very weak negative effect for middle-high SES residents in the same year.[29]

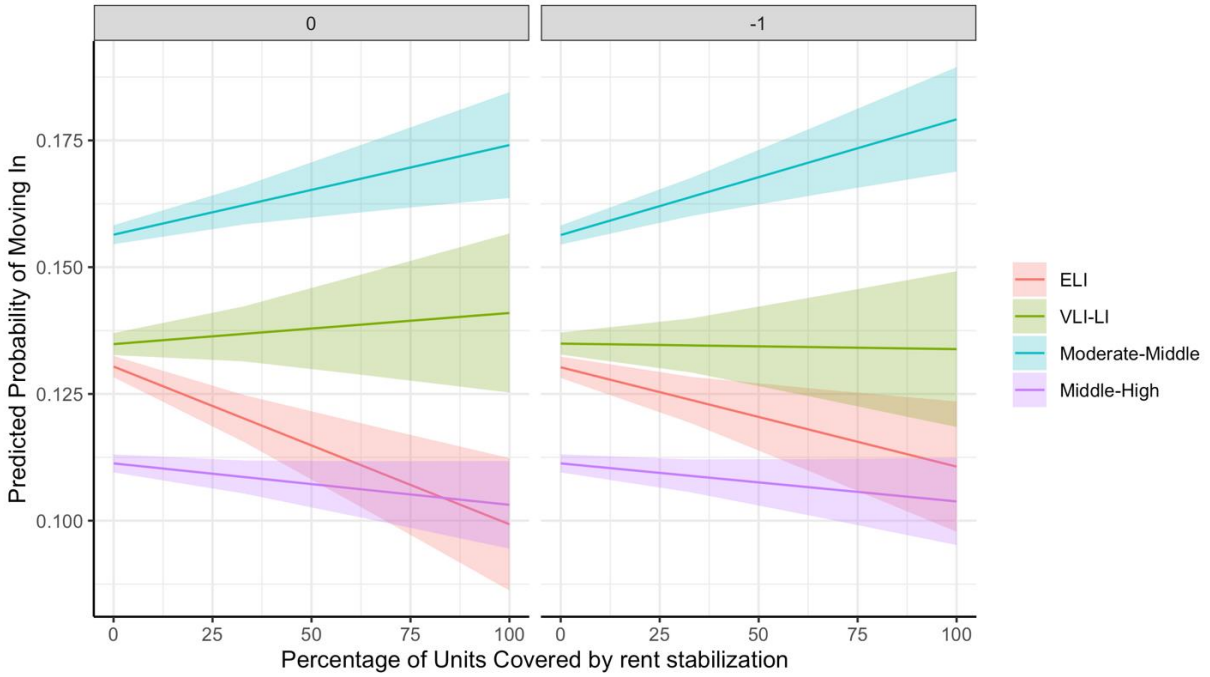
[29] In logistic regression models, there were only effects for ELI residents in the same year but not the year after. There were only effects for moderate-middle SES residents the year after but not in the same year. There were no effects for VLI-LI and middle-high SES residents. There were no effects for any residents in logistic regression models.

Figure 53. Predicted Probability of Moving In by SES and Percent of Units Covered by (a) Just Cause; and (b) Rent Stabilization

(a) Just Cause for Evictions



(b) Rent Stabilization



Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database.

Predicted SES composition of inmovers

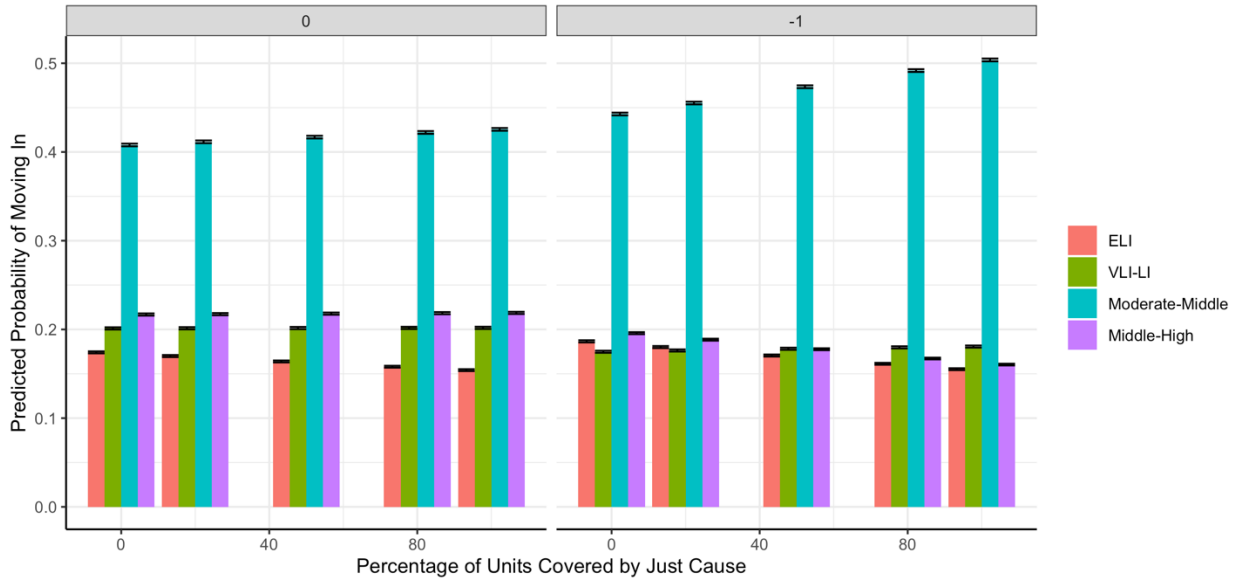
Next, we examined the extent to which the share of units covered by tenant protections shape the composition of residents moving into neighborhoods using multinomial logistic models, shown in figure 54.

While moderate-middle SES residents comprise the majority of movers, just cause for evictions is associated with increased shares of moderate-middle SES people moving into neighborhoods, and rent stabilization is associated with increased shares of VLI-LI people.

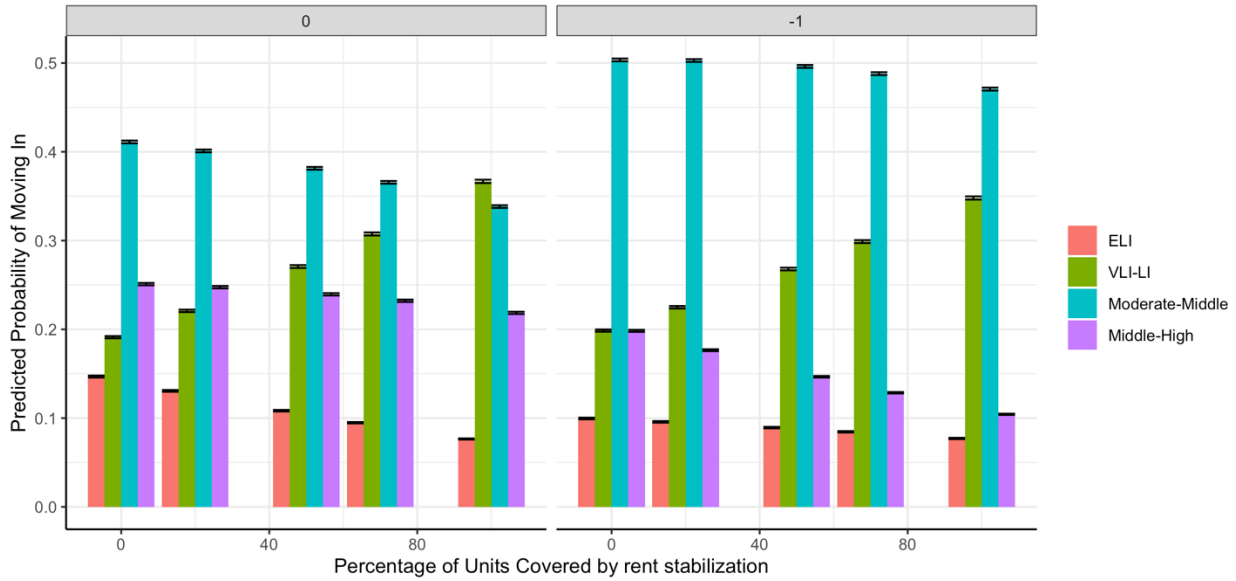
Increases in the shares of units covered by just cause increase the proportion of inmovers who are moderate-middle SES by the most in year after and increases in units covered by rent stabilization increase the proportion of inmovers who are VLI-LI in both years. VLI-LI residents are still the most likely to move in in any given year. There is a negative effect for ELI, and middle-high SES residents in both years for both types of protections.

Figure 54. Predicted Composition of Movers into Block Groups by Percent of Units Covered by (a) Just Cause; and (b) Rent Stabilization

(a) Just Cause for Evictions



(b) Rent Stabilization



Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database.

Summary

In this analysis, we asked, how do new developments and tenant protections impact mobility patterns in the Bay Area? Do the impacts of new developments vary depending on whether the new units are subsidized or market-rate? Do the impacts of tenant protections vary between just cause for eviction policies and rent stabilization policies? Using novel data on new housing production and two unique large-scale datasets of Bay Area residents over the last 20 years, we assess who moves out of neighborhoods when new housing is built and who is moving in.

Findings from the Infogroup data (UC Berkeley) and CCP data (Stanford) generally show similar impacts of market-rate construction on both out- and inmigration, and of subsidized construction on inmigration, but sometimes diverge on other questions (Tables 2 and 3). Note, however, that the tables are comparing different SES groups, so that only the moderate-middle category is strictly comparable. Thus, apparent disagreements might disappear with comparable categories. Because the datasets contain information on distinct units of analysis (individuals vs. households) and distinct dimensions of socioeconomic status (income vs. financial stability), the categories are not directly comparable.

Nonetheless, the two datasets both suggest that outmigration is lowest for lower-SES groups in block groups with new construction. The findings from both teams show that market-rate construction is associated with displacement among some lower-SES groups and is linked to decreased outmigration for the high-SES group, but only the Infogroup data shows that it is correlated with outmigration for the very low-SES (Infogroup)/extremely low-SES (CCP). The findings from both datasets also agree that subsidized construction is associated with outmigration for the middle-SES (Infogroup)/moderate-middle SES (CCP) groups, but only the Infogroup data shows that it is associated with outmigration as well for very low- and high-SES households. The findings from the two datasets generally agree that both market-rate and subsidized construction is correlated with inmigration across income groups, but there is some disagreement in the multinomial results predicting the likelihood of moving into block groups for different groups.

Both sets of results show that tenant protections are associated with reduced outmigration for the lowest income, but there is disagreement on their impacts on other groups. Although the teams find similar tenant protection impacts in the multinomial models on inmigration (negative for higher-income), they generally disagree on the impacts for other groups.

Table 2. Model Results, Stanford/CCP vs. Berkeley/Infogroup

Mobility type	Housing Intervention	Income group (UCB/Stanford)	Stanford/FRBNY-Equifax CCP (25-64 models)	Stanford/FRBNY-Equifax CCP (full models)	Berkeley/Infogroup
Outmigration	Market-rate construction	ELI-Low/ELI	mixed/insig	mixed/insig	+
		Moderate-Middle/VLI-LI	+	+	+
		Middle-High/Moderate-Middle	+	+	mixed/insig
		High/Middle-High	mixed/insig	-	-
	Subsidized construction	ELI-Low/ELI	mixed/insig	mixed/insig	-
		Moderate-Middle/VLI-LI	mixed/insig	mixed/insig	+
		Middle-High/Moderate-Middle	+	+	+
		High/Middle-High	mixed/insig	+	-
	Just cause	ELI-Low/ELI	-	-	-
		Moderate-Middle/VLI-LI	-	-	-
		Middle-High/Moderate-Middle	+	+	-
		High/Middle-High	mixed/insig	+	-
	Rent stabilization	ELI-Low/ELI	-	-	-
		Moderate-Middle/VLI-LI	-	-	+
		Middle-High/Moderate-Middle	+	+	-
		High/Middle-High	+	+	+
Inmigation	Market-rate construction	ELI-Low/ELI	mixed/insig	+	+
		Moderate-Middle/VLI-LI	+	+	+
		Middle-High/Moderate-Middle	+	+	+
		High/Middle-High	+	+	+
	Subsidized construction	ELI-Low/ELI	mixed/insig	mixed/insig	mixed/insig
		Moderate-Middle/VLI-LI	+	+	+
		Middle-High/Moderate-Middle	+	+	+
		High/Middle-High	+	+	mixed/insig
	Just cause	ELI-Low/ELI	mixed/insig	-	-
		Moderate-Middle/VLI-LI	mixed/insig	mixed/insig	-
		Middle-High/Moderate-Middle	mixed/insig	+	-
		High/Middle-High	mixed/insig	mixed/insig	-
	Rent stabilization	ELI-Low/ELI	-	-	-
		Moderate-Middle/VLI-LI	mixed/insig	mixed/insig	-
		Middle-High/Moderate-Middle	+	+	-
		High/Middle-High	-	-	-
Inmigration (multinomial models)	Market-rate construction	ELI-Low/ELI	mixed/insig	-	-
		Moderate-Middle/VLI-LI	mixed/insig	-	mixed/insig
		Middle-High/Moderate-Middle	mixed/insig	mixed/insig	mixed/insig
		High/Middle-High	+	+	+
	Subsidized construction	ELI-Low/ELI	mixed/insig	mixed/insig	mixed/insig
		Moderate-Middle/VLI-LI	-	-	mixed/insig
		Middle-High/Moderate-Middle	mixed/insig	mixed/insig	mixed/insig
		High/Middle-High	+	mixed/insig	mixed/insig
	Just cause	ELI-Low/ELI	mixed/insig	-	+
		Moderate-Middle/VLI-LI	+	+	-
		Middle-High/Moderate-Middle	mixed/insig	+	-
		High/Middle-High	mixed/insig	-	-
	Rent stabilization	ELI-Low/ELI	-	-	+
		Moderate-Middle/VLI-LI	+	+	-
		Middle-High/Moderate-Middle	mixed/insig	-	-
		High/Middle-High	-	-	-

Next, we analyzed the destinations of movers using three measures of constrained moves as an alternative approximation of displacement. We measure a constrained move by comparing if the destination neighborhoods' within-county median household income deciles and median rent deciles are equal to less than the origin, and if the within-county poverty rate deciles is equal to or higher than the origin. The results from the different datasets from the two teams show slightly different impacts for new production, no matter how a constrained move is measured, but are in agreement about the effects of tenant protections on lower-income residents (Table ES2). Findings from the CCP data show that market-rate construction increases the probability of making a constrained move for everyone except for high-SES residents across any measure. Results using the Infogroup data generally show increased probabilities as well, but only after the first year. For new subsidized construction, the Infogroup results generally show that it reduces the probability of making a constrained move for all but high-income residents. While results from the CCP data also find this for the lowest-SES residents using the household income and poverty rate measures, but the opposite is true using the rent measure. Further, the CCP findings show that subsidized construction increases the probability of making a constrained move as measured by rent for higher-SES groups, while the Infogroup findings identify this increased probability only for low-income.

On tenant protections, the findings from the two teams are generally similar that increases in units covered by tenant protections reduce the probability of making a constrained move for lower-income residents, and that increases in percent of units covered by rent stabilization increase the probability to make a constrained move for high-SES residents using the poverty rate measure, but the two teams find some different effects for the high-SES group. The findings using the CCP data show that increases in the percent of units covered by rent stabilization increase the probability of making a constrained move for high-SES residents in the income and rent measures as well.

Table 3. Destination Model Results, Stanford vs. Berkeley

Constrained Move	Housing Intervention	Income group (UCB/Stanford)	Stanford/FRBNY-Equifax CCP (25-64 models)	Stanford/FRBNY-Equifax CCP (full models)	Berkeley/Infogroup
Household income	Market-rate construction	ELI-Low/ELI	+	+	+
		Moderate-Middle/VLI-LI	+	+	+
		Middle-High/Moderate-Middle	+	+	+
		High/Middle-High	mixed/insig	+	+
	Subsidized construction	ELI-Low/ELI	mixed/insig	-	-
		Moderate-Middle/VLI-LI	mixed/insig	mixed/insig	-
		Middle-High/Moderate-Middle	mixed/insig	mixed/insig	-
		High/Middle-High	+	+	mixed/insig
	Just cause	ELI-Low/ELI	-	-	-
		Moderate-Middle/VLI-LI	-	-	-
		Middle-High/Moderate-Middle	mixed/insig	mixed/insig	-
		High/Middle-High	mixed/insig	mixed/insig	-
	Rent stabilization	ELI-Low/ELI	-	-	-
		Moderate-Middle/VLI-LI	-	-	-
		Middle-High/Moderate-Middle	mixed/insig	mixed/insig	-
		High/Middle-High	+	+	mixed/insig
Poverty Rate	Market-rate construction	ELI-Low/ELI	+	+	+
		Moderate-Middle/VLI-LI	+	+	+
		Middle-High/Moderate-Middle	+	+	-
		High/Middle-High	-	-	-
	Subsidized construction	ELI-Low/ELI	mixed/insig	-	mixed/insig
		Moderate-Middle/VLI-LI	mixed/insig	mixed/insig	-
		Middle-High/Moderate-Middle	mixed/insig	-	mixed/insig
		High/Middle-High	mixed/insig	mixed/insig	+
	Just cause	ELI-Low/ELI	-	-	-
		Moderate-Middle/VLI-LI	mixed/insig	-	-
		Middle-High/Moderate-Middle	mixed/insig	mixed/insig	-
		High/Middle-High	mixed/insig	mixed/insig	-
	Rent stabilization	ELI-Low/ELI	-	-	-
		Moderate-Middle/VLI-LI	mixed/insig	-	-
		Middle-High/Moderate-Middle	mixed/insig	+	-
		High/Middle-High	+	+	mixed/insig
Rent	Market-rate construction	ELI-Low/ELI	+	+	+
		Moderate-Middle/VLI-LI	mixed/insig	+	+
		Middle-High/Moderate-Middle	+	+	-
		High/Middle-High	+	+	-
	Subsidized construction	ELI-Low/ELI	mixed/insig	+	-
		Moderate-Middle/VLI-LI	mixed/insig	+	+
		Middle-High/Moderate-Middle	+	+	-
		High/Middle-High	+	+	mixed/insig
	Just cause	ELI-Low/ELI	-	-	-
		Moderate-Middle/VLI-LI	-	-	-
		Middle-High/Moderate-Middle	mixed/insig	mixed/insig	-
		High/Middle-High	+	+	-
	Rent stabilization	ELI-Low/ELI	-	-	-
		Moderate-Middle/VLI-LI	-	-	-
		Middle-High/Moderate-Middle	+	+	-
		High/Middle-High	mixed/insig	mixed/insig	mixed/insig

Infogroup findings summary

Very low-SES renter households generally move less frequently than high-SES households. Yet, renter households of very low- and low-SES groups are slightly more likely to move out of their block groups when new market-rate housing is built, with effects decreasing after 2 years. On the other hand, outmigration rates decrease sharply for high-SES households and are mixed for middle-SES households. Subsidized housing production tends to reduce outmigration for very low- and high-SES groups, while increasing it for low- and middle-SES households.

Market-rate production induces new move-ins across SES groups, with impacts decreasing after 2 years. High-SES households generally have the highest probability of moving into block groups with new market-rate production, and very low-SES households have the lowest probability–and multinomial models predicting move-ins suggest that the new housing may have little or negative impact for lower-income groups. The effects of subsidized production on inmigration are more mixed across modeling methods and SES groups. But in general, new production of subsidized housing induces a slight increase in inmigration.

A higher percentage of units in a block group covered by just cause for evictions is associated with fewer move-outs at all SES levels, both the same year and 1 year after, with the biggest impacts for middle-SES groups. Rent stabilization has mixed effects across SES groups: it decreases outmigration for very low-SES households, increases outmigration for low- and high-SES households, and has no effect on move-outs for middle-SES households.

In general, just cause and rent stabilization ordinances reduce move-in rates for all but the very low-SES, who are more likely to move in. The coefficient for market-rate and subsidized housing is positive for both forms of tenant protections, suggesting that new production works in conjunction with tenant protections to make neighborhoods less exclusive.

In general, when new market-rate housing production occurs in a block group, movers tend to make downward, constrained moves, even when we use different measures (income, poverty, or rent) for "constraint." High-SES households are generally less likely than other groups to make these constrained moves. Impacts were generally negative but more mixed for subsidized housing production, perhaps because of the small sample sizes.

Increases in units covered by either just cause for eviction or rent stabilization ordinances decrease the probability of making a constrained move, as assessed with median household income or poverty deciles, for households across all SES groups in both the year units are covered and the year after.

CCP findings summary

Overall, we find that VLI-LI and moderate-middle SES residents are more likely to be displaced by new market-rate production, while it allows middle-high SES residents to stay in place. We find no effects on moving for the lowest-SES residents. These effects for VLI-LI and moderate-middle SES residents last up to 3 years after new housing is built. Because there is so little new production of subsidized housing, estimates of the effect of subsidized housing produce are inexact, but our findings suggest that they do not mitigate displacement among ELI residents. Findings from separate analyses among individuals ages 25-64 in households without mortgages suggest that new subsidized housing may promote flight among higher-SES renters and that new market-rate development primarily keeps middle-high SES homeowners in place.

When we examined how new production affects who moves into different neighborhoods, we found that new production increases the probability that people will move into a neighborhood across all SES groups for at least 3 years after the units are built, and the probabilities are highest

for moderate-middle SES residents, followed by middle-high SES residents. While new subsidized production increases the probability that people will move into a neighborhood for a couple years, it has inconsistent effects for ELI residents. Analysis of the composition of movers into neighborhoods with more new production suggests that both subsidized and market-rate production provides more opportunities for higher-SES residents, especially probable renters. New subsidized housing provides opportunities for ELI residents in the short-term and increases the inmigration of VLI-LI and middle-high SES residents shortly after they are built.

When we examined how new production affects the probabilities for movers to make constrained moves, we find that new subsidized housing generally prevents lower-SES movers from making a constrained move but that new market-rate housing results in increased probabilities of making constrained moves. The results for subsidized units generally hold true only for constrained moves measured by household income and poverty rates, however. When constrained moves are measured by rent, subsidized units increase the probability of making a constrained move for all movers at various points in time. The results for market-rate housing are consistent across all three measures, but only middle-high SES residents experience a decrease in probability to make a constrained move 4 years after for household income.

Our analysis of tenant protections and outmigration show that rent control and just cause seem to prevent displacement of ELI residents and encourage outmigration among middle-high and moderate-middle SES residents. However, when we subset our analysis to non-mortgage holders aged 25-64, the results suggest that only the lowest-SES probably renters are able to take advantage of these stabilization policies.

When we examined how tenant protections affect who moves into neighborhoods, we found that rent control and just cause protections increased the inmigration of moderate-middle SES residents but discouraged inmigration for ELI residents. Nonetheless, the overall composition of movers into neighborhoods had slight increases in the shares of lower-SES residents as the share of protected units increased. The results suggest that moderate-middle SES residents are most likely to take advantage of tenant protection policies. Separate analyses of non-mortgage holders aged 25-64 further support that tenant protections do not appear to encourage lower-SES renters to move in, but rent control does increase the proportion of renters into these neighborhoods who are lower-SES. In other words, protections do not appear to increase the likelihood that lower-SES residents will move into neighborhoods overall (as opposed to not moving), which likely reflects the lower overall inmigration into these neighborhoods as fewer people move out once they are in protected units, but rent control slightly increases the share of movers who are lower-SES among those who move in.

When we examined the impacts of these tenant protections on the probability of movers to make constrained moves, we find that just cause is more effective than rent control at preventing constrained moves among lower-SES groups when measured with income and poverty, but rent control is more effective when measured with rent. Increases in units covered by rent control increase the probability of making a constrained move for VLI-LI and middle-high SES movers as assessed with household income and poverty. Increases in units covered by just cause for eviction protections decrease the probability of making a constrained move for ELI, VLI-LI and moderate-middle SES movers. However, when moves are assessed with rent deciles, increases in

units covered by rent control reduce the probability of making a constrained move for all SES groups at various points in time, whereas increases in units covered by just cause only reduce the probability of making a constrained move for ELI movers.

Policy implications

Despite some areas of disagreement and uncertainty, this study suggests that new market-rate housing production is generally resulting in slight increases in both outmigration and inmigration. New subsidized construction tends to increase inmigration but has mixed effects on outmigration. Thus, new construction fosters churn: some households leave while others move in, and the net impact is minimal, at least over the 4-year period studied. That newcomers at all income levels can move in suggests that market-rate construction is easing housing market pressures. At the same time, some households may be moving involuntarily, with lower-SES groups exhibiting constrained moves. Even if they are replaced by others at similar income/SES levels, displacement would still need to be mitigated in order to avoid the disruption of lives and communities.

Extremely low- to low-SES groups experience increases in outmigration of 1-2% in each subsequent year for 4 years when new market-rate construction occurs in their block group, whether there are 100 or 1,000 new units. For example, while in a normal year 10% of households might move out, new construction will mean that 12% move out per year for the next 4 years. In a block group that houses 500 households with 50 moving out in a typical year, new construction will result in 60 households moving out each year after construction, totaling 40 additional displaced households in 4 years.

This suggests a level of impact that is readily mitigable. Which approach is most appropriate? Since producing new subsidized units may have the unintended consequence of spurring displacement, communities might best look to housing preservation strategies. The most effective 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, property tax incentives for building owners, condominium conversion restrictions, and community land trusts.

Tenant protections have mixed effects across income groups, but they are generally reducing this churn. Where tenant protections fall short is by discouraging inmigration, reflecting reduced housing options. Although the exact mechanism by which this works is unclear, our models and results suggest that new housing production should help mitigate this.

This study examines the effects of new housing production and tenant protections together, finding that they can complement and reinforce each other. In general, even when new market-rate housing production is associated with heightened outmigration, tenant protections (measured together) reduce it. In contexts where tenant protections are reducing outmigration, new subsidized construction can help reduce it further. When tenant protections reduce inmigration, policies to promote housing production can help mitigate it.

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 thirty 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 policies studied here–market-rate and subsidized housing production, just cause ordinances, and rent stabilization–are only providing minimal relief, and their impacts may be distorted. For example, new construction may result in direct displacement, while tenant protections may result in exclusionary displacement, subsequently leaving local residents with limited opportunities to move by choice. At the same time, the depth of the housing shortage means that tenant protections are critical to keep cities accessible to residents at all income levels in the short and medium timeframe. In regions where there is no shortage of affordable housing to start with, these policies may have very different impacts–and may not necessarily be effective at mitigating displacement.

References

Ahvenniemi, H., Pennanen, K., Knuuti, A., Arvola, A., & Viitanen, K. (2018). Impact of Infill Development on Prices of Existing Apartments in Finnish Urban Neighbourhoods. International Journal of Strategic Property Management, 22(3), 157–167. https://doi.org/10.3846/ijspm.2018.1540

Anderson, Raymond. 2007. *The Credit Scoring Toolkit: Theory and Practice for Retail Credit Risk Management and Decision Automation.* New York: Oxford University Press.

Asquith, B. (2019). Do Rent Increases Reduce the Housing Supply under Rent Control? Evidence from Evictions in San Francisco. *Upjohn Institute Working Papers*. https://doi.org/10.17848/wp19-296

Asquith, B., Mast, E., & Reed, D. (2019). Supply Shock Versus Demand Shock: The Local Effects of New Housing in Low-Income Areas. *Upjohn Institute Working Papers*. https://doi.org/10.17848/wp19-316

Autor, D. H., Palmer, C. J., & Pathak, P. A. (2014). Housing Market Spillovers: Evidence from the End of Rent Control in Cambridge, Massachusetts. *Journal of Political Economy*, *122*(3), 661–717. https://doi.org/10.1086/675536

Baum-Snow, N., & Marion, J. (2009). The effects of low income housing tax credit developments on neighborhoods. *Journal of Public Economics*, 93(5-6), 654-666.

Been, V., Gould Ellen, I., & O'Regan, K. (n.d.). *Supply Skepticism: Housing Supply and Affordability*. 17.

Bostic, Raphael, Paul S. Calem, and Susan M. Wachter. 2005. "Hitting the Wall: Credit as an Impediment to Homeownership." Pp. 155-72 in *Building Assets, Building Credit: Creating Wealth in Low-Income Communities.* Brookings Institution Press.

Brevoort, Kenneth P., Philipp Grimm, and Michelle Kambara. 2016. "Credit Invisibles and the Unscored." *Cityscape* 18(2):9–33.

Brunes, F., Hermansson, C., Song, H.-S., & Wilhelmsson, M. (2020). NIMBYs for the rich and YIMBYs for the poor: Analyzing the property price effects of infill development. Journal of European Real Estate Research, 13(1), 55–81. https://doi.org/10.1108/JERER-11-2019-0042

Carlson, H. J. (2020). Measuring displacement: Assessing proxies for involuntary residential mobility. *City & Community*, *19*(3), 573-592.

Cuellar, J. (2020). Effect of "Just Cause" Eviction Ordinances on Eviction in Four California Cities. Retrieved January 2, 2021, from Journal of Public and International Affairs website: https://jpia.princeton.edu/news/effect-just-cause-eviction-ordinances-eviction-four-california-cities

Damiano, A., & Frenier, C. (2020). *Build Baby Build?: Housing Submarkets and the Effects of New Construction on Existing Rents*. 48.

Davidson, M., & Lees, L. (2010). New-build gentrification: its histories, trajectories, and critical geographies. *Population, Space and Place*, 16(5), 395-411.

DeLuca, Stephanie, Philip M. E. Garboden, and Peter Rosenblatt. 2013. "Segregating Shelter: How Housing Policies Shape the Residential Locations of Low-Income Minority

Families." *Annals of the American Academy of Political and Social Science* 647 (1): 268–99.

Desmond, Matthew, and Tracey Shollenberger. 2015. "Forced Displacement from Rental Housing: Prevalence and Neighborhood Consequences." *Demography* 52 (5): 1751–72.

Diamond, R., McQuade, T., & Qian, F. (2019). The Effects of Rent Control Expansion on Tenants, Landlords, and Inequality: Evidence from San Francisco. *American Economic Review*, *109*(9), 3365–3394. https://doi.org/10.1257/aer.20181289

Ding, L., Hwang, J., & Divringi, E. (2016). Gentrification and residential mobility in Philadelphia. *Regional Science and Urban Economics*, 61, 38-51.

Ding, C., & Knaap, G.-J. (2002). Property values in inner-city neighborhoods: The effects of homeownership, housing investment, and economic development. Housing Policy Debate, 13(4), 701–727. https://doi.org/10.1080/10511482.2002.9521462

Ding, C., Simons, R., & Baku, E. (2000). The effect of residential investment on nearby property values: evidence from Cleveland, Ohio. *Journal of Real Estate Researc*h, 19(1), 23-48.

Egan, T. & Khan, A. (2015). *Potential Effects of Limiting Market-Rate Housing in the Mission*. San Francisco: Office of the Controller.

Ellen, I. G., Schill, M. H., Schwartz, A. E., & Voicu, I. (n.d.). *DOES FEDERALLY SUBSIDIZED RENTAL HOUSING DEPRESS NEIGHBORHOOD PROPERTY VALUES?* 47.

Emmanuel, D. (2016, May 18). The Upshot of Focusing on Extremely Low Income Renters: Expanded Housing Availability for All Renters. Retrieved January 2, 2021, from On the Home Front website: https://hfront.org/2016/05/18/the-upshot-of-focusing-on-extremely-low-income-renters-expanded-housing-availability-for-all-renters/

Fair Isaac Corporation. 2015. "Understanding Your FICO Score." Retrieved from www.myfico.com/Downloads/Files/myFICO_UYFS_Booklet.pdf.

Federal Reserve Board (Board of Governors of the Federal Reserve System). 2007. *Report to the Congress on Credit Scoring and Its Effects on the Availability and Affordability of Credit*. Washington, DC: Board of Governors of the Federal Reserve System. Retrieved from www.federalreserve.gov/boarddocs/rptcongress/creditscore.

Freemark, Y. (2019, January 29). Upzoning Chicago: Impacts of a Zoning Reform on Property Values and Housing Construction—Yonah Freemark, 2020. Retrieved January 2, 2021, from https://journals.sagepub.com/doi/10.1177/1078087418824672

Galster, G., Tatian, P., & Pettit, K. (2004). Supportive Housing and Neighborhood Property Value Externalities. Land Economics, 80(1), 33–54. https://doi.org/10.2307/3147143

Hwang, J., & Shrimali, B. P. (2019). *Increasing Access to Affordable Housing Opportunities in Silicon Valley*. San Francisco, CA: Federal Reserve Bank of San Francisco.

Joint Center for Housing Studies for Harvard (2015). *America's rental housing: expanding options for diverse and growing demand*. Cambridge, MA: Harvard University.

Joint Center for Housing Studies of Harvard University. (2019). *The State of the Nation's Housing 2019 | Joint Center for Housing Studies*. Retrieved from https://www.jchs.harvard.edu/state-nations-housing-2019

Lee, Donghoon, and Wilbert van der Klaauw. 2010. "An Introduction to the FRBNY Consumer Credit Panel." Federal Reserve Bank of New York Staff Reports 479. New York: Federal Reserve Bank of New York. Retrieved from www.newyorkfed.org/research/staff_reports/sr479.html.

Li, X. (2019). Do New Housing Units in Your Backyard Raise Your Rents? *NYU Wagner and NYU Furman Center, Job Market Paper*, 57.

Liu, L., McManus, D. A., & Yannopoulos, E. (2020). *Geographic and Temporal Variation in Housing Filtering Rates* (SSRN Scholarly Paper No. ID 3527800). Rochester, NY: Social Science Research Network. https://doi.org/10.2139/ssrn.3527800

Mast, E. (2019). The Effect of New Market-Rate Housing Construction on the Low-Income Housing Market. *Upjohn Institute Working Papers*. https://doi.org/10.17848/wp19-307

Metropolitan Transportation Commission. (2020). *Vital Signs: Housing Production*. Retrieved August 8, 2021, from https://www.vitalsigns.mtc.ca.gov/housing-production

Olsen, A.K. (2019). *Cities, Growth and Housing: Essays on Urban Political Economy*. PhD dissertation. Berkeley, CA: University of California, Berkeley.

Pastor, M., Carter, V., & Abood, M. (2018, October 10). Rent Matters: What are the Impacts of Rent Stabilization Measures? > PERE > USC Dana and David Dornsife College of Letters, Arts and Sciences. Retrieved January 4, 2021, from http://dornsifelive.usc.edu/pere/rent-matters

Pennington, K. (2018, June 8). The Impact of Housing Production on Legal Eviction in San Francisco [Unpublished Paper]. Retrieved January 4, 2021, from https://www.scribd.com/document/385855381/KatePennington-EvictionStudy-18-6-8

Pennington, K. (2020). *Does Building New Housing Cause Displacement? The Supply and Demand Effects of Construction in San Francisco*. 64.

Pollakowski, H. O., Ritchay, D., & Weinrobe, Z. (2005). *Effects of mixed-income, multi-family rental housing developments on single-family housing values*. Center for Real Estate, Massachusetts Institute of Technology.

Rosenthal, S. S. (2014). Are Private Markets and Filtering a Viable Source of Low-Income Housing? Estimates from a "Repeat Income" Model. *American Economic Review*, *104*(2), 687–706. https://doi.org/10.1257/aer.104.2.687

Schwartz, Alex F. (2021). *Housing policy in the United States*. Fourth edition. New York: Routledge.

Seslen, T. N., Wheaton, W., & Pollakowksi, H. O. (2005). The Investment Performance of Housing and "Hedonic" Spatial Equilibrium. Undefined. https://www.semanticscholar.org/paper/The-Investment-Performance-of-Housing-and-%22Hedonic%22-Seslen-Wheaton/a3171db02143ca86b559a99f06388f0f0ac0b440

Sims, D. P. (2007). Out of control: What can we learn from the end of Massachusetts rent control? *Journal of Urban Economics*, *61*(1), 129–151. https://doi.org/10.1016/j.jue.2006.06.004

Simons, R., Quercia, R., & Levin, I. (1998). The Value Impact of New Residential Construction and Neighborhood Disinvestment on Residential Sales Price. Journal of Real Estate Research, 15(2), 147–161. https://doi.org/10.1080/10835547.1998.12090921

Wherry, Frederick, Kristen S. Seefeldt, and Anthony S. Alvarez. 2019. *Credit Where It's Due: Rethinking Financial Citizenship*. New York: Russell Sage Foundation.

Wiley, Keith. 2009. An Exploration of the Impact of Infill on Neighborhood Property Values. (Doctoral dissertation). Available from Dissertations and Theses database. (UMI No. 10221)

Zuk, M., & Chapple, K. (2016). *Housing Production, Filtering and Displacement: Untangling the Relationships*. Retrieved from https://escholarship.org/uc/item/7bx938fx#author

V. Appendices

Appendix A: List of Exemptions from Just Cause for Evictions (JC) and Rent Stabilization (RS) Laws, by Jurisdiction

Jurisdiction	Year(s) Adopted	Exemptions
City of Alameda	2015	JC & RS: ● Mobile homes
Berkeley	1980	JC: ● Owner-occupied units RS: ● Owner-occupied units ● Buildings with two or more units built after June 30, 1980* **These types of units were exempt until an amendment in 2017 applied RS to these units as well, so they are counted in years 2017-2019*
East Palo Alto	1988	RS: ● Units built after 1988 ● Owner-occupied 2-3 unit building* **These types of units were only exempt from 2010 onwards, due to a 2010 amendment*
Emeryville	2017 (JC only)	*Emeryville only has JC, not RS. No additional exemptions for JC*
Hayward	1979	JC*: ● Units built after 1979 ● Condos & houses RS: ● Units built after 1979 **In 2019, an amendment was passed that made all units, including ones that were previously exempt, subject to JC, so for 2019 no exemptions are applied*
Los Gatos	1980 (RS only)	JC: ● All units (Los Gatos only has RS)

		RS: ● Properties with 2 or fewer units
Mountain View	2016	JC: ● Properties with 2 or fewer units ● Units built 2017 or later
Oakland	2002 (JC); 1980 (RS)	JC: ● *From 2002-2015:* Units built after 1980 ● *From 2016 onwards:* Units built 1996 or later RS: ● *Always*: Units built 1983 or later ● *2003 onwards:* Owner-occupied duplexes & triplexes
Richmond	2016	*No additional exemptions for JC or RS*
San Francisco	1979	JC & RS: ● Units built after 1979
San Jose	2017 (JC); 1979 (RS)	JC: ● Units built 1980 or later ● Single-family homes ● Duplexes RS: ● Units built 1980 or later ● Duplexes
Union City	2017 (JC only)	*Union City only has JC, no RS. No additional exemptions for JC*

Note: The exemptions listed above are in addition to the exemptions from rent stabilization laws mandated by the Costa Hawkins Rental Housing Act.

Appendix B
Federal Reserve Bank of New York Consumer Credit Panel/Equifax Data (CCP)

The CCP data consist of an anonymized 5% random sample of consumers over 18 years old with Social Security numbers (SSNs) and a credit history, collected quarterly by the credit bureau Equifax. The sample is intended to be a nationally representative sample of consumers in a given quarter. About 1-3% of consumers are dropped and a similar share are added to the panel each quarter to maintain this representativeness. Thus, younger people and new immigrants who become consumers are added and consumers who die, move out of the US, or have a prolonged period of inactivity are dropped. The sample includes consumers with at least one credit account or collection/public record (such as bankruptcy or foreclosure), as well as those with closed or authorized user accounts (Lee and van der Klaauw 2010). While 45 million US adults do not have credit scores (Wherry et al. 2019), nearly half of these adults are represented in our data.

The CCP data includes information on individuals' age, credit information including Equifax Risk Scores—a credit score, census block group of address, and payment activity of mortgages and other credit accounts. Similar information is provided for all other adult consumers in the same household, based on their residential address. The CCP data excludes individuals who lack credit or a credit history, which may underrepresent younger individuals, noncitizens or undocumented immigrants, and very low-SES individuals and may overrepresent older individuals and include those who are deceased. Further, our ability to assess mobility among homeless individuals and those who are severely residentially unstable is limited because their residential data is likely misreported.

The Equifax Risk Score is a proprietary credit score that estimates the likelihood that an individual will pay his or her debts without defaulting. A variety of factors that relate to loan performance contribute to credit scores, including previous payment history, outstanding debts, length of credit history, new accounts opened, and types of credit used (Federal Reserve Board 2007; Fair Isaac Corporation 2015); delinquency, large increases in one's debt, and events of public record (e.g., bankruptcy or foreclosure) often lead to low credit scores (Anderson 2007). The scores range from 280 to 850, with higher scores representing greater financial health and advantage.[30] Having no score indicates that the consumer has a "thin" file, or too few accounts or new credit such that there is too little information to estimate a score (Brevoort et al. 2016). Because the CCP data contain individuals who have a public record for collection, thin files are disproportionately lower-income, but younger consumers are also more likely to have thin files (Brevoort et al. 2016). Credit bureaus do not factor income into calculating credit scores, though credit scores correlate highly with income levels; however, credit scores can reflect individuals across the income and wealth distributions (Bostic, Calem, and Wachter 2005; Brevoort, Grimm, and Kambara 2016).

[30] Transunion and Experian, the other two major credit bureaus, produce scores with similar scoring models but slightly different scales.

Table C1. SES Composition of Bay Area Counties Over Time

County	SES	2002	2003	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Alameda	ELI	19.3	19.1	18.7	18.2	18.0	18.9	19.8	19.8	18.0	16.7	15.6	15.3	15.1	15.2	15.3
Alameda	Moderate	12.8	12.2	12.3	12.2	12.1	11.7	11.9	13.0	14.1	14.6	14.2	12.7	11.4	10.0	9.5
Alameda	Moderate -Middle	29.0	28.8	26.2	25.3	24.6	23.0	22.1	22.4	23.3	24.5	25.9	27.0	27.4	27.5	26.3
Alameda	Middle-High	38.9	39.9	42.8	44.3	45.3	46.4	46.1	44.8	44.6	44.2	44.4	45.1	46.1	47.2	49.0
Contra Costa	ELI	16.6	16.5	15.9	15.7	16.3	17.8	19.4	19.2	17.6	16.3	15.3	14.9	14.8	14.8	15.1
Contra Costa	VLI-LI	11.8	11.3	11.3	11.1	11.1	10.8	11.7	13.3	14.7	15.2	14.3	13.4	11.9	10.4	9.7
Contra Costa	Moderate -Middle	27.6	27.5	25.6	24.5	23.4	22.0	20.2	20.7	21.9	23.6	25.9	26.8	27.5	27.5	26.6
Contra Costa	Middle-High	44.0	44.7	47.3	48.7	49.2	49.4	48.7	46.8	45.9	45.0	44.5	44.9	45.8	47.3	48.6
Marin	ELI	10.2	10.4	10.7	10.6	10.6	11.0	11.7	11.7	11.3	10.8	10.1	9.3	9.2	9.2	9.2
Marin	VLI-LI	8.8	8.2	7.7	8.4	8.1	7.5	7.9	8.8	9.2	9.5	9.4	9.4	7.7	6.4	5.8
Marin	Moderate -Middle	27.2	26.2	23.8	22.7	21.6	21.2	21.0	20.9	21.4	21.3	22.7	22.4	23.3	23.5	22.6
Marin	Middle-High	53.8	55.2	57.8	58.3	59.7	60.3	59.4	58.5	58.1	58.3	57.8	58.9	59.8	60.9	62.5
Napa	ELI	15.3	14.8	14.8	14.2	14.4	16.2	18.0	17.9	15.7	14.5	14.4	14.1	14.4	14.0	14.4
Napa	VLI-LI	12.0	11.5	10.7	11.9	11.7	10.7	12.1	13.7	14.9	15.2	14.2	13.5	11.5	10.4	9.9
Napa	Moderate -Middle	28.8	27.6	26.6	25.1	24.6	23.7	22.1	21.7	23.4	25.4	27.5	28.8	29.6	29.4	28.2
Napa	Middle-High	43.9	46.0	47.9	48.8	49.2	49.4	47.9	46.6	46.0	44.9	43.9	43.7	44.5	46.2	47.5
San Francisco	ELI	16.0	15.5	15.5	15.0	14.2	13.8	13.8	13.8	13.3	12.5	12.1	11.7	11.3	11.1	11.0
San Francisco	VLI-LI	11.8	11.6	11.4	11.3	11.0	10.8	10.3	10.5	10.7	10.9	10.1	9.1	8.5	7.7	7.0
San Francisco	Moderate -Middle	31.1	31.2	28.5	27.9	27.8	26.6	26.6	27.1	27.2	27.4	27.7	28.4	28.1	27.6	26.2
San Francisco	Middle-High	41.0	41.7	44.5	45.8	46.9	48.9	49.4	48.5	48.8	49.2	50.2	50.8	52.1	53.6	55.9
San Mateo	ELI	13.4	13.4	13.9	13.2	13.1	13.6	14.1	14.3	13.2	12.2	11.8	11.1	10.8	10.9	11.2
San Mateo	VLI-LI	10.8	10.5	10.4	10.5	10.6	10.3	10.5	11.1	11.9	12.3	11.6	10.6	9.6	8.3	7.5
San Mateo	Moderate -Middle	27.7	27.6	25.0	24.3	24.0	22.7	22.0	22.0	22.5	23.6	24.5	25.1	25.5	25.5	24.4

San Mateo	Middle-High	48.1	48.5	50.7	51.9	52.3	53.5	53.4	52.7	52.4	52.0	52.2	53.2	54.0	55.4	56.9
Santa Clara	ELI	14.4	14.1	14.1	14.0	13.8	14.2	15.3	15.0	13.7	12.7	12.0	11.6	11.3	11.3	11.5
Santa Clara	VLI-LI	11.0	10.8	10.6	10.7	10.6	10.3	10.5	11.6	12.3	12.7	11.9	10.8	9.7	8.2	7.7
Santa Clara	Moderate-Middle	29.9	29.4	26.4	25.1	24.8	23.5	22.8	23.1	23.8	24.7	25.7	26.7	27.2	27.4	26.0
Santa Clara	Middle-High	44.7	45.7	48.9	50.2	50.8	52.0	51.5	50.4	50.3	50.0	50.4	50.9	51.9	53.1	54.8
Solano	ELI	21.7	21.7	20.8	20.7	21.4	24.5	25.9	25.2	22.7	21.6	20.5	19.5	19.5	19.3	19.8
Solano	VLI-LI	15.4	14.7	14.7	14.3	14.1	13.5	14.9	17.0	19.0	19.4	17.9	17.4	15.8	14.1	13.2
Solano	Moderate-Middle	29.7	29.1	27.5	26.9	25.5	23.4	21.6	21.9	23.2	25.1	27.9	29.4	30.1	30.7	29.2
Solano	Middle-High	33.3	34.6	37.0	38.1	39.0	38.7	37.6	35.9	35.1	33.8	33.7	33.7	34.6	35.8	37.7
Sonoma	ELI	15.4	15.0	15.0	14.8	15.1	16.1	16.9	17.1	15.7	15.0	14.1	14.0	13.4	13.4	13.2
Sonoma	VLI-LI	11.6	10.9	11.3	11.1	11.2	11.3	11.5	12.8	14.0	14.6	14.2	12.8	11.9	10.8	10.1
Sonoma	Moderate-Middle	27.6	27.8	24.6	23.9	23.0	21.9	21.5	21.4	22.9	24.0	26.0	27.1	27.5	27.6	27.2
Sonoma	Middle-High	45.4	46.3	49.1	50.2	50.6	50.7	50.1	48.8	47.4	46.4	45.6	46.2	47.2	48.2	49.5

Source: FRBNY Consumer Credit Panel/Equifax Data.

Table C2. Regression Results from Linear Probability Models Predicting Outmigration on Logged New Housing Units in Same Year, Two Years Prior, and Four Years Prior

	New Production of Subsidized Units			New Production of Market-rate Units		
	(1)	(2)	(3)	(1)	(2)	(3)
No lag						
SES (ref = ELI)						
VLI-LI	0.051***	0.047***	0.029***	0.051***	0.046***	0.029***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Moderate-Midlde	0.043***	0.057***	0.038***	0.043***	0.057***	0.038***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Middle-High	-0.035***	0.011***	0.022***	-0.035***	0.012***	0.023***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Number of New Units (log-transformed)	0.008***	-0.00001	-0.001	0.004***	0.002***	0.002***
	(0.001)	(0.001)	(0.001)	(0.0002)	(0.0005)	(0.001)
SES (ref = ELI) * Number of New Units						
VLI-LI * Number of New Units		0.003	0.003		0.003***	0.001
		(0.002)	(0.002)		(0.001)	(0.001)
Moderate-Middle * Number of New Units		0.008***	0.005***		0.001	-0.00001
		(0.002)	(0.002)		(0.001)	(0.001)
Middle-High * Number of New Units		0.005***	0.003*		-0.001**	-0.002***
		(0.002)	(0.002)		(0.001)	(0.001)
Individual and household variables included		x	x		x	x
Additional neighborhood variables included			x			x
R-squared	0.013	0.044	0.051	0.013	0.044	0.051
N (person-years)	3,558,807	3,558,807	3,065,898	3,558,807	3,558,807	3,065,898
2-year lag						
SES (ref = ELI)						
VLI-LI	0.051***	0.047***	0.029***	0.051***	0.046***	0.029***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Moderate-Midlde	0.043***	0.058***	0.039***	0.043***	0.058***	0.038***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Middle-High	-0.035***	0.011***	0.022***	-0.035***	0.012***	0.023***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Number of New Units (log-transformed)	0.008***	0.007***	0.005***	0.004***	0.002***	0.001
	(0.001)	(0.001)	(0.001)	(0.0002)	(0.0005)	(0.001)
SES (ref = ELI) * Number of New Units						
VLI-LI * Number of New Units		-0.001	-0.003		0.002**	0.001*
		(0.002)	(0.002)		(0.001)	(0.001)
Moderate-Middle * Number of New Units		-0.003	-0.002		0.0001	0.0001
		(0.002)	(0.002)		(0.001)	(0.001)
Middle-High * Number of New Units		-0.001	-0.003*		-0.002***	-0.002***
		(0.002)	(0.002)		(0.001)	(0.001)
Individual and household variables included		x	x		x	x
Additional neighborhood variables included			x			x
R-squared	0.013	0.044	0.051	0.013	0.044	0.051
N (person-years)	3,558,807	3,558,807	3,065,898	3,558,807	3,558,807	3,065,898
4-year lag						
SES (ref = ELI)						
VLI-LI	0.048***	0.043***	0.029***	0.048***	0.043***	0.029***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Moderate-Midlde	0.041***	0.054***	0.038***	0.041***	0.054***	0.038***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Middle-High	-0.036***	0.009***	0.022***	-0.036***	0.010***	0.023***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Number of New Units (log-transformed)	0.007***	0.002	0.0003	0.003***	0.002**	-0.001
	(0.001)	(0.001)	(0.001)	(0.0002)	(0.0005)	(0.0005)
SES (ref = ELI) * Number of New Units						
VLI-LI * Number of New Units		-0.001	-0.001		0.002**	0.001
		(0.002)	(0.002)		(0.001)	(0.001)
Moderate-Middle * Number of New Units		0.003**	0.002		0.0004	0.00002
		(0.002)	(0.002)		(0.001)	(0.001)
Middle-High * Number of New Units		0.002	0.001		-0.002***	-0.002***
		(0.002)	(0.002)		(0.001)	(0.001)
Individual and household variables included		x	x		x	x
Additional neighborhood variables included			x			x
R-squared	0.012	0.044	0.051	0.012	0.044	0.051
N (person-years)	3,111,471	3,111,471	3,065,898	3,111,471	3,111,471	3,065,898

Note: *p<.10; **p<.05; ***p<.01

Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database.

Table C3. Regression Results from Linear Probability Models Predicting Inmigration on Logged New Housing Units in Same Year, Two Years Prior, and Four Years Prior

	New Production of Subsidized Units			New Production of Market-rate Units		
	(1)	(2)	(3)	(1)	(2)	(3)
No lag						
SES (ref = ELI)						
VLI-LI	0.035***	0.025***	0.005***	0.035***	0.024***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Moderate-Midlde	0.038***	0.046***	0.028***	0.038***	0.045***	0.027***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Middle-High	-0.087***	-0.029***	-0.020***	-0.087***	-0.029***	-0.020***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Number of New Units (log-transformed)	0.011***	-0.001	-0.001	0.01***	0.005***	0.004***
	(0.001)	(0.001)	(0.002)	(0.0002)	(0.001)	(0.001)
SES (ref = ELI) * Number of New Units						
VLI-LI * Number of New Units		0.009***	0.006***		0.005***	0.002***
		(0.002)	(0.003)		(0.001)	(0.001)
Moderate-Middle * Number of New Units		0.012***	0.007***		0.004***	0.003***
		(0.002)	(0.002)		(0.001)	(0.001)
Middle-High * Number of New Units		0.008***	0.003		0.001*	0.0001
		(0.002)	(0.002)		(0.001)	(0.001)
Individual and household variables included		x	x		x	x
Additional neighborhood variables included			x			x
R-squared	0.026	0.078	0.083	0.026	0.078	0.083
N (person-years)	3,335,926	3,335,926	3,065,898	3,335,926	3,335,926	3,065,898
2-year lag						
SES (ref = ELI)						
VLI-LI	0.035***	0.025***	0.005***	0.035***	0.025***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Moderate-Midlde	0.038***	0.046***	0.028***	0.038***	0.045***	0.027***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Middle-High	-0.088***	-0.029***	-0.020***	-0.088***	-0.029***	-0.020***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Number of New Units (log-transformed)	0.012***	0.003*	0.002	0.010***	0.007**	0.004***
	(0.001)	(0.001)	(0.002)	(0.0002)	(0.001)	(0.001)
SES (ref = ELI) * Number of New Units						
VLI-LI * Number of New Units		0.005**	0.005**		0.002***	0.001
		(0.002)	(0.002)		(0.001)	(0.001)
Moderate-Middle * Number of New Units		0.008***	0.005**		0.002***	0.002***
		(0.002)	(0.002)		(0.001)	(0.001)
Middle-High * Number of New Units		0.006***	0.001		-0.0002	-0.0001
		(0.002)	(0.002)		(0.001)	(0.001)
Individual and household variables included		x	x		x	x
Additional neighborhood variables included			x			x
R-squared	0.026	0.078	0.083	0.026	0.078	0.083
N (person-years)	3,335,926	3,335,926	3,065,898	3,335,926	3,335,926	3,065,898
4-year lag						
SES (ref = ELI)						
VLI-LI	0.035***	0.024***	0.005***	0.035***	0.023***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Moderate-Midlde	0.039***	0.046***	0.028***	0.039***	0.045***	0.027***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Middle-High	-0.087***	-0.030***	-0.020***	-0.087***	-0.029***	-0.020***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Number of New Units (log-transformed)	0.008***	-0.0002	-0.003*	0.007***	0.004***	0.001**
	(0.001)	(0.001)	(0.002)	(0.0002)	(0.001)	(0.001)
SES (ref = ELI) * Number of New Units						
SES (ref = ELI) * Number of New Units		0.006***	0.005**		0.004***	0.003***
VLI-LI * Number of New Units		(0.002)	(0.002)		(0.001)	(0.001)
		0.007***	0.005**		0.001**	0.001*
Moderate-Middle * Number of New Units		(0.002)	(0.002)		(0.001)	(0.001)
		0.006***	0.003*		-0.0004	0.0003
Middle-High * Number of New Units		(0.002)	(0.002)		(0.001)	(0.001)
Individual and household variables included		x	x		x	x
Additional neighborhood variables included			x			x
R-squared	0.026	0.079	0.083	0.026	0.079	0.083
N (person-years)	3,111,471	3,111,471	3,065,898	3,111,471	3,111,471	3,065,898

Note: *p<.10; **p<.05; ***p<.01

Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database.

Appendix D
Table D1a Outmigration – Market Rate

Outmigration	No lag						1-year lag						2-year lag						4-year lag					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3		Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE
Number of new units (log-transformed)	0.003***	(0.0001)	-0.001***	(0.0003)	-0.004***	(0.0005)	0.004***	(0.0001)	-0.0002	(0.0003)	-0.0004	(0.0005)	0.003***	(0.0001)	0.0001	(0.0003)	0.002***	(0.0005)	0.002***	(0.0001)	-0.001***	(0.0003)	-0.002***	(0.0005)
High income	-0.013***	(0.001)	-0.010***	(0.001)	-0.008***	(0.001)	-0.013***	(0.001)	-0.010***	(0.001)	-0.008***	(0.001)	-0.013***	(0.001)	-0.009***	(0.001)	-0.006***	(0.001)	-0.013***	(0.001)	-0.009***	(0.001)	-0.007***	(0.001)
Low income	-0.012***	(0.0005)	-0.012***	(0.001)	-0.015***	(0.001)	-0.012***	(0.0005)	-0.011***	(0.001)	-0.014***	(0.001)	-0.012***	(0.0005)	-0.011***	(0.001)	-0.014***	(0.001)	-0.012***	(0.0005)	-0.010***	(0.001)	-0.014***	(0.001)
Very low income	-0.057***	(0.0004)	-0.048***	(0.001)	-0.051***	(0.001)	-0.057***	(0.0004)	-0.048***	(0.001)	-0.050***	(0.001)	-0.057***	(0.0004)	-0.048***	(0.001)	-0.049***	(0.001)	-0.057***	(0.0004)	-0.047***	(0.001)	-0.050***	(0.001)
Household head age 30-34			-0.015***	(0.001)	-0.016***	(0.001)			-0.015***	(0.001)	-0.016***	(0.001)			-0.015***	(0.001)	-0.016***	(0.001)			-0.015***	(0.001)	-0.016***	(0.001)
Household head age 35-39			-0.034***	(0.001)	-0.034***	(0.001)			-0.034***	(0.001)	-0.034***	(0.001)			-0.034***	(0.001)	-0.034***	(0.001)			-0.034***	(0.001)	-0.034***	(0.001)
Household head age 40-44			-0.048***	(0.001)	-0.048***	(0.001)			-0.048***	(0.001)	-0.048***	(0.001)			-0.048***	(0.001)	-0.048***	(0.001)			-0.048***	(0.001)	-0.048***	(0.001)
Household head age 45-49			-0.057***	(0.001)	-0.056***	(0.001)			-0.057***	(0.001)	-0.056***	(0.001)			-0.057***	(0.001)	-0.056***	(0.001)			-0.057***	(0.001)	-0.056***	(0.001)
Household head age 50-54			-0.060***	(0.001)	-0.059***	(0.001)			-0.060***	(0.001)	-0.059***	(0.001)			-0.060***	(0.001)	-0.059***	(0.001)			-0.060***	(0.001)	-0.059***	(0.001)
Household head age 55-59			-0.060***	(0.001)	-0.059***	(0.001)			-0.060***	(0.001)	-0.059***	(0.001)			-0.060***	(0.001)	-0.059***	(0.001)			-0.061***	(0.001)	-0.059***	(0.001)
Household head age 60-64			-0.058***	(0.001)	-0.056***	(0.001)			-0.058***	(0.001)	-0.056***	(0.001)			-0.058***	(0.001)	-0.056***	(0.001)			-0.058***	(0.001)	-0.056***	(0.001)
Household head age 65-69			-0.045***	(0.001)	-0.046***	(0.001)			-0.045***	(0.001)	-0.046***	(0.001)			-0.045***	(0.001)	-0.046***	(0.001)			-0.045***	(0.001)	-0.046***	(0.001)
Household head age 65+			-0.062***	(0.001)	-0.057***	(0.001)			-0.062***	(0.001)	-0.057***	(0.001)			-0.062***	(0.001)	-0.057***	(0.001)			-0.062***	(0.001)	-0.057***	(0.001)
Household head age 70-74			-0.052***	(0.001)	-0.051***	(0.001)			-0.052***	(0.001)	-0.051***	(0.001)			-0.052***	(0.001)	-0.051***	(0.001)			-0.052***	(0.001)	-0.051***	(0.001)
Household head age 75+			-0.052***	(0.001)	-0.049***	(0.001)			-0.052***	(0.001)	-0.049***	(0.001)			-0.052***	(0.001)	-0.049***	(0.001)			-0.051***	(0.001)	-0.049***	(0.001)
Black			0.005***	(0.001)	0.008***	(0.001)			0.005***	(0.001)	0.008***	(0.001)			0.005***	(0.001)	0.008***	(0.001)			0.005***	(0.001)	0.008***	(0.001)
Latinx			-0.004***	(0.0005)	-0.0004	(0.001)			-0.004***	(0.0005)	-0.0002	(0.001)			-0.004***	(0.0005)	-0.0002	(0.001)			-0.004***	(0.0005)	-0.0004	(0.001)
White			0.027***	(0.0004)	0.025***	(0.0004)			0.027***	(0.0004)	0.025***	(0.0004)			0.027***	(0.0004)	0.025***	(0.0004)			0.027***	(0.0004)	0.025***	(0.0004)
Length of residence			-0.005***	(0.00003)	-0.005***	(0.00003)			-0.005***	(0.00003)	-0.005***	(0.00003)			-0.005***	(0.00003)	-0.005***	(0.00003)			-0.005***	(0.00003)	-0.005***	(0.00003)
Number of children			-0.008***	(0.0005)	-0.009***	(0.0005)			-0.008***	(0.0005)	-0.009***	(0.0005)			-0.008***	(0.0005)	-0.009***	(0.0005)			-0.008***	(0.0005)	-0.009***	(0.0005)
Non-married			0.002***	(0.0005)	-0.002***	(0.001)			0.002***	(0.0005)	-0.002***	(0.001)			0.002***	(0.0005)	-0.002***	(0.001)			0.003***	(0.0005)	-0.002***	(0.001)
Number of adults			0.009***	(0.0004)	0.005***	(0.0004)			0.009***	(0.0004)	0.005***	(0.0004)			0.009***	(0.0004)	0.005***	(0.0004)			0.009***	(0.0004)	0.005***	(0.0004)
Percent vacant in 2000					-0.0003**	(0.0001)					-0.0003***	(0.0001)					-0.0003***	(0.0001)					-0.0003***	(0.0001)
Percent of housing built in past 20 years as of 2000					0.00004**	(0.00001)					0.00001	(0.00001)					0.00001	(0.00001)					0.0001***	(0.00001)
Ownership rate in 2000					-0.0004**	(0.00001)					-0.0004***	(0.00001)					-0.0004***	(0.00001)					-0.0004***	(0.00001)
Percent foreign-born in 2000					-0.0002**	(0.00002)					-0.0002***	(0.00002)					-0.0002***	(0.00002)					-0.0002***	(0.00002)
Median home value in 2000					-0.00000*	(0.000)					-0.00000**	(0.000)					-0.00000**	(0.000)					-0.00000**	(0.000)
Median gross rent in 2000					-0.00003**	(0.00000)					-0.00003**	(0.00000)					-0.00003**	(0.00000)					-0.00003**	(0.00000)
Number of subsidized units in 2016					-0.00001*	(0.00000)					-0.00001**	(0.00000)					-0.00001**	(0.00000)					-0.00001**	(0.00000)
Percent college-educated in 2000					0.0004***	(0.00002)					0.0004***	(0.00002)					0.0004***	(0.00002)					0.0004***	(0.00002)
Percent Hispanic in 2000					-0.0001**	(0.00001)					-0.0001***	(0.00001)					-0.0001***	(0.00001)					-0.0001***	(0.00001)
Poverty rate in 2000					-0.0005**	(0.00003)					-0.0005***	(0.00003)					-0.0005***	(0.00003)					-0.0005***	(0.00003)
Number of new units - other type of housing (log-transformed)					0.0001	(0.0003)					-0.001*	(0.0003)					-0.001***	(0.0003)					-0.001***	(0.0003)
Percent of units covered by tenant protections					-0.009***	(0.001)					-0.010***	(0.001)					-0.009***	(0.001)					-0.006***	(0.001)
Avg. outmigration rate for 3 previous years					0.034***	(0.001)					0.034***	(0.001)					0.034***	(0.001)					0.034***	(0.001)
Avg. inmigration rate for 3 previous years					-0.003**	(0.001)					-0.003***	(0.001)					-0.004***	(0.001)					-0.003**	(0.001)
Oakland					0.004***	(0.001)					0.005***	(0.001)					0.005***	(0.001)					0.004***	(0.001)
San Francisco					0.0004	(0.001)					0.001*	(0.001)					0.001**	(0.001)					0.0002	(0.001)
San Jose					0.017***	(0.001)					0.017***	(0.001)					0.017***	(0.001)					0.017***	(0.001)
South Bay					0.017***	(0.001)					0.016***	(0.001)					0.017***	(0.001)					0.017***	(0.001)
High * Number of new units			-0.001*	(0.0004)	-0.0002	(0.001)			-0.0004	(0.0004)	-0.001	(0.001)			-0.001***	(0.0004)	-0.004***	(0.001)			-0.001***	(0.0004)	-0.002***	(0.001)
Low * Number of new units			0.002***	(0.0004)	0.006***	(0.001)			0.002***	(0.0004)	0.005***	(0.001)			0.002***	(0.0004)	0.003***	(0.001)			0.001***	(0.0004)	0.005***	(0.001)
Very Low * Number of new units			0.004***	(0.0004)	0.006***	(0.001)			0.005***	(0.0004)	0.003***	(0.001)			0.004***	(0.0004)	0.001	(0.001)			0.004***	(0.0004)	0.004***	(0.001)
Constant	0.123***	(0.0004)	0.156***	(0.001)	0.211***	(0.002)	0.123***	(0.0004)	0.156***	(0.001)	0.210***	(0.002)	0.123***	(0.0004)	0.155***	(0.001)	0.209***	(0.002)	0.123***	(0.0004)	0.155***	(0.001)	0.209***	(0.002)
Observations	4156465		3339164		2845535		4146940		3334177		2845535		4113869		3314908		2845535		3974877		3219637		2845535	
R2	0.007		0.031		0.035		0.007		0.031		0.035		0.007		0.031		0.035		0.007		0.031		0.035	
Adjusted R2	0.007		0.031		0.035		0.007		0.031		0.035		0.007		0.031		0.035		0.007		0.031		0.035	
Residual Std. Error	0.367 (df = 4156460)		0.350 (df = 3339138)		0.340 (df = 2845491)		0.367 (df = 4146935)		0.350 (df = 3334151)		0.340 (df = 2845491)		0.366 (df = 4113864)		0.349 (df = 3314882)		0.340 (df = 2845491)		0.364 (df = 3974872)		0.348 (df = 3219611)		0.340 (df = 2845491)	
F Statistic	7,729.738*** (df = 4; 4156460)		4,272.404*** (df = 25; 3339138)		2,376.668*** (df = 43; 2845491)		7,787.057*** (df = 4; 4146935)		4,270.633*** (df = 25; 3334151)		2,381.083*** (df = 43; 2845491)		7,680.547*** (df = 4; 4113864)		4,240.556*** (df = 25; 3314882)		2,380.308*** (df = 43; 2845491)		7,342.021*** (df = 4; 3974872)		4,123.067*** (df = 25; 3219611)		2,373.064*** (df = 43; 2845491)	

Source: Infogroup, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Table D1b Outmigration – Subsidized

Outmigration	No lag						1-year lag						2-year lag						4-year lag					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3		Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE
Number of new units (log-transformed)	0.001***	(0.0002)	0.001**	(0.001)	0.0003	(0.001)	0.00001	(0.0002)	0.001	(0.001)	-0.002	(0.001)	-0.001**	(0.0002)	0.002***	(0.001)	0.001	(0.001)	-0.0005**	(0.0002)	0.003***	(0.001)	0.005***	(0.001)
High income	-0.013***	(0.001)	-0.010***	(0.001)	-0.008***	(0.001)	-0.013***	(0.001)	-0.010***	(0.001)	-0.008***	(0.001)	-0.013***	(0.001)	-0.010***	(0.001)	-0.008***	(0.001)	-0.013***	(0.001)	-0.010***	(0.001)	-0.008***	(0.001)
Low income	-0.013***	(0.0005)	-0.010***	(0.001)	-0.013***	(0.001)	-0.013***	(0.0005)	-0.010***	(0.001)	-0.013***	(0.001)	-0.013***	(0.0005)	-0.010***	(0.001)	-0.013***	(0.001)	-0.012***	(0.0005)	-0.009***	(0.001)	-0.013***	(0.001)
Very low income	-0.058***	(0.0004)	-0.046***	(0.001)	-0.049***	(0.001)	-0.058***	(0.0004)	-0.046***	(0.001)	-0.049***	(0.001)	-0.058***	(0.0004)	-0.046***	(0.001)	-0.048***	(0.001)	-0.058***	(0.0004)	-0.045***	(0.001)	-0.049***	(0.001)
Household head age 30-34			-0.015***	(0.001)	-0.016***	(0.001)			-0.015***	(0.001)	-0.016***	(0.001)			-0.015***	(0.001)	-0.016***	(0.001)			-0.015***	(0.001)	-0.016***	(0.001)
Household head age 35-39			-0.034***	(0.001)	-0.034***	(0.001)			-0.034***	(0.001)	-0.034***	(0.001)			-0.034***	(0.001)	-0.034***	(0.001)			-0.033***	(0.001)	-0.034***	(0.001)
Household head age 40-44			-0.048***	(0.001)	-0.048***	(0.001)			-0.048***	(0.001)	-0.048***	(0.001)			-0.048***	(0.001)	-0.048***	(0.001)			-0.048***	(0.001)	-0.048***	(0.001)
Household head age 45-49			-0.057***	(0.001)	-0.056***	(0.001)			-0.057***	(0.001)	-0.056***	(0.001)			-0.057***	(0.001)	-0.056***	(0.001)			-0.057***	(0.001)	-0.056***	(0.001)
Household head age 50-54			-0.060***	(0.001)	-0.059***	(0.001)			-0.060***	(0.001)	-0.059***	(0.001)			-0.060***	(0.001)	-0.059***	(0.001)			-0.060***	(0.001)	-0.059***	(0.001)
Household head age 55-59			-0.060***	(0.001)	-0.059***	(0.001)			-0.060***	(0.001)	-0.059***	(0.001)			-0.060***	(0.001)	-0.059***	(0.001)			-0.061***	(0.001)	-0.059***	(0.001)
Household head age 60-64			-0.058***	(0.001)	-0.056***	(0.001)			-0.058***	(0.001)	-0.056***	(0.001)			-0.058***	(0.001)	-0.056***	(0.001)			-0.058***	(0.001)	-0.056***	(0.001)
Household head age 65-69			-0.045***	(0.001)	-0.046***	(0.001)			-0.045***	(0.001)	-0.046***	(0.001)			-0.045***	(0.001)	-0.046***	(0.001)			-0.045***	(0.001)	-0.046***	(0.001)
Household head age 65+			-0.062***	(0.001)	-0.057***	(0.001)			-0.062***	(0.001)	-0.057***	(0.001)			-0.062***	(0.001)	-0.057***	(0.001)			-0.061***	(0.001)	-0.056***	(0.001)
Household head age 70-74			-0.052***	(0.001)	-0.051***	(0.001)			-0.052***	(0.001)	-0.051***	(0.001)			-0.052***	(0.001)	-0.051***	(0.001)			-0.052***	(0.001)	-0.051***	(0.001)
Household head age 75+			-0.052***	(0.001)	-0.049***	(0.001)			-0.052***	(0.001)	-0.049***	(0.001)			-0.052***	(0.001)	-0.049***	(0.001)			-0.051***	(0.001)	-0.049***	(0.001)
Black			0.004***	(0.001)	0.008***	(0.001)			0.004***	(0.001)	0.008***	(0.001)			0.004***	(0.001)	0.008***	(0.001)			0.005***	(0.001)	0.008***	(0.001)
Latinx			-0.004***	(0.0005)	-0.0004	(0.001)			-0.004***	(0.0005)	-0.0002	(0.001)			-0.004***	(0.0005)	-0.0003	(0.001)			-0.004***	(0.0005)	-0.0004	(0.001)
White			0.027***	(0.0004)	0.025***	(0.0004)			0.027***	(0.0004)	0.025***	(0.0004)			0.027***	(0.0004)	0.025***	(0.0004)			0.028***	(0.0004)	0.025***	(0.0004)
Length of residence			-0.005***	(0.00003	-0.005***	(0.00003)			-0.005***	(0.00003	-0.005***	(0.00003)			-0.005***	(0.00003	-0.005***	(0.00003)			-0.005***	(0.00003)	-0.005***	(0.00003)
Number of children			-0.008***	(0.0005)	-0.009***	(0.0005)			-0.008***	(0.0005)	-0.009***	(0.0005)			-0.008***	(0.0005)	-0.009***	(0.0005)			-0.008***	(0.0005)	-0.009***	(0.0005)
Non-married			0.002***	(0.0005)	-0.002***	(0.001)			0.002***	(0.0005)	-0.002***	(0.001)			0.003***	(0.0005)	-0.002***	(0.001)			0.003***	(0.0005)	-0.002***	(0.001)
Number of adults			0.009***	(0.0004)	0.005***	(0.0004)			0.009***	(0.0004)	0.005***	(0.0004)			0.009***	(0.0004)	0.005***	(0.0004)			0.009***	(0.0004)	0.005***	(0.0004)
Percent vacant in 2000					-0.0003***	(0.0001)					-0.0003***	(0.0001)					-0.0003***	(0.0001)					-0.0003***	(0.0001)
Percent of housing built in past 20 years as of 2000					0.00002	(0.00001)					-0.00001	(0.00001)					-0.00000	(0.00001)					0.00003**	(0.00001)
Ownership rate in 2000					-0.0004***	(0.00001)					-0.0004***	(0.00001)					-0.0004***	(0.00001)					-0.0004***	(0.00001)
Percent foreign-born in 2000					-0.0002***	(0.00002)					-0.0002***	(0.00002)					-0.0002***	(0.00002)					-0.0002***	(0.00002)
Median home value in 2000					-0.00000**	(0.000)					-0.00000**	(0.000)					-0.00000**	(0.000)					-0.00000**	(0.000)
Median gross rent in 2000					-0.00003**	(0.00000)					-0.00003**	(0.00000)					-0.00003**	(0.00000)					-0.00003**	(0.00000)
Number of subsidized units in 2016					-0.00001**	(0.00000)					-0.00001**	(0.00000)					-0.00001**	(0.00000)					-0.00001**	(0.00000)
Percent college-educated in 2000					0.0004***	(0.00002)					0.0004***	(0.00002)					0.0004***	(0.00002)					0.0004***	(0.00002)
Percent Hispanic in 2000					-0.0001***	(0.00001)					-0.0001***	(0.00001)					-0.0001***	(0.00001)					-0.0001***	(0.00001)
Poverty rate in 2000					-0.0005***	(0.00003)					-0.001***	(0.00003)					-0.0005***	(0.00003)					-0.0005***	(0.00003)
Number of new units - other type of housing (log-transformed)					0.001***	(0.0002)					0.003***	(0.0002)					0.003***	(0.0002)					0.001***	(0.0002)
Percent of units covered by tenant protections					-0.009***	(0.001)					-0.010***	(0.001)					-0.009***	(0.001)					-0.006***	(0.001)
Avg. outmigration rate for 3 previous years					0.034***	(0.001)					0.034***	(0.001)					0.034***	(0.001)					0.034***	(0.001)
Avg. inmigration rate for 3 previous years					-0.003**	(0.001)					-0.003***	(0.001)					-0.004***	(0.001)					-0.003**	(0.001)
Oakland					0.004***	(0.001)					0.005***	(0.001)					0.005***	(0.001)					0.003***	(0.001)
San Francisco					0.001	(0.001)					0.001*	(0.001)					0.001*	(0.001)					0.0002	(0.001)
San Jose					0.017***	(0.001)					0.017***	(0.001)					0.017***	(0.001)					0.017***	(0.001)
South Bay					0.017***	(0.001)					0.017***	(0.001)					0.017***	(0.001)					0.017***	(0.001)
High * Number of new units			-0.002**	(0.001)	-0.005***	(0.002)			-0.002**	(0.001)	-0.002	(0.002)			0.002	(0.001)	-0.005***	(0.002)			0.003**	(0.001)	-0.006***	(0.002)
Low * Number of new units			0.002**	(0.001)	0.004***	(0.001)			0.002**	(0.001)	0.005***	(0.001)			-0.001	(0.001)	0.001	(0.001)			0.0001	(0.001)	-0.001	(0.002)
Very Low * Number of new units			-0.002***	(0.001)	-0.001	(0.001)			-0.002**	(0.001)	0.001	(0.001)			-0.004***	(0.001)	-0.002*	(0.001)			-0.006***	(0.001)	-0.007***	(0.001)
Constant	0.126***	(0.0004)	0.155***	(0.001)	0.210***	(0.002)	0.126***	(0.0004)	0.155***	(0.001)	0.209***	(0.002)	0.125***	(0.0004)	0.155***	(0.001)	0.209***	(0.002)	0.125***	(0.0004)	0.153***	(0.001)	0.208***	(0.002)
Observations	4156465		3339164		2845535		4146940		3334177		2845535		4113869		3314908		2845535		3974877		3219637		2845535	
R2	0.007		0.031		0.035		0.007		0.031		0.035		0.007		0.031		0.035		0.007		0.031		0.035	
Adjusted R2	0.007		0.031		0.035		0.007		0.031		0.035		0.007		0.031		0.035		0.007		0.031		0.035	
Residual Std. Error	0.367 (df = 4156460)		0.350 (df = 3339138		0.340 (df = 2845491		0.367 (df = 4146935)		0.350 (df = 3334151		0.340 (df = 2845491		0.366 (df = 4113864)		0.350 (df = 3314882		0.340 (df = 2845491		0.364 (df = 3974872)		0.348 (df = 3219611)		0.340 (df = 2845491)	
F Statistic	7,554.004*** (df = 4; 415646		4,261.203*** (df = 25; 3339		2,372.720*** (df = 43; 2845		7,538.452*** (df = 4; 414693		4,253.358*** (df = 25; 3334		2,378.493*** (df = 43; 2845		7,497.308*** (df = 4; 411386		4,228.392*** (df = 25; 3314		2,377.201*** (df = 43; 2845		7,271.916*** (df = 4; 397487		4,121.409*** (df = 25; 321961		2,370.657*** (df = 43; 2845491	

Source: Infogroup, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Table D2a Inmigration – Market Rate

Outmigration	No lag						1-year lag						2-year lag						4-year lag					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3		Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE
Number of new units (log-transformed)	0.009***	(0.0001)	0.007***	(0.0003)	0.004***	(0.0005)	0.013***	(0.0001)	0.009***	(0.0003)	0.010***	(0.0005)	0.012***	(0.0001)	0.009***	(0.0003)	0.008***	(0.0005)	0.009***	(0.0001)	0.007***	(0.0003)	0.003***	(0.0005)
High income	0.007***	(0.001)	0.008***	(0.001)	0.006***	(0.001)	0.007***	(0.001)	0.007***	(0.001)	0.004***	(0.001)	0.007***	(0.001)	0.007***	(0.001)	0.004***	(0.001)	0.006***	(0.001)	0.007***	(0.001)	0.005***	(0.001)
Low income	-0.022***	(0.0005)	-0.006***	(0.001)	-0.005***	(0.001)	-0.021***	(0.0005)	-0.005***	(0.001)	-0.004***	(0.001)	-0.021***	(0.0005)	-0.005***	(0.001)	-0.004***	(0.001)	-0.021***	(0.0005)	-0.005***	(0.001)	-0.005***	(0.001)
Very low income	-0.065***	(0.0005)	-0.028***	(0.001)	-0.022***	(0.001)	-0.063***	(0.0005)	-0.027***	(0.001)	-0.021***	(0.001)	-0.063***	(0.0005)	-0.027***	(0.001)	-0.021***	(0.001)	-0.065***	(0.0005)	-0.028***	(0.001)	-0.022***	(0.001)
Household head age 30-34			-0.015***	(0.001)	-0.016***	(0.001)			-0.014***	(0.001)	-0.016***	(0.001)			-0.014***	(0.001)	-0.016***	(0.001)			-0.015***	(0.001)	-0.016***	(0.001)
Household head age 35-39			-0.041***	(0.001)	-0.042***	(0.001)			-0.040***	(0.001)	-0.042***	(0.001)			-0.040***	(0.001)	-0.042***	(0.001)			-0.041***	(0.001)	-0.042***	(0.001)
Household head age 40-44			-0.057***	(0.001)	-0.059***	(0.001)			-0.057***	(0.001)	-0.058***	(0.001)			-0.057***	(0.001)	-0.058***	(0.001)			-0.058***	(0.001)	-0.059***	(0.001)
Household head age 45-49			-0.062***	(0.001)	-0.062***	(0.001)			-0.062***	(0.001)	-0.062***	(0.001)			-0.062***	(0.001)	-0.062***	(0.001)			-0.062***	(0.001)	-0.062***	(0.001)
Household head age 50-54			-0.058***	(0.001)	-0.057***	(0.001)			-0.058***	(0.001)	-0.057***	(0.001)			-0.058***	(0.001)	-0.057***	(0.001)			-0.058***	(0.001)	-0.057***	(0.001)
Household head age 55-59			-0.051***	(0.001)	-0.051***	(0.001)			-0.051***	(0.001)	-0.051***	(0.001)			-0.051***	(0.001)	-0.051***	(0.001)			-0.051***	(0.001)	-0.051***	(0.001)
Household head age 60-64			-0.044***	(0.001)	-0.045***	(0.001)			-0.044***	(0.001)	-0.044***	(0.001)			-0.044***	(0.001)	-0.044***	(0.001)			-0.045***	(0.001)	-0.045***	(0.001)
Household head age 65-69			-0.020***	(0.001)	-0.025***	(0.001)			-0.020***	(0.001)	-0.025***	(0.001)			-0.020***	(0.001)	-0.025***	(0.001)			-0.021***	(0.001)	-0.025***	(0.001)
Household head age 65+			-0.037***	(0.001)	-0.036***	(0.001)			-0.037***	(0.001)	-0.036***	(0.001)			-0.037***	(0.001)	-0.036***	(0.001)			-0.038***	(0.001)	-0.037***	(0.001)
Household head age 70-74			-0.020***	(0.001)	-0.024***	(0.001)			-0.020***	(0.001)	-0.024***	(0.001)			-0.020***	(0.001)	-0.024***	(0.001)			-0.020***	(0.001)	-0.024***	(0.001)
Household head age 75+			-0.003***	(0.001)	-0.007***	(0.001)			-0.003***	(0.001)	-0.006***	(0.001)			-0.003***	(0.001)	-0.007***	(0.001)			-0.003***	(0.001)	-0.007***	(0.001)
Black			-0.0002	(0.001)	0.003***	(0.001)			0.0001	(0.001)	0.003***	(0.001)			0.00003	(0.001)	0.003***	(0.001)			0.0001	(0.001)	0.002***	(0.001)
Latinx			-0.013***	(0.0005)	-0.004***	(0.001)			-0.012***	(0.0005)	-0.004***	(0.001)			-0.013***	(0.0005)	-0.004***	(0.001)			-0.012***	(0.0005)	-0.004***	(0.001)
White			0.019***	(0.0004)	0.019***	(0.0004)			0.020***	(0.0004)	0.020***	(0.0004)			0.020***	(0.0004)	0.020***	(0.0004)			0.020***	(0.0004)	0.019***	(0.0004)
Length of residence			-0.012***	(0.00003)	-0.011***	(0.00003)			-0.012***	(0.00003)	-0.011***	(0.00003)			-0.012***	(0.00003)	-0.011***	(0.00003)			-0.012***	(0.00003)	-0.011***	(0.00003)
Number of children			-0.002***	(0.0004)	-0.004***	(0.0004)			-0.002***	(0.0004)	-0.004***	(0.0004)			-0.002***	(0.0004)	-0.004***	(0.0004)			-0.002***	(0.0004)	-0.004***	(0.0004)
Non-married			-0.028***	(0.0005)	-0.028***	(0.001)			-0.027***	(0.0005)	-0.028***	(0.001)			-0.027***	(0.0005)	-0.028***	(0.001)			-0.026***	(0.0005)	-0.028***	(0.001)
Number of adults			0.020***	(0.0003)	0.016***	(0.0004)			0.020***	(0.0003)	0.016***	(0.0004)			0.020***	(0.0003)	0.016***	(0.0004)			0.019***	(0.0003)	0.016***	(0.0004)
Percent vacant in 2000					0.0001***	(0.00005)					0.0001	(0.00005)					0.0001	(0.00005)					0.0001*	(0.00005)
Percent of housing built in past 20 years as of 2000					0.0001***	(0.00001)					0.00002*	(0.00001)					0.00003**	(0.00001)					0.0001***	(0.00001)
Ownership rate in 2000					-0.0001***	(0.00001)					-0.0001***	(0.00001)					-0.0001***	(0.00001)					-0.0001***	(0.00001)
Percent foreign-born in 2000					-0.0001***	(0.00002)					-0.0001***	(0.00002)					-0.0001***	(0.00002)					-0.0001***	(0.00002)
Median home value in 2000					-0.00000**	(0.000)					-0.00000**	(0.000)					-0.00000**	(0.000)					-0.00000**	(0.000)
Median gross rent in 2000					-0.00002**	(0.00000)					-0.00002**	(0.00000)					-0.00002**	(0.00000)					-0.00002**	(0.00000)
Number of subsidized units in 2016					-0.00001**	(0.00000)					-0.00001**	(0.00000)					-0.00001**	(0.00000)					-0.00001**	(0.00000)
Percent college-educated in 2000					0.0004***	(0.00002)					0.0004***	(0.00002)					0.0004***	(0.00002)					0.0004***	(0.00002)
Percent Hispanic in 2000					-0.0003***	(0.00001)					-0.0003***	(0.00001)					-0.0003***	(0.00001)					-0.0002***	(0.00001)
Poverty rate in 2000					-0.0003***	(0.00003)					-0.0003***	(0.00003)					-0.0003***	(0.00003)					-0.0003***	(0.00003)
Number of new units - other type of housing (log-transformed)					0.001***	(0.0003)					0.003***	(0.0003)					0.001***	(0.0003)					-0.001***	(0.0003)
Percent of units covered by tenant protections					-0.015***	(0.001)					-0.015***	(0.001)					-0.016***	(0.001)					-0.016***	(0.001)
Avg. outmigration rate for 3 previous years					0.031***	(0.001)					0.030***	(0.001)					0.031***	(0.001)					0.030***	(0.001)
Avg. inmigration rate for 3 previous years					0.016***	(0.001)					0.015***	(0.001)					0.014***	(0.001)					0.015***	(0.001)
Oakland					0.007***	(0.001)					0.008***	(0.001)					0.009***	(0.001)					0.009***	(0.001)
San Francisco					0.001*	(0.001)					0.001	(0.001)					0.003***	(0.001)					0.005***	(0.001)
San Jose					0.010***	(0.001)					0.010***	(0.001)					0.010***	(0.001)					0.012***	(0.001)
South Bay					0.013***	(0.001)					0.011***	(0.001)					0.012***	(0.001)					0.014***	(0.001)
High * Number of new units			0.002***	(0.0004)	-0.002***	(0.001)			0.004***	(0.0004)	0.001	(0.001)			0.004***	(0.0004)	0.001*	(0.001)			0.002***	(0.0004)	-0.0003	(0.001)
Low * Number of new units			-0.001***	(0.0004)	0.002***	(0.001)			-0.001***	(0.0004)	-0.0002	(0.001)			-0.001***	(0.0004)	0.001**	(0.001)			-0.003***	(0.0004)	0.001**	(0.001)
Very Low * Number of new units			-0.002***	(0.0004)	-0.001**	(0.001)			-0.003***	(0.0004)	-0.005***	(0.001)			-0.003***	(0.0004)	-0.004***	(0.001)			-0.004***	(0.0004)	-0.001**	(0.001)
Constant	0.130***	(0.0004)	0.206***	(0.001)	0.222***	(0.002)	0.128***	(0.0004)	0.203***	(0.001)	0.219***	(0.002)	0.128***	(0.0004)	0.203***	(0.001)	0.220***	(0.002)	0.130***	(0.0004)	0.203***	(0.001)	0.221***	(0.002)
Observations	4015932		3256166		2773775		4011126		3253703		2773775		3990502		3241751		2773775		3875902		3159838		2773775	
R2	0.012		0.083		0.080		0.013		0.084		0.081		0.013		0.083		0.081		0.012		0.082		0.080	
Adjusted R2	0.012		0.083		0.080		0.013		0.084		0.081		0.013		0.083		0.081		0.012		0.082		0.080	
Residual Std. Error	0.361 (df = 4015927)		0.328 (df = 3256140)		0.313 (df = 2773731)		0.361 (df = 4011121)		0.327 (df = 3253677)		0.313 (df = 2773731)		0.360 (df = 3990497)		0.327 (df = 3241725)		0.313 (df = 2773731)		0.359 (df = 3875897)		0.326 (df = 3159812)		0.313 (df = 2773731)	
F Statistic	11,841.350*** (df = 4; 40159		11,768.800*** (df = 25; 3256		5,643.768*** (df = 43; 27737		13,097.860*** (df = 4; 40111		11,866.200*** (df = 25; 3253		5,695.636*** (df = 43; 27737		12,751.540*** (df = 4; 39904		11,780.070*** (df = 25; 3241		5,682.189*** (df = 43; 27737		11,280.500*** (df = 4; 38758		11,311.040*** (df = 25; 3159		5,634.959*** (df = 43; 27737	

Source: Infogroup, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Table D2b Inmigration – Subsidized

Outmigration	No lag						1-year lag						2-year lag						4-year lag					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3		Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE
Number of new units (log-transformed)	0.003***	(0.0002)	0.008***	(0.001)	0.009***	(0.001)	0.005***	(0.0002)	0.011***	(0.001)	0.013***	(0.001)	0.003***	(0.0002)	0.007***	(0.001)	0.002*	(0.001)	-0.0005**	(0.0002)	0.004***	(0.001)	0.004***	(0.001)
High income	0.008***	(0.001)	0.011***	(0.001)	0.005***	(0.001)	0.007***	(0.001)	0.011***	(0.001)	0.005***	(0.001)	0.008***	(0.001)	0.012***	(0.001)	0.005***	(0.001)	0.007***	(0.001)	0.011***	(0.001)	0.005***	(0.001)
Low income	-0.024***	(0.0005)	-0.008***	(0.001)	-0.004***	(0.001)	-0.024***	(0.0005)	-0.008***	(0.001)	-0.004***	(0.001)	-0.024***	(0.0005)	-0.008***	(0.001)	-0.004***	(0.001)	-0.024***	(0.0005)	-0.008***	(0.001)	-0.004***	(0.001)
Very low income	-0.069***	(0.0005)	-0.032***	(0.001)	-0.022***	(0.001)	-0.069***	(0.0005)	-0.032***	(0.001)	-0.022***	(0.001)	-0.069***	(0.0005)	-0.032***	(0.001)	-0.022***	(0.001)	-0.069***	(0.0005)	-0.032***	(0.001)	-0.022***	(0.001)
Household head age 30-34			-0.015***	(0.001)	-0.016***	(0.001)			-0.015***	(0.001)	-0.016***	(0.001)			-0.015***	(0.001)	-0.016***	(0.001)			-0.015***	(0.001)	-0.016***	(0.001)
Household head age 35-39			-0.041***	(0.001)	-0.042***	(0.001)			-0.041***	(0.001)	-0.042***	(0.001)			-0.041***	(0.001)	-0.042***	(0.001)			-0.041***	(0.001)	-0.042***	(0.001)
Household head age 40-44			-0.058***	(0.001)	-0.059***	(0.001)			-0.058***	(0.001)	-0.058***	(0.001)			-0.058***	(0.001)	-0.058***	(0.001)			-0.058***	(0.001)	-0.059***	(0.001)
Household head age 45-49			-0.063***	(0.001)	-0.062***	(0.001)			-0.063***	(0.001)	-0.062***	(0.001)			-0.063***	(0.001)	-0.062***	(0.001)			-0.063***	(0.001)	-0.062***	(0.001)
Household head age 50-54			-0.059***	(0.001)	-0.057***	(0.001)			-0.058***	(0.001)	-0.057***	(0.001)			-0.058***	(0.001)	-0.057***	(0.001)			-0.059***	(0.001)	-0.057***	(0.001)
Household head age 55-59			-0.052***	(0.001)	-0.051***	(0.001)			-0.052***	(0.001)	-0.051***	(0.001)			-0.052***	(0.001)	-0.051***	(0.001)			-0.051***	(0.001)	-0.051***	(0.001)
Household head age 60-64			-0.045***	(0.001)	-0.045***	(0.001)			-0.045***	(0.001)	-0.044***	(0.001)			-0.044***	(0.001)	-0.045***	(0.001)			-0.045***	(0.001)	-0.045***	(0.001)
Household head age 65-69			-0.020***	(0.001)	-0.025***	(0.001)			-0.020***	(0.001)	-0.025***	(0.001)			-0.020***	(0.001)	-0.025***	(0.001)			-0.021***	(0.001)	-0.025***	(0.001)
Household head age 65+			-0.037***	(0.001)	-0.036***	(0.001)			-0.037***	(0.001)	-0.036***	(0.001)			-0.037***	(0.001)	-0.036***	(0.001)			-0.037***	(0.001)	-0.037***	(0.001)
Household head age 70-74			-0.019***	(0.001)	-0.024***	(0.001)			-0.019***	(0.001)	-0.024***	(0.001)			-0.019***	(0.001)	-0.024***	(0.001)			-0.020***	(0.001)	-0.024***	(0.001)
Household head age 75+			-0.002**	(0.001)	-0.007***	(0.001)			-0.002**	(0.001)	-0.006***	(0.001)			-0.002**	(0.001)	-0.007***	(0.001)			-0.002**	(0.001)	-0.007***	(0.001)
Black			-0.001	(0.001)	0.003***	(0.001)			-0.001	(0.001)	0.003***	(0.001)			-0.001	(0.001)	0.003***	(0.001)			-0.0003	(0.001)	0.002***	(0.001)
Latinx			-0.013***	(0.0005)	-0.004***	(0.001)			-0.013***	(0.0005)	-0.004***	(0.001)			-0.013***	(0.0005)	-0.004***	(0.001)			-0.012***	(0.0005)	-0.004***	(0.001)
White			0.019***	(0.0004)	0.019***	(0.0004)			0.019***	(0.0004)	0.020***	(0.0004)			0.019***	(0.0004)	0.020***	(0.0004)			0.020***	(0.0004)	0.019***	(0.0004)
Length of residence			-0.012***	(0.00003)	-0.011***	(0.00003)			-0.012***	(0.00003)	-0.011***	(0.00003)			-0.012***	(0.00003)	-0.011***	(0.00003)			-0.012***	(0.00003)	-0.011***	(0.00003)
Number of children			-0.002***	(0.0004)	-0.004***	(0.0004)			-0.001***	(0.0004)	-0.004***	(0.0004)			-0.002***	(0.0004)	-0.004***	(0.0004)			-0.002***	(0.0004)	-0.004***	(0.0004)
Non-married			-0.028***	(0.0005)	-0.028***	(0.001)			-0.028***	(0.0005)	-0.028***	(0.001)			-0.028***	(0.0005)	-0.028***	(0.001)			-0.027***	(0.0005)	-0.028***	(0.001)
Number of adults			0.020***	(0.0003)	0.016***	(0.0004)			0.020***	(0.0003)	0.016***	(0.0004)			0.020***	(0.0003)	0.016***	(0.0004)			0.019***	(0.0003)	0.016***	(0.0004)
Percent vacant in 2000					0.0001**	(0.00005)					0.0001	(0.00005)					0.0001	(0.00005)					0.0001*	(0.00005)
Percent of housing built in past 20 years as of 2000					0.0001***	(0.00001)					0.00004***	(0.00001)					0.00004***	(0.00001)					0.0001***	(0.00001)
Ownership rate in 2000					-0.0001***	(0.00001)					-0.0001***	(0.00001)					-0.0001***	(0.00001)					-0.0001***	(0.00001)
Percent foreign-born in 2000					-0.0001***	(0.00002)					-0.0001***	(0.00002)					-0.0001***	(0.00002)					-0.0001***	(0.00002)
Median home value in 2000					-0.00000**	(0.000)					-0.00000**	(0.000)					-0.00000**	(0.000)					-0.00000**	(0.000)
Median gross rent in 2000					-0.00002**	(0.00000)					-0.00002**	(0.00000)					-0.00002**	(0.00000)					-0.00002**	(0.00000)
Number of subsidized units in 2016					-0.00001**	(0.00000)					-0.00001**	(0.00000)					-0.00001**	(0.00000)					-0.00001**	(0.00000)
Percent college-educated in 2000					0.0004***	(0.00002)					0.0004***	(0.00002)					0.0004***	(0.00002)					0.0004***	(0.00002)
Percent Hispanic in 2000					-0.0003***	(0.00001)					-0.0003***	(0.00001)					-0.0003***	(0.00001)					-0.0002***	(0.00001)
Poverty rate in 2000					-0.0003***	(0.00003)					-0.0003***	(0.00003)					-0.0003***	(0.00003)					-0.0003***	(0.00003)
Number of new units - other type of housing (log-transformed)					0.004***	(0.0002)					0.008***	(0.0002)					0.007***	(0.0002)					0.003***	(0.0002)
Percent of units covered by tenant protections					-0.015***	(0.001)					-0.014***	(0.001)					-0.016***	(0.001)					-0.016***	(0.001)
Avg. outmigration rate for 3 previous years					0.031***	(0.001)					0.030***	(0.001)					0.031***	(0.001)					0.030***	(0.001)
Avg. inmigration rate for 3 previous years					0.015***	(0.001)					0.015***	(0.001)					0.014***	(0.001)					0.015***	(0.001)
Oakland					0.007***	(0.001)					0.008***	(0.001)					0.009***	(0.001)					0.009***	(0.001)
San Francisco					0.001*	(0.001)					0.001	(0.001)					0.003***	(0.001)					0.005***	(0.001)
San Jose					0.010***	(0.001)					0.010***	(0.001)					0.010***	(0.001)					0.012***	(0.001)
South Bay					0.014***	(0.001)					0.012***	(0.001)					0.012***	(0.001)					0.014***	(0.001)
High * Number of new units			-0.002*	(0.001)	-0.010***	(0.001)			-0.005***	(0.001)	-0.010***	(0.001)			-0.005***	(0.001)	-0.003**	(0.002)			-0.005***	(0.001)	-0.007***	(0.002)
Low * Number of new units			-0.003***	(0.001)	-0.005***	(0.001)			-0.004***	(0.001)	-0.007***	(0.001)			-0.002**	(0.001)	0.002	(0.001)			-0.003***	(0.001)	-0.002	(0.001)
Very Low * Number of new units			-0.008***	(0.001)	-0.010***	(0.001)			-0.008***	(0.001)	-0.011***	(0.001)			-0.006***	(0.001)	-0.002*	(0.001)			-0.006***	(0.001)	-0.006***	(0.001)
Constant	0.138***	(0.0004)	0.212***	(0.001)	0.222***	(0.002)	0.138***	(0.0004)	0.212***	(0.001)	0.219***	(0.002)	0.138***	(0.0004)	0.211***	(0.001)	0.220***	(0.002)	0.138***	(0.0004)	0.210***	(0.001)	0.221***	(0.002)
Observations	4015932		3256166		2773775		4011126		3253703		2773775		3990502		3241751		2773775		3875902		3159838		2773775	
R2	0.010		0.082		0.080		0.010		0.082		0.081		0.010		0.082		0.081		0.010		0.082		0.080	
Adjusted R2	0.010		0.082		0.080		0.010		0.082		0.081		0.010		0.082		0.081		0.010		0.082		0.080	
Residual Std. Error	0.361 (df = 4015927)		0.328 (df = 3256140)		0.313 (df = 2773731)		0.361 (df = 4011121)		0.328 (df = 3253677)		0.313 (df = 2773731)		0.361 (df = 3990497)		0.327 (df = 3241725)		0.313 (df = 2773731)		0.359 (df = 3875897)		0.326 (df = 3159812)		0.313 (df = 2773731)	
F Statistic	10,365.890*** (df = 4; 401592		11,672.900*** (df = 25; 32561		5,644.783*** (df = 43; 277373		10,461.730*** (df = 4; 401112		11,668.280*** (df = 25; 32536		5,692.793*** (df = 43; 277373		10,265.340*** (df = 4; 399049		11,595.070*** (df = 25; 32417		5,677.251*** (df = 43; 277373		9,860.465*** (df = 4; 3875897		11,224.430*** (df = 25; 31598		5,635.394*** (df = 43; 277373	

Source: Infogroup, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Table D3a Outmigration – Just Cause

Outmigration	No lag						1-year lag					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE
Percent of units covered	-0.015***	(0.0004)	-0.023***	(0.001)	-0.025***	(0.001)	-0.016***	(0.0004)	-0.024***	(0.001)	-0.029***	(0.001)
High income	-0.012***	(0.001)	-0.018***	(0.001)	-0.018***	(0.001)	-0.012***	(0.001)	-0.018***	(0.001)	-0.019***	(0.001)
Low income	-0.015***	(0.001)	-0.018***	(0.001)	-0.021***	(0.001)	-0.015***	(0.001)	-0.018***	(0.001)	-0.021***	(0.001)
Very low income	-0.062***	(0.0005)	-0.057***	(0.001)	-0.057***	(0.001)	-0.062***	(0.0005)	-0.057***	(0.001)	-0.057***	(0.001)
Household head age 30-34			-0.016***	(0.001)	-0.016***	(0.001)			-0.016***	(0.001)	-0.016***	(0.001)
Household head age 35-39			-0.035***	(0.001)	-0.034***	(0.001)			-0.035***	(0.001)	-0.034***	(0.001)
Household head age 40-44			-0.050***	(0.001)	-0.048***	(0.001)			-0.050***	(0.001)	-0.048***	(0.001)
Household head age 45-49			-0.058***	(0.001)	-0.056***	(0.001)			-0.058***	(0.001)	-0.056***	(0.001)
Household head age 50-54			-0.061***	(0.001)	-0.059***	(0.001)			-0.061***	(0.001)	-0.059***	(0.001)
Household head age 55-59			-0.061***	(0.001)	-0.059***	(0.001)			-0.061***	(0.001)	-0.059***	(0.001)
Household head age 60-64			-0.058***	(0.001)	-0.056***	(0.001)			-0.058***	(0.001)	-0.056***	(0.001)
Household head age 65-69			-0.046***	(0.001)	-0.046***	(0.001)			-0.046***	(0.001)	-0.046***	(0.001)
Household head age 65+			-0.060***	(0.001)	-0.057***	(0.001)			-0.060***	(0.001)	-0.057***	(0.001)
Household head age 70-74			-0.051***	(0.001)	-0.051***	(0.001)			-0.051***	(0.001)	-0.051***	(0.001)
Household head age 75+			-0.050***	(0.001)	-0.049***	(0.001)			-0.050***	(0.001)	-0.049***	(0.001)
Black			0.006***	(0.001)	0.008***	(0.001)			0.006***	(0.001)	0.008***	(0.001)
Latinx			-0.003***	(0.001)	-0.0002	(0.001)			-0.003***	(0.001)	-0.0002	(0.001)
White			0.029***	(0.0004)	0.025***	(0.0004)			0.030***	(0.0004)	0.025***	(0.0004)
Length of residence			-0.005***	(0.00003)	-0.005***	(0.00003)			-0.005***	(0.00003)	-0.005***	(0.00003)
Number of children			-0.009***	(0.0005)	-0.009***	(0.0005)			-0.009***	(0.0005)	-0.009***	(0.0005)
Non-married			0.005***	(0.001)	-0.002***	(0.001)			0.005***	(0.001)	-0.002***	(0.001)
Number of adults			0.007***	(0.0004)	0.005***	(0.0004)			0.007***	(0.0004)	0.005***	(0.0004)
Percent vacant in 2000					-0.0003***	(0.0001)					-0.0003***	(0.0001)
Percent of housing built in past 20 years as of 2000					-0.00002	(0.00001)					-0.00003**	(0.00001)
Ownership rate in 2000					-0.0004***	(0.00001)					-0.0004***	(0.00001)
Percent foreign-born in 2000					-0.0002***	(0.00002)					-0.0002***	(0.00002)
Median home value in 2000					-0.00000**	(0.000)					-0.00000**	(0.000)
Median gross rent in 2000					-0.00003**	(0.00000)					-0.00003**	(0.00000)
Number of subsidized units in 2016					-0.00001**	(0.00000)					-0.00001**	(0.00000)
Percent college-educated in 2000					0.0004***	(0.00002)					0.0004***	(0.00002)
Percent Hispanic in 2000					-0.0001***	(0.00001)					-0.0001***	(0.00001)
Poverty rate in 2000					-0.001***	(0.00003)					-0.001***	(0.00003)
Avg. number of new market-rate units built in 3 previous years					0.005***	(0.0003)					0.005***	(0.0003)
Avg. number of new subsidized units built in 3 previous years					-0.003***	(0.0005)					-0.003***	(0.0005)
Avg. outmigration rate for 3 previous years					0.035***	(0.001)					0.035***	(0.001)
Avg. inmigration rate for 3 previous years					-0.004***	(0.001)					-0.004***	(0.001)
Oakland					0.004***	(0.001)					0.006***	(0.001)
San Francisco					0.001	(0.001)					0.003***	(0.001)
San Jose					0.014***	(0.001)					0.014***	(0.001)
South Bay					0.015***	(0.001)					0.015***	(0.001)
High * Percent of units			0.018***	(0.002)	0.019***	(0.002)			0.019***	(0.002)	0.020***	(0.002)
Low * Percent of units			0.016***	(0.001)	0.019***	(0.002)			0.015***	(0.001)	0.018***	(0.002)
Very low * Percent of units			0.017***	(0.001)	0.017***	(0.001)			0.017***	(0.001)	0.018***	(0.001)
Constant	0.134***	(0.0005)	0.167***	(0.001)	0.215***	(0.002)	0.135***	(0.0005)	0.167***	(0.001)	0.215***	(0.002)
Observations	3533678		2868366		2845535		3533678		2868366		2845535	
R2	0.009		0.033		0.035		0.009		0.033		0.035	
Adjusted R2	0.009		0.033		0.035		0.009		0.033		0.035	
Residual Std. Error	0.359 (df = 3533673)		0.343 (df = 2868340)		0.340 (df = 2845491)		0.359 (df = 3533673)		0.343 (df = 2868340)		0.340 (df = 2845491)	
F Statistic	7,588.373*** (df = 4; 3533673)		3,903.629*** (df = 25; 286834		2,382.863*** (df = 43; 284549		7,641.340*** (df = 4; 3533673)		3,908.246*** (df = 25; 286834		2,385.641*** (df = 43; 284549	
Note:	*p<0.1; **p<0.05; ***p<0.01											

Source: Infogroup, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Table D3b Outmigration – Rent Stabilization

Outmigration	No lag						1-year lag					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE
Percent of units covered	-0.010***	(0.0005)	0.005***	(0.001)	-0.001	(0.002)	-0.011***	(0.0005)	0.004**	(0.001)	-0.002	(0.002)
High income	-0.013***	(0.001)	-0.019***	(0.001)	-0.018***	(0.001)	-0.013***	(0.001)	-0.019***	(0.001)	-0.018***	(0.001)
Low income	-0.014***	(0.001)	-0.012***	(0.001)	-0.014***	(0.001)	-0.014***	(0.001)	-0.012***	(0.001)	-0.014***	(0.001)
Very low income	-0.061***	(0.0005)	-0.044***	(0.001)	-0.043***	(0.001)	-0.060***	(0.0005)	-0.044***	(0.001)	-0.043***	(0.001)
Household head age 30-34			-0.016***	(0.001)	-0.016***	(0.001)			-0.016***	(0.001)	-0.016***	(0.001)
Household head age 35-39			-0.035***	(0.001)	-0.034***	(0.001)			-0.035***	(0.001)	-0.034***	(0.001)
Household head age 40-44			-0.050***	(0.001)	-0.048***	(0.001)			-0.050***	(0.001)	-0.048***	(0.001)
Household head age 45-49			-0.058***	(0.001)	-0.056***	(0.001)			-0.058***	(0.001)	-0.056***	(0.001)
Household head age 50-54			-0.061***	(0.001)	-0.059***	(0.001)			-0.061***	(0.001)	-0.059***	(0.001)
Household head age 55-59			-0.061***	(0.001)	-0.059***	(0.001)			-0.061***	(0.001)	-0.059***	(0.001)
Household head age 60-64			-0.057***	(0.001)	-0.056***	(0.001)			-0.058***	(0.001)	-0.056***	(0.001)
Household head age 65-69			-0.046***	(0.001)	-0.046***	(0.001)			-0.046***	(0.001)	-0.046***	(0.001)
Household head age 65+			-0.060***	(0.001)	-0.056***	(0.001)			-0.060***	(0.001)	-0.056***	(0.001)
Household head age 70-74			-0.051***	(0.001)	-0.051***	(0.001)			-0.051***	(0.001)	-0.051***	(0.001)
Household head age 75+			-0.049***	(0.001)	-0.049***	(0.001)			-0.049***	(0.001)	-0.049***	(0.001)
Black			0.005***	(0.001)	0.007***	(0.001)			0.005***	(0.001)	0.007***	(0.001)
Latinx			-0.003***	(0.001)	-0.0004	(0.001)			-0.003***	(0.001)	-0.0004	(0.001)
White			0.028***	(0.0004)	0.025***	(0.0004)			0.028***	(0.0004)	0.025***	(0.0004)
Length of residence			-0.005***	(0.00003)	-0.005***	(0.00003)			-0.005***	(0.00003)	-0.005***	(0.00003)
Number of children			-0.009***	(0.0005)	-0.009***	(0.0005)			-0.009***	(0.0005)	-0.009***	(0.0005)
Non-married			0.003***	(0.001)	-0.003***	(0.001)			0.003***	(0.001)	-0.003***	(0.001)
Number of adults			0.007***	(0.0004)	0.005***	(0.0004)			0.007***	(0.0004)	0.005***	(0.0004)
Percent vacant in 2000					-0.0003***	(0.0001)					-0.0003***	(0.0001)
Percent of housing built in past 20 years as of 2000					0.00005***	(0.00001)					0.00004***	(0.00001)
Ownership rate in 2000					-0.0004***	(0.00001)					-0.0004***	(0.00001)
Percent foreign-born in 2000					-0.0001***	(0.00002)					-0.0001***	(0.00002)
Median home value in 2000					-0.00000**	(0.000)					-0.00000**	(0.000)
Median gross rent in 2000					-0.00002**	(0.00000)					-0.00002**	(0.00000)
Number of subsidized units in 2016					-0.00001**	(0.00000)					-0.00001**	(0.00000)
Percent college-educated in 2000					0.0004***	(0.00002)					0.0004***	(0.00002)
Percent Hispanic in 2000					-0.0001***	(0.00001)					-0.0001***	(0.00001)
Poverty rate in 2000					-0.0005***	(0.00003)					-0.0005***	(0.00003)
Avg. number of new market-rate units built in 3 previous years					0.005***	(0.0003)					0.005***	(0.0003)
Avg. number of new subsidized units built in 3 previous years					-0.002***	(0.0005)					-0.002***	(0.0005)
Avg. outmigration rate for 3 previous years					0.034***	(0.001)					0.034***	(0.001)
Avg. inmigration rate for 3 previous years					-0.003**	(0.001)					-0.003**	(0.001)
Oakland					0.003***	(0.001)					0.003***	(0.001)
San Francisco					-0.002**	(0.001)					-0.001**	(0.001)
San Jose					0.017***	(0.001)					0.017***	(0.001)
South Bay					0.017***	(0.001)					0.017***	(0.001)
High * Percent of units			0.021***	(0.002)	0.023***	(0.002)			0.022***	(0.002)	0.023***	(0.002)
Low * Percent of units			0.005***	(0.002)	0.006***	(0.002)			0.005***	(0.002)	0.006***	(0.002)
Very low * Percent of units			-0.013***	(0.002)	-0.014***	(0.002)			-0.012***	(0.002)	-0.013***	(0.002)
Constant	0.131***	(0.0005)	0.157***	(0.001)	0.205***	(0.002)	0.131***	(0.0005)	0.158***	(0.001)	0.206***	(0.002)
Observations	3533678		2868366		2845535		3533678		2868366		2845535	
R2	0.008		0.033		0.035		0.008		0.033		0.035	
Adjusted R2	0.008		0.033		0.035		0.008		0.033		0.035	
Residual Std. Error	0.359 (df = 3533673)		0.343 (df = 2868340)		0.340 (df = 2845491)		0.359 (df = 3533673)		0.343 (df = 2868340)		0.340 (df = 2845491)	
F Statistic	7,344.225*** (df = 4; 3533673)		3,901.194*** (df = 25; 286834		2,388.013*** (df = 43; 284549		7,355.777*** (df = 4; 3533673)		3,900.545*** (df = 25; 286834		2,388.098*** (df = 43; 284549	
Note:	*p<0.1; **p<0.05; ***p<0.01											

Source: Infogroup, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Table D4a Inmigration – Just Cause

Outmigration	No lag						1-year lag					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE
Percent of units covered	-0.038***	(0.0004)	-0.040***	(0.001)	-0.037***	(0.001)	-0.038***	(0.0004)	-0.040***	(0.001)	-0.037***	(0.001)
High income	0.002***	(0.001)	0.014***	(0.001)	0.007***	(0.001)	0.002***	(0.001)	0.015***	(0.001)	0.008***	(0.001)
Low income	-0.025***	(0.001)	-0.024***	(0.001)	-0.018***	(0.001)	-0.025***	(0.001)	-0.023***	(0.001)	-0.018***	(0.001)
Very low income	-0.067***	(0.001)	-0.053***	(0.001)	-0.039***	(0.001)	-0.068***	(0.001)	-0.053***	(0.001)	-0.039***	(0.001)
Household head age 30-34			-0.016***	(0.001)	-0.016***	(0.001)			-0.016***	(0.001)	-0.016***	(0.001)
Household head age 35-39			-0.043***	(0.001)	-0.042***	(0.001)			-0.043***	(0.001)	-0.042***	(0.001)
Household head age 40-44			-0.060***	(0.001)	-0.058***	(0.001)			-0.060***	(0.001)	-0.058***	(0.001)
Household head age 45-49			-0.064***	(0.001)	-0.062***	(0.001)			-0.064***	(0.001)	-0.062***	(0.001)
Household head age 50-54			-0.059***	(0.001)	-0.057***	(0.001)			-0.059***	(0.001)	-0.057***	(0.001)
Household head age 55-59			-0.052***	(0.001)	-0.051***	(0.001)			-0.052***	(0.001)	-0.051***	(0.001)
Household head age 60-64			-0.045***	(0.001)	-0.045***	(0.001)			-0.045***	(0.001)	-0.044***	(0.001)
Household head age 65-69			-0.024***	(0.001)	-0.025***	(0.001)			-0.024***	(0.001)	-0.025***	(0.001)
Household head age 65+			-0.038***	(0.001)	-0.036***	(0.001)			-0.038***	(0.001)	-0.036***	(0.001)
Household head age 70-74			-0.023***	(0.001)	-0.024***	(0.001)			-0.023***	(0.001)	-0.024***	(0.001)
Household head age 75+			-0.005***	(0.001)	-0.007***	(0.001)			-0.005***	(0.001)	-0.007***	(0.001)
Black			0.003***	(0.001)	0.003***	(0.001)			0.002***	(0.001)	0.003***	(0.001)
Latinx			-0.008***	(0.0005)	-0.004***	(0.001)			-0.008***	(0.0005)	-0.004***	(0.001)
White			0.024***	(0.0004)	0.020***	(0.0004)			0.024***	(0.0004)	0.020***	(0.0004)
Length of residence			-0.011***	(0.00003)	-0.011***	(0.00003)			-0.011***	(0.00003)	-0.011***	(0.00003)
Number of children			-0.005***	(0.0004)	-0.004***	(0.0004)			-0.005***	(0.0004)	-0.004***	(0.0004)
Non-married			-0.021***	(0.001)	-0.028***	(0.001)			-0.020***	(0.001)	-0.028***	(0.001)
Number of adults			0.017***	(0.0004)	0.016***	(0.0004)			0.017***	(0.0004)	0.016***	(0.0004)
Percent vacant in 2000					0.0001*	(0.00005)					0.0001*	(0.00005)
Percent of housing built in past 20 years as of 2000					-0.0001***	(0.00001)					-0.0001***	(0.00001)
Ownership rate in 2000					-0.0001***	(0.00001)					-0.0001***	(0.00001)
Percent foreign-born in 2000					-0.0001***	(0.00002)					-0.0001***	(0.00002)
Median home value in 2000					-0.000***	(0.000)					-0.000***	(0.000)
Median gross rent in 2000					-0.00002**	(0.00000)					-0.00002**	(0.00000)
Number of subsidized units in 2016					-0.00001**	(0.00000)					-0.00001**	(0.00000)
Percent college-educated in 2000					0.0004***	(0.00002)					0.0004***	(0.00002)
Percent Hispanic in 2000					-0.0002***	(0.00001)					-0.0002***	(0.00001)
Poverty rate in 2000					-0.0004***	(0.00003)					-0.0004***	(0.00003)
Avg. number of new market-rate units built in 3 previous years					0.012***	(0.0002)					0.012***	(0.0002)
Avg. number of new subsidized units built in 3 previous years					0.003***	(0.0004)					0.003***	(0.0004)
Avg. outmigration rate for 3 previous years					0.031***	(0.001)					0.031***	(0.001)
Avg. inmigration rate for 3 previous years					0.012***	(0.001)					0.012***	(0.001)
Oakland					0.005***	(0.001)					0.005***	(0.001)
San Francisco					-0.002**	(0.001)					-0.001*	(0.001)
San Jose					0.007***	(0.001)					0.007***	(0.001)
South Bay					0.007***	(0.001)					0.007***	(0.001)
High * Percent of units			-0.009***	(0.002)	-0.002	(0.002)			-0.010***	(0.002)	-0.003	(0.002)
Low * Percent of units			0.032***	(0.001)	0.029***	(0.002)			0.032***	(0.001)	0.029***	(0.002)
Very low * Percent of units			0.040***	(0.001)	0.035***	(0.001)			0.041***	(0.001)	0.036***	(0.001)
Constant	0.153***	(0.0005)	0.220***	(0.001)	0.232***	(0.002)	0.152***	(0.0005)	0.220***	(0.001)	0.231***	(0.002)
Observations	3422623		2797226		2773775		3422623		2797226		2773775	
R2	0.012		0.080		0.081		0.012		0.080		0.081	
Adjusted R2	0.012		0.080		0.081		0.012		0.080		0.081	
Residual Std. Error	0.349 (df = 3422618)		0.316 (df = 2797200)		0.313 (df = 2773731)		0.349 (df = 3422618)		0.316 (df = 2797200)		0.313 (df = 2773731)	
F Statistic	10,115.770*** (df = 4; 342261		9,692.678*** (df = 25; 279720		5,715.020*** (df = 43; 277373		10,117.780*** (df = 4; 342261		9,696.261*** (df = 25; 279720		5,716.511*** (df = 43; 277373	
Note:	*p<0.1; **p<0.05; ***p<0.01											

Source: Infogroup, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Table D4a Inmigration – Rent Stabilization

Outmigration	No lag						1-year lag					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE
Percent of units covered	-0.048***	(0.001)	-0.029***	(0.001)	-0.027***	(0.002)	-0.049***	(0.001)	-0.031***	(0.001)	-0.029***	(0.002)
High income	0.001**	(0.001)	0.012***	(0.001)	0.005***	(0.001)	0.002**	(0.001)	0.012***	(0.001)	0.006***	(0.001)
Low income	-0.022***	(0.001)	-0.016***	(0.001)	-0.011***	(0.001)	-0.022***	(0.001)	-0.017***	(0.001)	-0.012***	(0.001)
Very low income	-0.063***	(0.001)	-0.042***	(0.001)	-0.030***	(0.001)	-0.063***	(0.001)	-0.042***	(0.001)	-0.031***	(0.001)
Household head age 30-34			-0.016***	(0.001)	-0.016***	(0.001)			-0.016***	(0.001)	-0.016***	(0.001)
Household head age 35-39			-0.043***	(0.001)	-0.042***	(0.001)			-0.043***	(0.001)	-0.042***	(0.001)
Household head age 40-44			-0.060***	(0.001)	-0.058***	(0.001)			-0.060***	(0.001)	-0.058***	(0.001)
Household head age 45-49			-0.064***	(0.001)	-0.062***	(0.001)			-0.064***	(0.001)	-0.062***	(0.001)
Household head age 50-54			-0.059***	(0.001)	-0.057***	(0.001)			-0.059***	(0.001)	-0.057***	(0.001)
Household head age 55-59			-0.052***	(0.001)	-0.051***	(0.001)			-0.052***	(0.001)	-0.051***	(0.001)
Household head age 60-64			-0.046***	(0.001)	-0.044***	(0.001)			-0.046***	(0.001)	-0.044***	(0.001)
Household head age 65-69			-0.024***	(0.001)	-0.025***	(0.001)			-0.024***	(0.001)	-0.025***	(0.001)
Household head age 65+			-0.038***	(0.001)	-0.036***	(0.001)			-0.038***	(0.001)	-0.036***	(0.001)
Household head age 70-74			-0.023***	(0.001)	-0.024***	(0.001)			-0.023***	(0.001)	-0.024***	(0.001)
Household head age 75+			-0.005***	(0.001)	-0.007***	(0.001)			-0.005***	(0.001)	-0.007***	(0.001)
Black			0.002***	(0.001)	0.003***	(0.001)			0.002***	(0.001)	0.003***	(0.001)
Latinx			-0.008***	(0.0005)	-0.004***	(0.001)			-0.008***	(0.0005)	-0.004***	(0.001)
White			0.023***	(0.0004)	0.020***	(0.0004)			0.023***	(0.0004)	0.020***	(0.0004)
Length of residence			-0.011***	(0.00003)	-0.011***	(0.00003)			-0.011***	(0.00003)	-0.011***	(0.00003)
Number of children			-0.004***	(0.0004)	-0.004***	(0.0004)			-0.004***	(0.0004)	-0.004***	(0.0004)
Non-married			-0.021***	(0.001)	-0.028***	(0.001)			-0.021***	(0.001)	-0.028***	(0.001)
Number of adults			0.017***	(0.0004)	0.016***	(0.0004)			0.017***	(0.0004)	0.016***	(0.0004)
Percent vacant in 2000					-0.00003	(0.00005)					-0.00003	(0.00005)
Percent of housing built in past 20 years as of 2000					0.00001	(0.00001)					0.00000	(0.00001)
Ownership rate in 2000					-0.0002***	(0.00001)					-0.0002***	(0.00001)
Percent foreign-born in 2000					-0.0001***	(0.00002)					-0.0001***	(0.00002)
Median home value in 2000					-0.000***	(0.000)					-0.000***	(0.000)
Median gross rent in 2000					-0.00002**	(0.00000)					-0.00002**	(0.00000)
Number of subsidized units in 2016					-0.00001**	(0.00000)					-0.00001**	(0.00000)
Percent college-educated in 2000					0.0004***	(0.00002)					0.0004***	(0.00002)
Percent Hispanic in 2000					-0.0002***	(0.00001)					-0.0002***	(0.00001)
Poverty rate in 2000					-0.0004***	(0.00003)					-0.0004***	(0.00003)
Avg. number of new market-rate units built in 3 previous years					0.012***	(0.0002)					0.012***	(0.0002)
Avg. number of new subsidized units built in 3 previous years					0.003***	(0.0004)					0.003***	(0.0004)
Avg. outmigration rate for 3 previous years					0.031***	(0.001)					0.031***	(0.001)
Avg. inmigration rate for 3 previous years					0.013***	(0.001)					0.012***	(0.001)
Oakland					0.005***	(0.001)					0.005***	(0.001)
San Francisco					-0.003***	(0.001)					-0.002***	(0.001)
San Jose					0.010***	(0.001)					0.010***	(0.001)
South Bay					0.010***	(0.001)					0.010***	(0.001)
High * Percent of units			-0.010***	(0.002)	-0.001	(0.002)			-0.010***	(0.002)	-0.002	(0.002)
Low * Percent of units			0.023***	(0.002)	0.019***	(0.002)			0.024***	(0.002)	0.021***	(0.002)
Very low * Percent of units			0.024***	(0.002)	0.022***	(0.002)			0.026***	(0.002)	0.023***	(0.002)
Constant	0.152***	(0.0005)	0.212***	(0.001)	0.228***	(0.002)	0.152***	(0.0005)	0.212***	(0.001)	0.229***	(0.002)
Observations	3422623		2797226		2773775		3422623		2797226		2773775	
R2	0.012		0.079		0.081		0.012		0.079		0.081	
Adjusted R2	0.012		0.079		0.081		0.012		0.079		0.081	
Residual Std. Error	0.349 (df = 3422618)		0.316 (df = 2797200)		0.313 (df = 2773731)		0.348 (df = 3422618)		0.316 (df = 2797200)		0.313 (df = 2773731)	
F Statistic	10,254.430*** (df = 4; 342261		9,637.267*** (df = 25; 279720		5,699.270*** (df = 43; 277373		10,327.270*** (df = 4; 342261		9,642.798*** (df = 25; 279720		5,701.677*** (df = 43; 277373	
Note:	*p<0.1; **p<0.05; ***p<0.01											

Source: Infogroup, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Appendix E. Renter Proxy, CCP

We separately examined residents younger than 65 years old in our sample who live in households without mortgages as a proxy for renters for all models. This sample can still include households who have paid off their mortgage.

New Production

Outmigration

The differences in results for new production and outmigration between the samples suggest that new market-rate development primarily keeps middle-high SES homeowners in place and that new subsidized housing may promote flight among higher-SES homeowners.

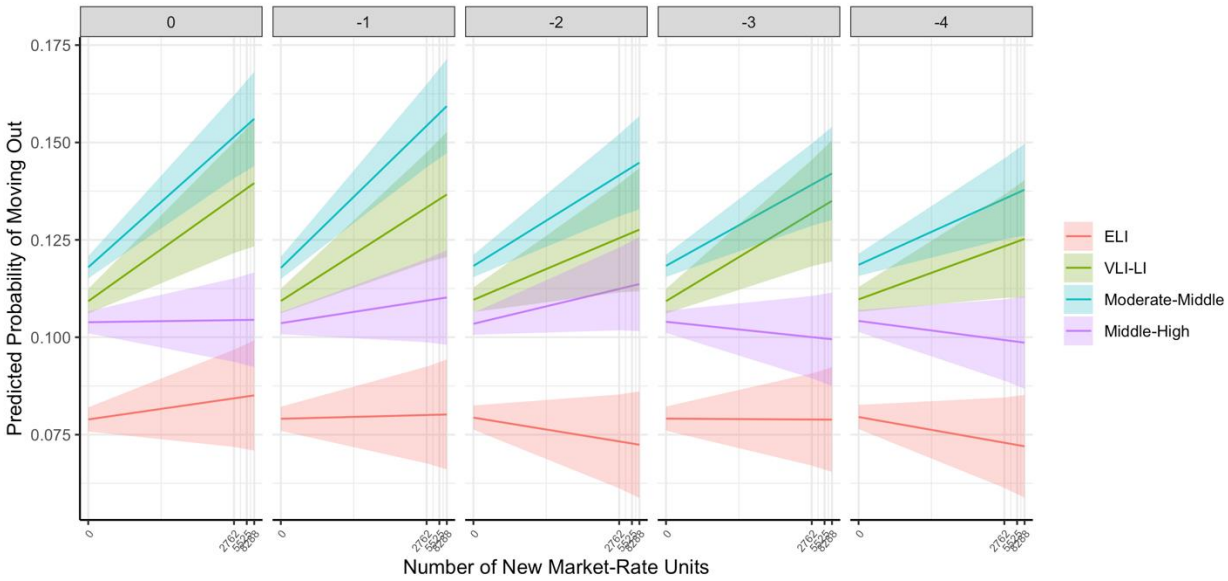
First, for new market-rate units, there is a weak positive effect 2 years after new market-rate construction is built. New market-rate construction increases the probability that VLI-LI and moderate-middle SES residents move out, with the effect lasting up to 4 years after new housing is built. For ELI residents in this sample, new market-rate housing is not associated with a greater probability of moving out in the year housing is built. Moreover, the probability that middle-high SES residents move out is significantly higher than for ELI residents in neighborhoods with new market-rate housing across most of the distribution in all years after the new housing is built, while the differences between ELI and middle-high SES residents in the sample including mortgage holders are slightly smaller.[31] For subsidized units, moderate-middle SES residents are also more likely to move out in the year they are built, in addition to the same years as the full sample. Middle-high SES residents are only more likely to move out in the same year that units are built.[32]

[31] In logistic regression models, results for ELI and moderate-middle SES residents are the same. VLI-LI residents are only more likely to move out in the same year, 1, and 3 years after. Middle-high SES residents are also more likely to move out 1 year after units are built, and effects are stronger than in the LPM results.

[32] In logistic regression models, results for ELI and VLI-LI residents are the same. Moderate-middle SES residents are only more likely to move out with new construction in the same year and 2 years after, while middle-high SES residents are more likely to move out in the same year, 1, and 4 years after units are built.

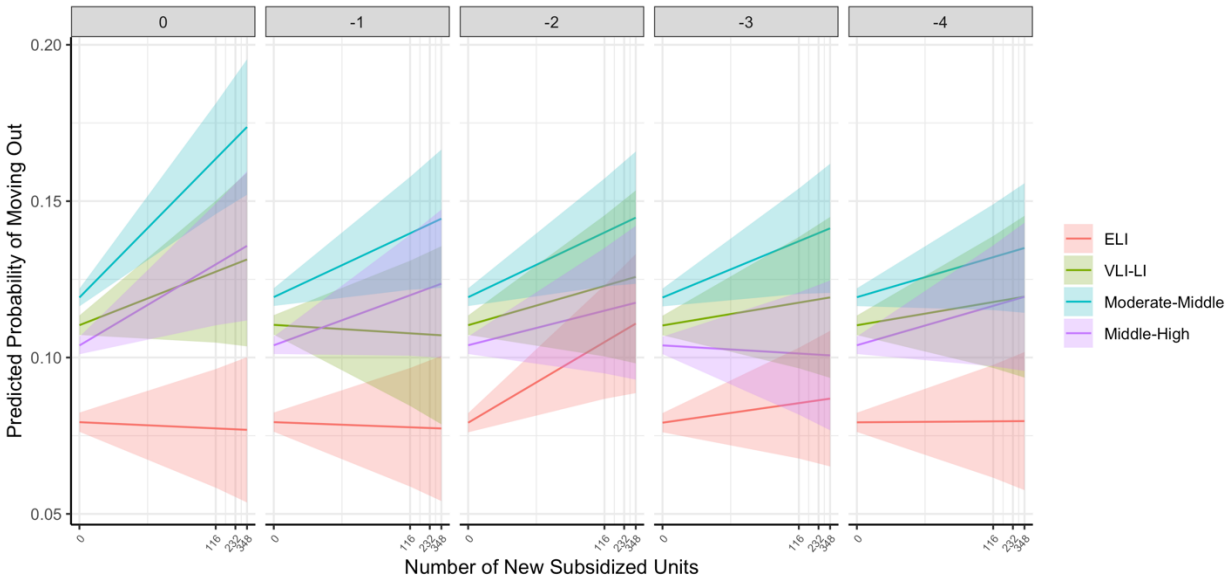
Figure E1. Predicted Probabilities by SES for Non-Mortgage Holders between Ages 25-64 of Moving Out from Block Groups by Number of New (a) Market-Rate, and (b) Subsidized Units

(a) Market-Rate



Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database.

(b) Subsidized



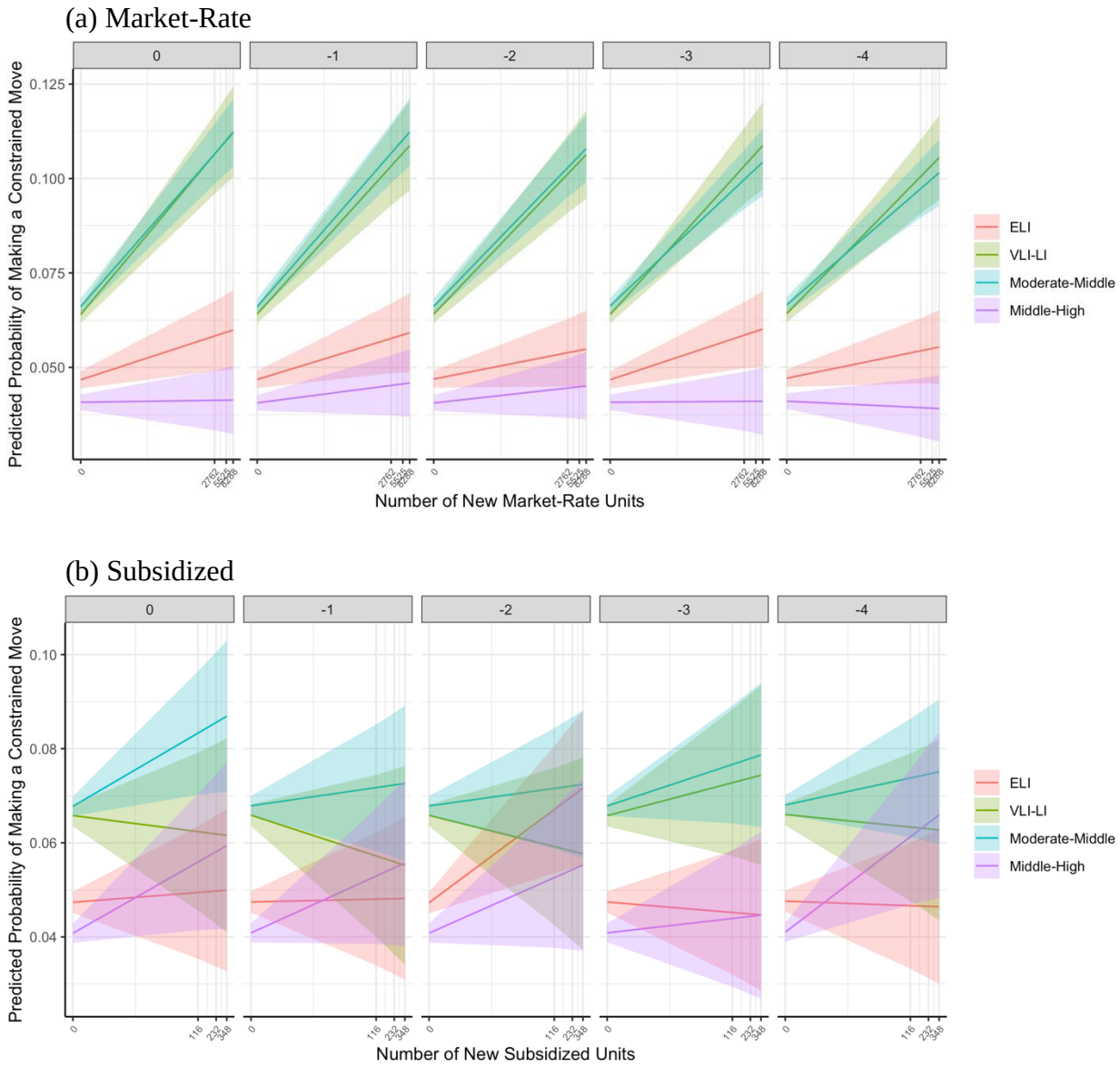
Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database.

Constrained Moves

For constrained moves, results are relatively similar between the full and non-mortgage holder samples, but there are a few small differences. Figures E2 to E4 illustrate these differences.

First, when considering destination household income deciles, for new market-rate units, results are extremely similar, but with wider error bars and additionally with smaller gaps between high-SES movers and everyone else. For subsidized units, there are no longer any effects for ELI residents. The error bars are also wider, and middle-high SES residents are more likely to make a constrained move 4 years after subsidized units are built. [Figure E2]

Figure E2. Predicted Probability of Making a Constrained Move by SES among Non-Mortgage Holders between Ages 25-64 from Block Groups with New Units (a) Market-Rate (b) Subsidized, Using Median Household Income Deciles

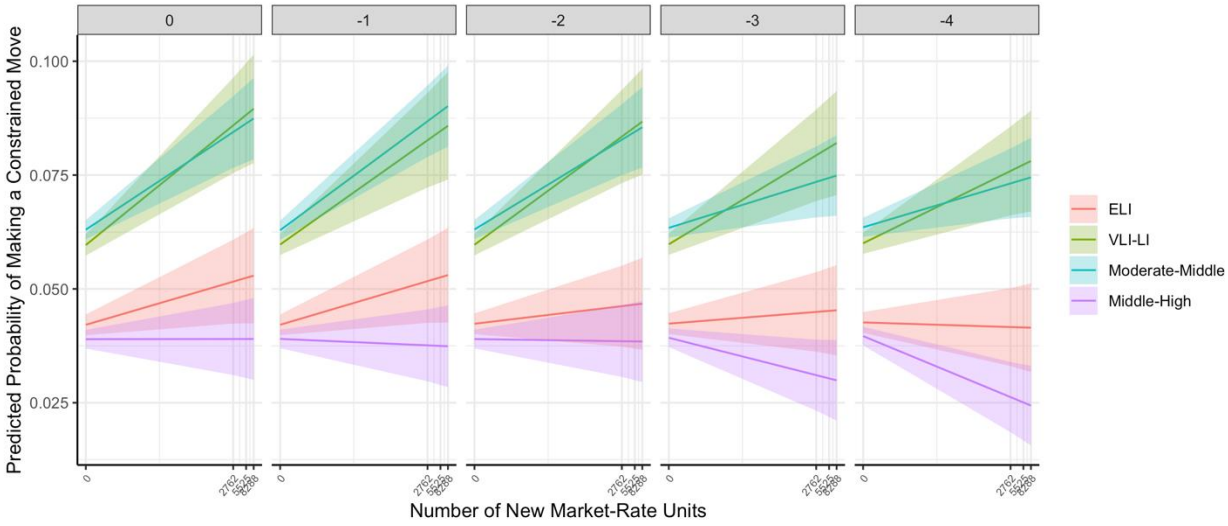


Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

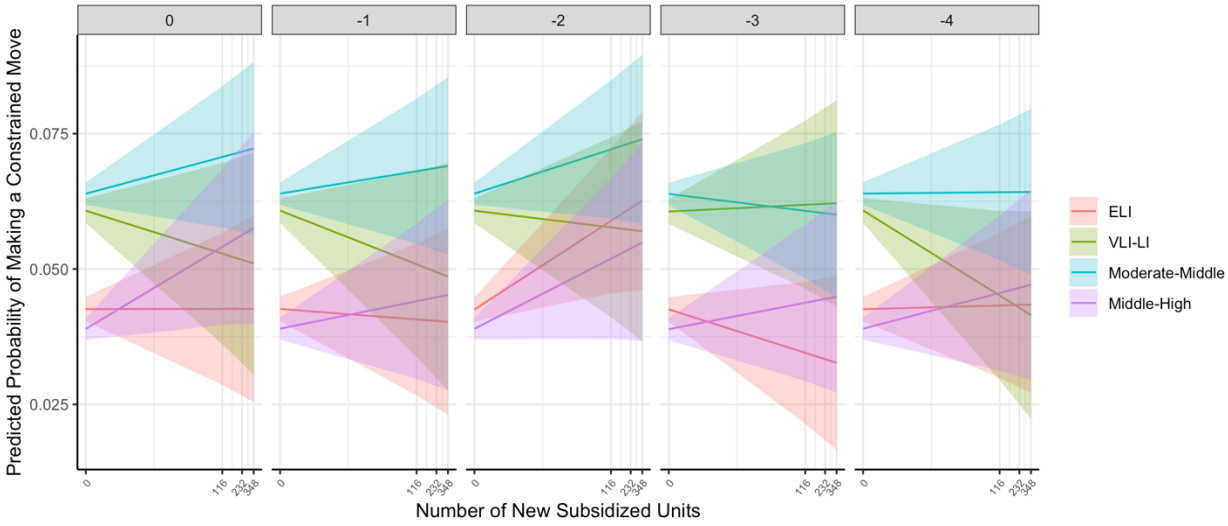
When assessing destinations using poverty rate deciles, figure E3 shows that for market-rate units, the effects are smaller than in the full sample. The effects are still the same for ELI and moderate-middle SES residents, but there are no longer any positive effects for VLI-LI residents starting 2 years after units are built. For middle-high SES residents, negative effects start 3 years after units are built instead of 2 years after in the full sample. Subsidized units only have a negative effect for ELI residents 4 years after units are built. There are no longer had any negative effects for VLI-LI and moderate-middle SES residents, and no longer any significant effects for middle-high SES residents.

Figure E3. Predicted Probability of Making a Constrained Move by SES among Non-Mortgage Holders between Ages 25-64 from Block Groups with New Units (a) Market-Rate (b) Subsidized, Using Poverty Rate Deciles

(a) Market-Rate



(b) Subsidized

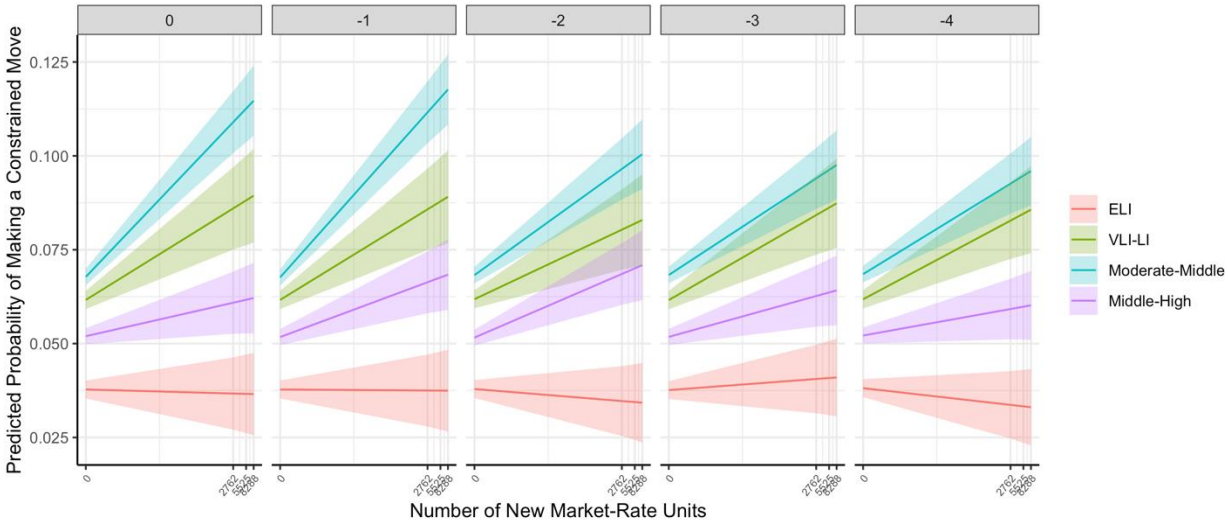


Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

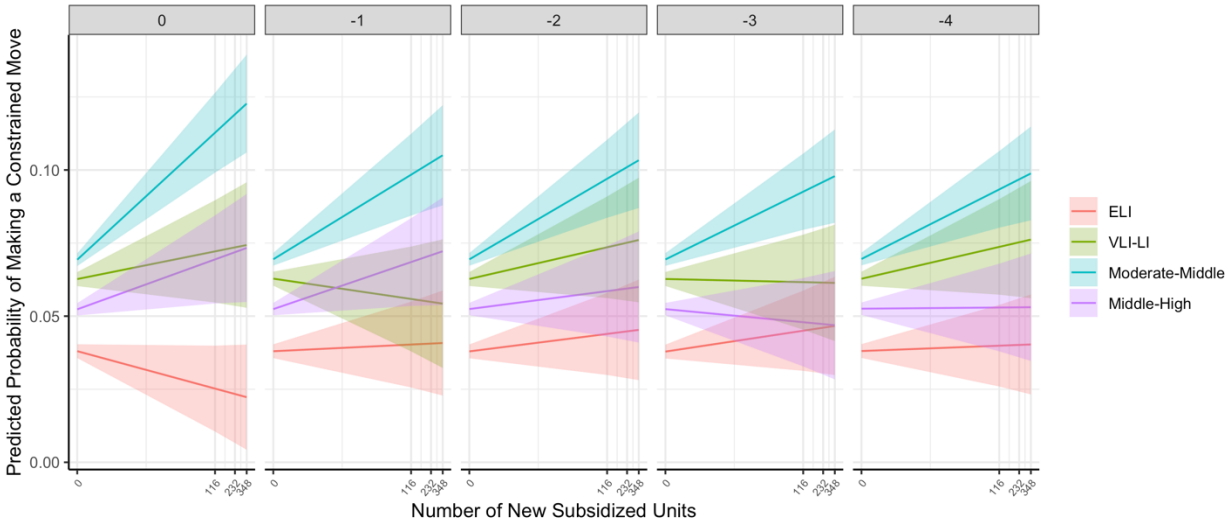
Results using median rent deciles [Figure E4] to assess destination neighborhoods also differ slightly with the non-mortgage holding sample. For market-rate units, results for ELI and moderate-middle SES residents remain consistent. While VLI-LI residents are more likely to make a constrained move in all years in the full sample, there are no effects for VLI-LI residents in the subsample. While there are no effects for middle-high SES residents in the full sample, middle-high SES probable renters in the subsample are more likely to make a constrained move starting the year units are built, with effects lasting up to 3 years after. Subsidized units no longer increase the probability to make a constrained move for ELI residents 2 and 4 years later For VLI-LI residents, new subsidized units no longer increase the probability to make a constrained move 2 years after and instead reduces it in the same year units are built. There are no changes for moderate-middle SES residents, who experience an increased likelihood to make a constrained move in all years. High-SES residents are more likely to make a constrained move in the same year and in the year after only instead of in the same year, 1, 2, and 4 years after.

Figure E4. Predicted Probability of Making a Constrained Move by SES among Non-Mortgage Holders between Ages 25-64 from Block Groups with New Units (a) Market-Rate (b) Subsidized, Using Median Rent Deciles

(a) Market-Rate



(b) Subsidized



Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Inmigration

Individual-level linear probability model

The differences in the market-rate linear probability models and multinomial models suggest that concentrations of new housing production—both market-rate and subsidized—have a stronger effect attracting higher-SES probable renters and inconsistently attract lower-SES ones.

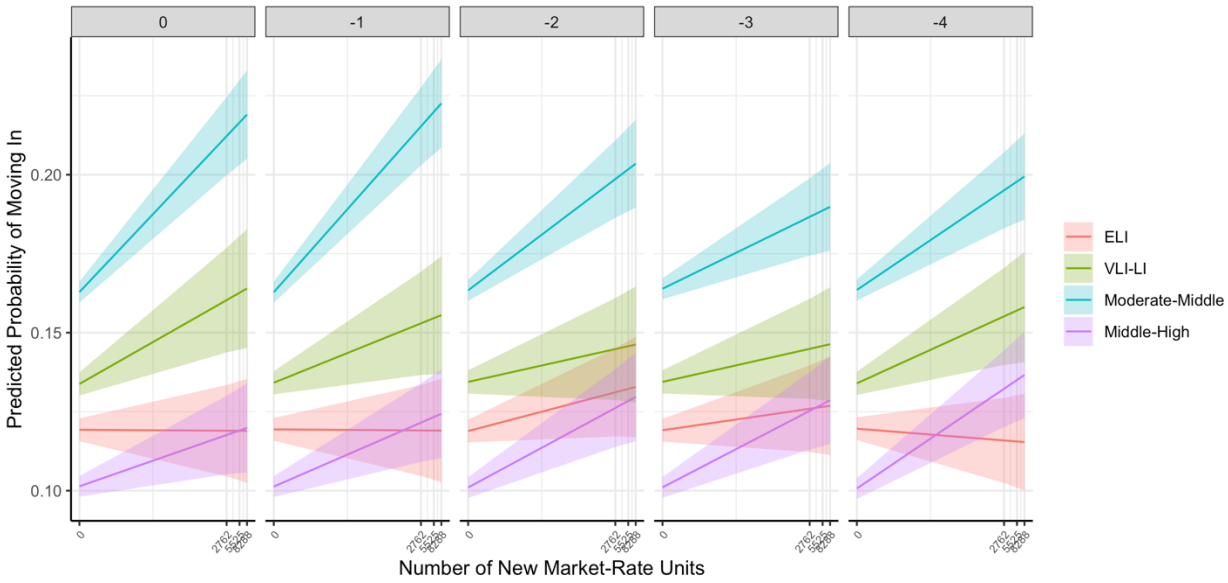
The results from the full linear probability model with interaction terms, presented in Figure E5, show that the effects do differ slightly from results for the full sample with inmigration. New market-rate housing is no longer associated with inmigration of ELI residents except very weakly 2 years after. It is only associated with inmigration of VLI-LI residents in the same year, 1 and 4 years after instead of in all years. It still has a positive effect for moderate-middle SES and middle-high SES residents in all years.[33] New subsidized units encourage inmigration of ELI residents weakly 3 years after they are built, but no longer encourages inmigration of VLI-LI residents 4 years after they are built. Instead of encouraging inmigration of middle-high SES residents starting in the same year and lasting up to 3 years after, there are effects for middle-high SES residents in the year and 2 years after only.[34]

[33] In logistic models, results are the same for all.

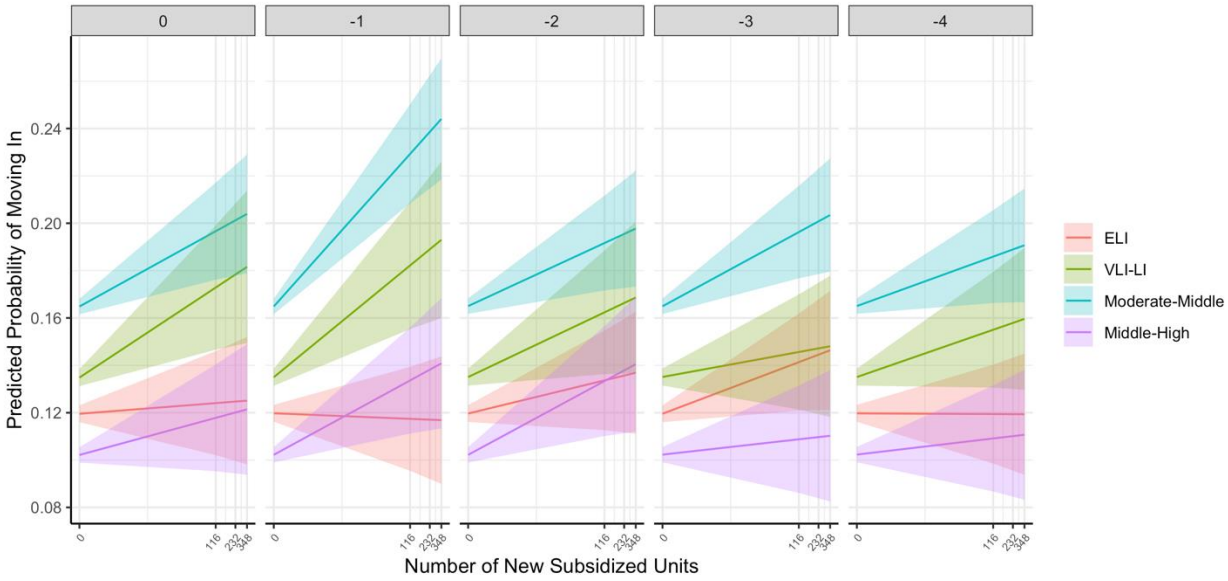
[34] In logistic regression models, results are the same for ELI residents. The difference for VLI-LI residents is that they are not more likely to move in 2 years after subsidized units are built. Moderate-middle SES residents are not more likely to move in 4 years after, and high-SES residents are also more likely to move in in the same year in addition to 1 and 2 years after.

Figure E5. Predicted Probabilities by SES of Moving into Block Groups among Non-Mortgage Holders between Ages 25-64 by Number of New (a) Market-Rate, and (b) Subsidized Units

(a) Market-Rate



(b) Subsidized



Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database.

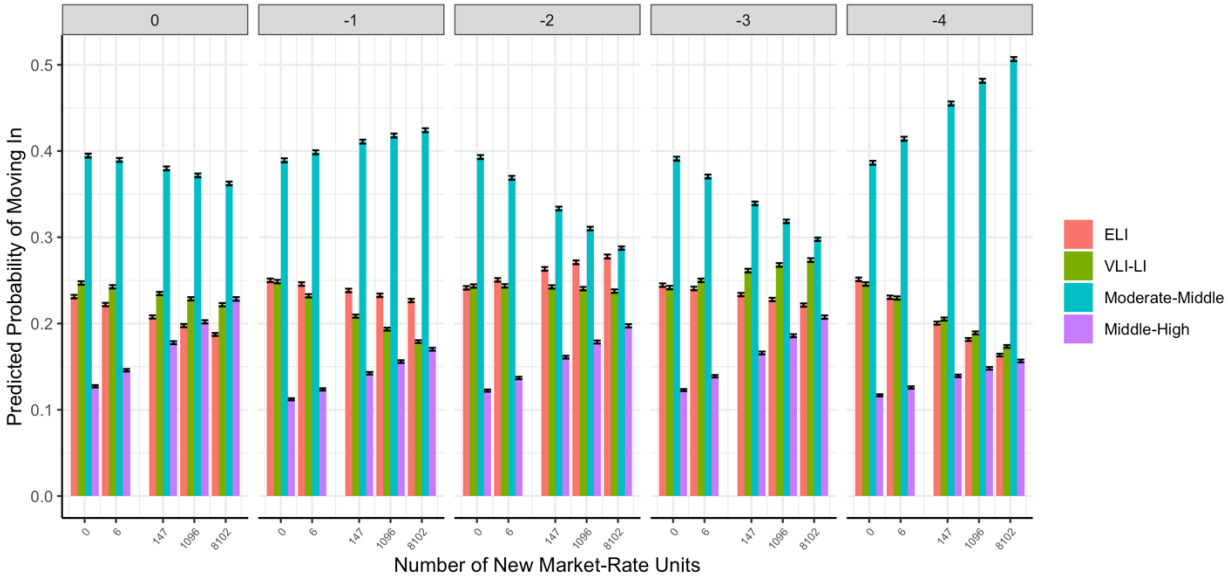
Inmigration

Individual-level multinomial logit model

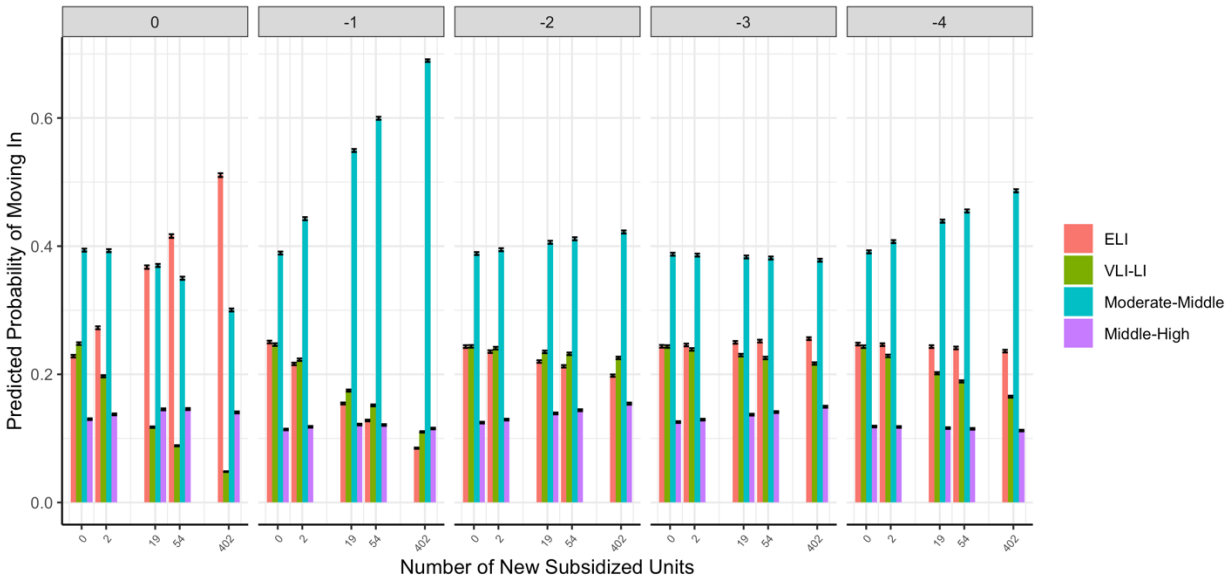
Results from multinomial models for inmigration, presented in Figure E6, differ for the non-mortgage subsample. Among younger non-mortgage holding inmovers, most are moderate-middle SES, and middle-high SES residents comprise a smaller share. For market-rate units, the likelihood that inmovers are middlle-to-high-SES residents increases with more new housing across all years, but, unlike the full sample, the likelihood that residents are ELI increases with more new housing 2 years after it is built, though this positive effect is not present in other years. VLI-LI residents are also consistently less likely to move into neighborhoods as more market-rate units are built, except 3 years after, where there is a slightly positive effect. Moderate-middle SES residents are more likely to move in 1 and 4 years after, but are less likely to in other years. For subsidized units, the likelihood that inmovers are moderate-middle SES increases substantially with new subsidized units in the year after new subsidized production is built and 2 and 4 years after but are slightly decreasing in other years, while the likelihood that they are ELI increases with more production in the year they are built and 3 years after but decreases in other years. The likelihood that inmovers are VLI-LI decreases with new production in all years. The likelihood that inmovers are middle-high SES increases with new production very slightly in all years except for 4 years after.

Figure E6. Predicted Composition of Non-Mortgage Holding Movers Ages 25-64 into Block Groups by Number of New (a) Market-Rate, and (b) Subsidized Units

(a) Market-Rate



(b) Subsidized



Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database.

Tenant Protections

Outmigration

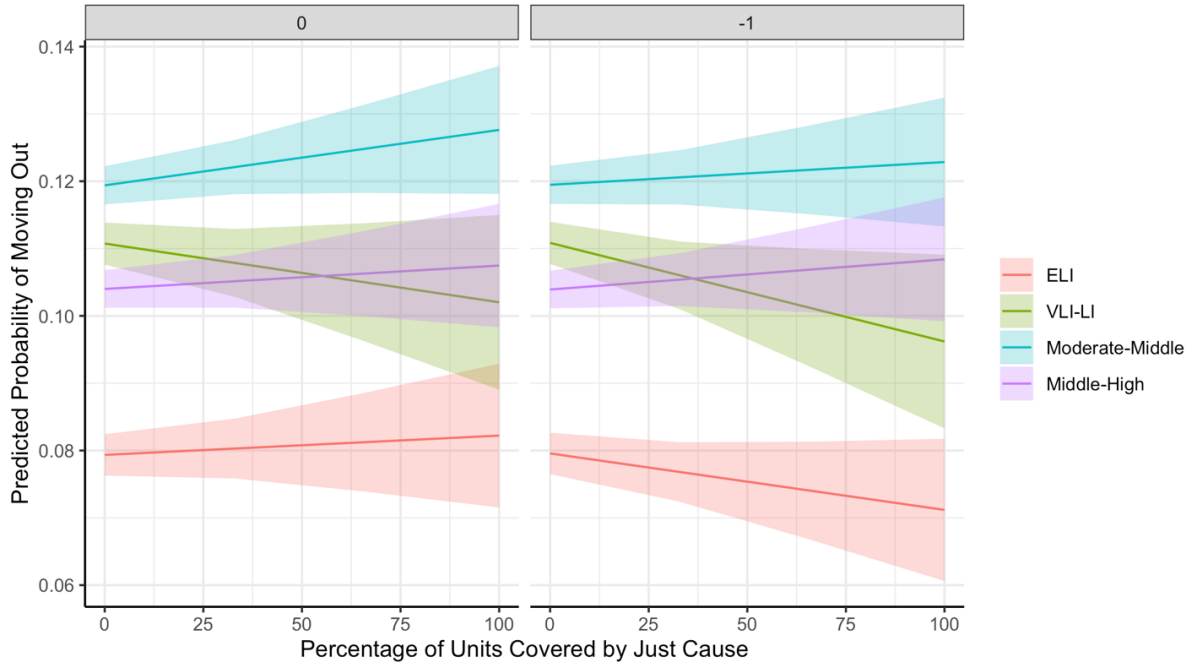
Analyses of outmigration for non-mortgage holders aged 25-64 suggest that the lowest-SES residents are not necessarily able to take full advantage of these stabilization policies.

Figure E7 shows that the differences between the SES groups become narrower and probable renters have a lower rate of moving out in general. Both just cause protections and rent stabilization decrease the probability of outmigration for both ELI and VLI-LI residents the year after units are covered. Nonetheless, increases in just cause and rent stabilized units still increase the probability of outmigration for moderate-middle and middle-high SES residents—in the same year and the year after just cause protections and for rent stabilization respectively for moderate-middle SES, and in both years and the year after for rent stabilization and just cause protections respectively for middle-high SES residents.[35]

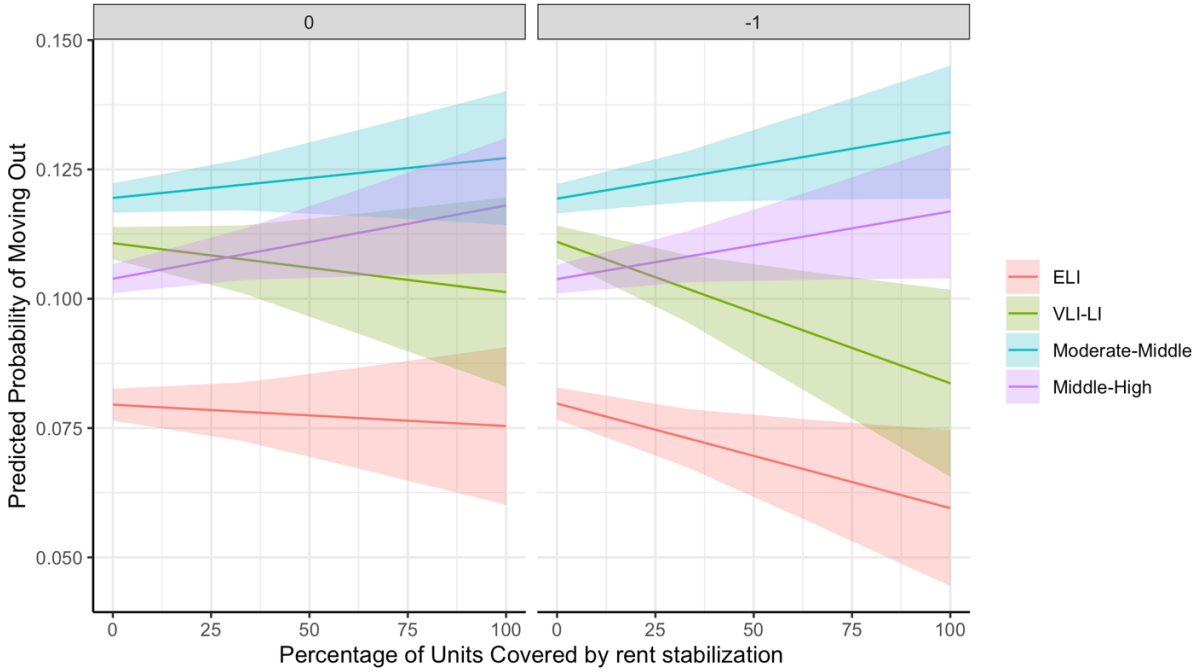
[35] In logistic regression models, results were the same for all.

Figure E7. Predicted Probability of Moving Out among Non-Mortgage Holders between Ages 25-64 by SES and Percent of Units Covered by (a) Just Cause; and (b) Rent Stabilization

(a) Just Cause for Evictions



(b) Rent Stabilization



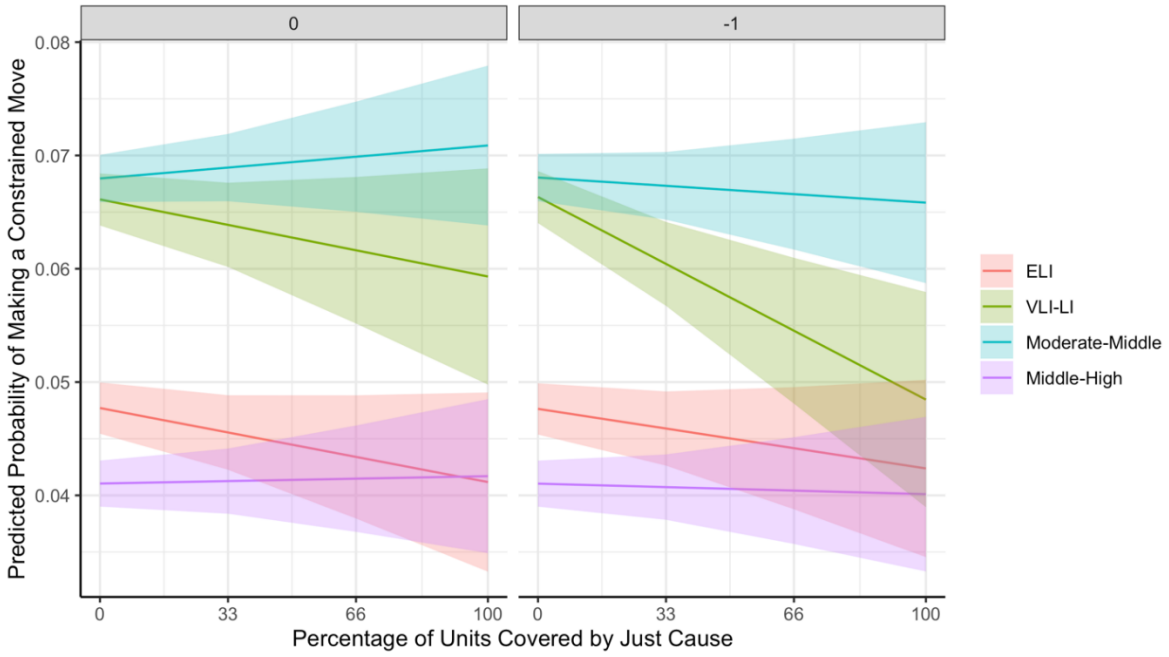
Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database.

Constrained Moves

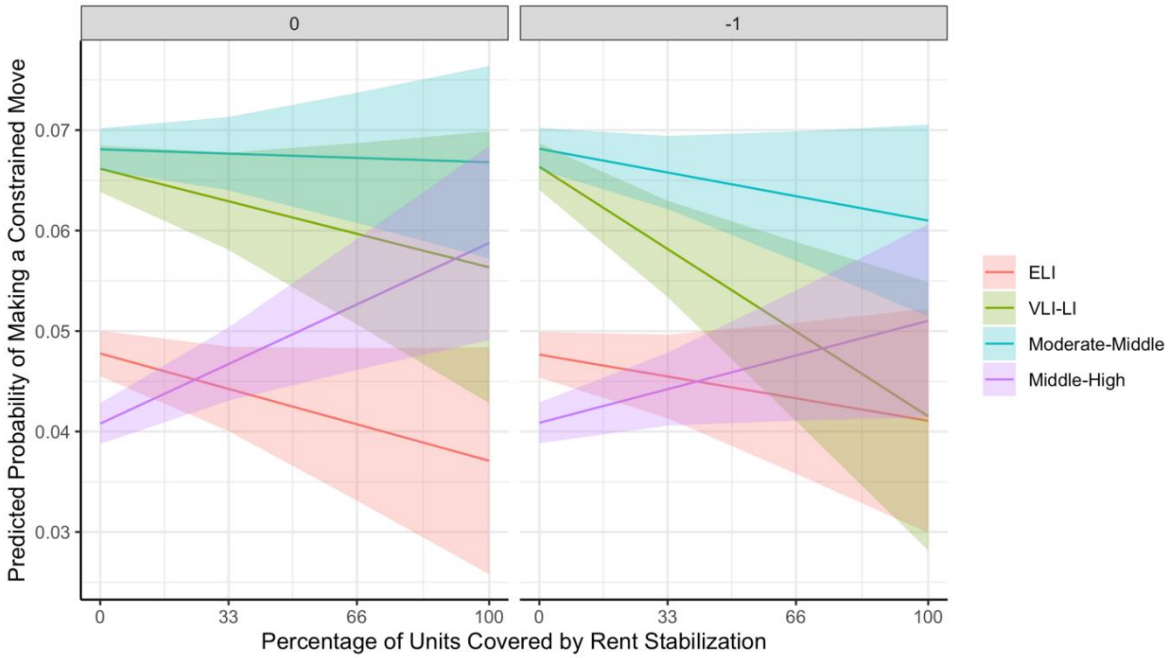
For constrained moves, figure E8 shows that increases in the percent of units covered by just cause protections no longer have a significant effect for ELI residents in the same year and for VLI-LI residents in the year after. The effect for ELI residents in the same year that rent stabilization units are covered is no longer significant, and the effect for VLI-LI resident in the year after is no longer significant.

Figure E8. Predicted Probability of Making a Constrained Move among Non-Mortgage Holders Ages 25-64 by SES from Block Groups by Percent of Units Covered by (a) Just Cause (b) Rent Stabilization, Using Median Household Income Deciles

(a) Just Cause for Evictions



(b) Rent Stabilization

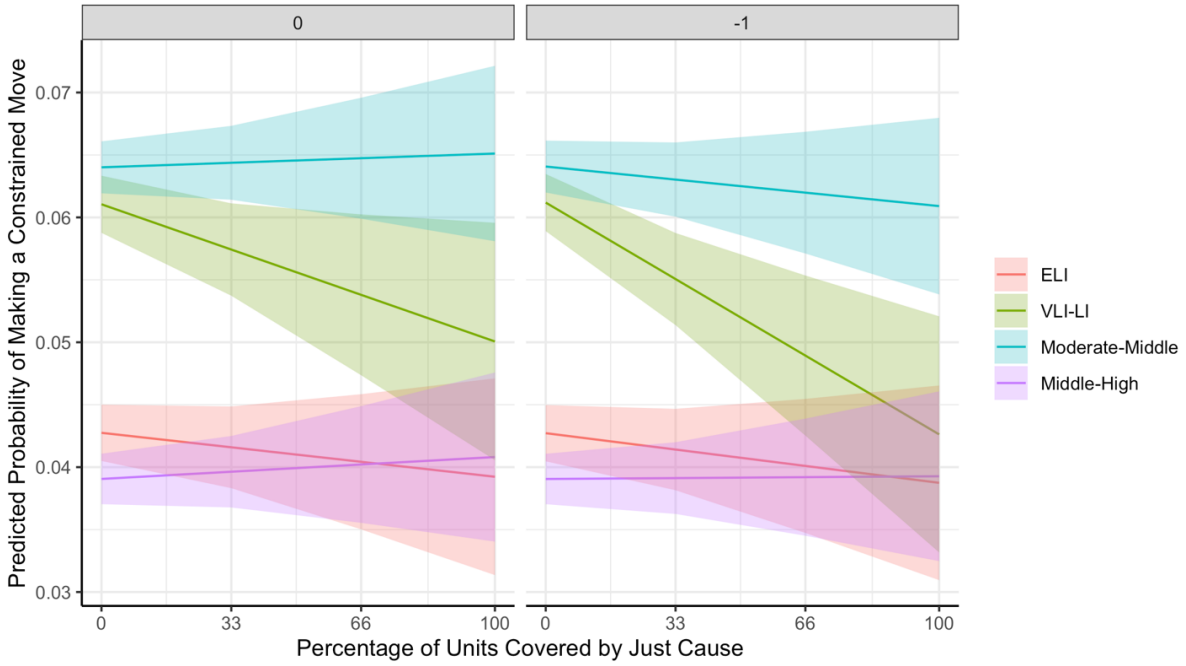


Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database.

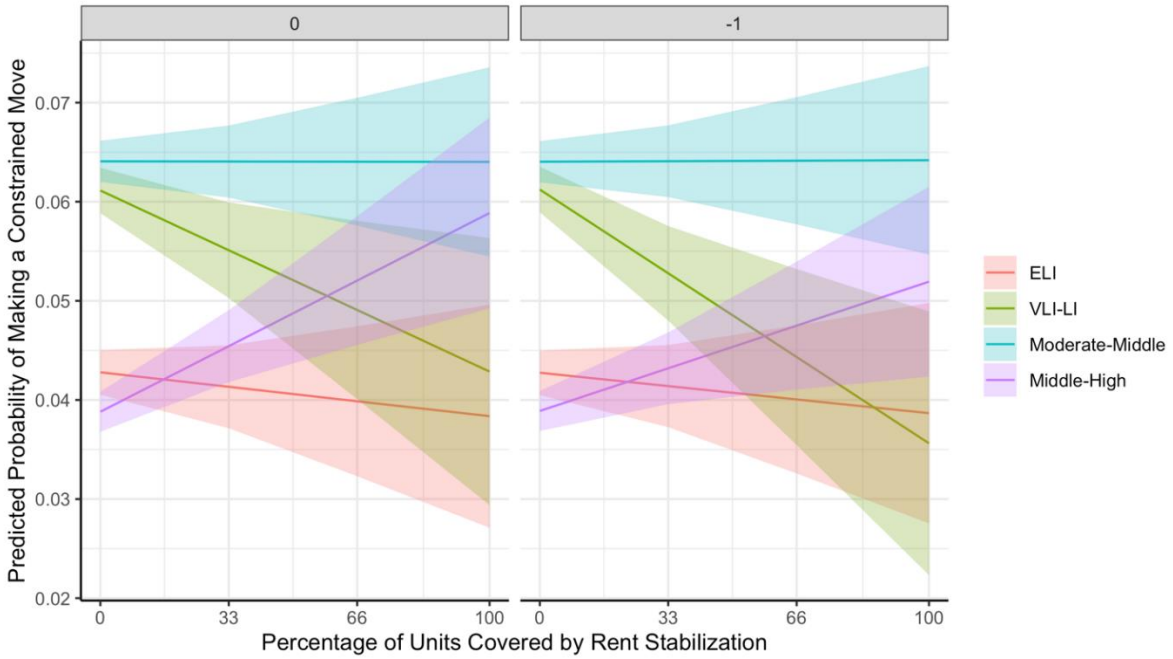
Figure E9 shows that when considering just cause units, increases in the percent of units covered by just cause protections no longer has effects for VLI-LI residents in both years. There are no longer any effects for VLI-LI residents in the same year units are covered by rent stabilization, and for moderate-middle SES residents the year after, using poverty rate deciles.

Figure E9. Predicted Probability of Making a Constrained Move among Non-Mortgage Holders Ages 25-64 by SES from Block Groups by Percent of Units Covered by (a) Just Cause (b) Rent Stabilization, Using Poverty Rate Deciles

(a) Just Cause for Evictions



(b) Rent Stabilization

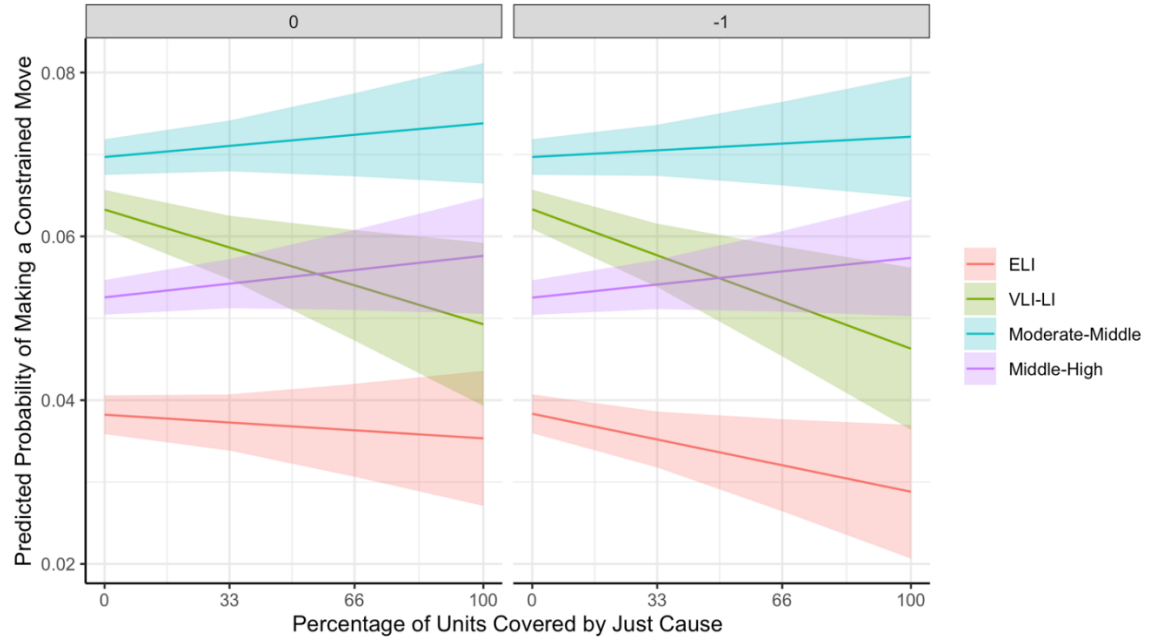


Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

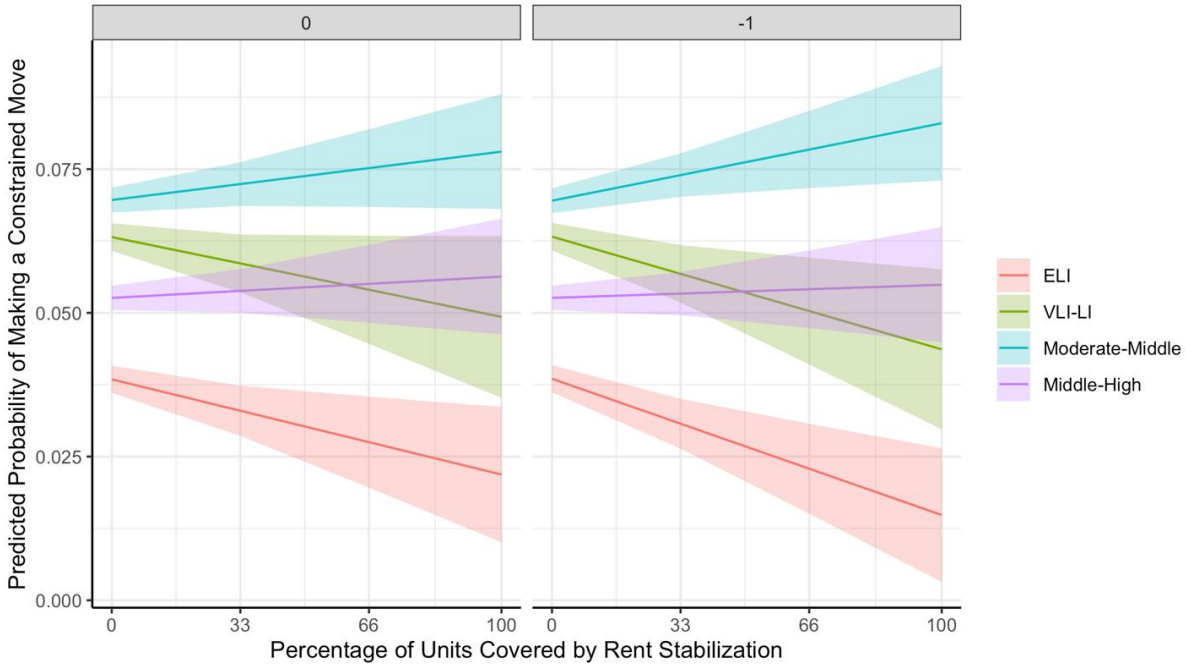
Figure E10 shows the predicted probabilities for constrained moves using median rent deciles. Increases in just cause units no longer decrease the probability of making a constrained move for VLI-LI residents in the same year, but results remain the same for other groups. Increases in percent of units covered by rent control now decrease the probability of making a constrained move for ELI residents in both years instead of only in the year after. And, there are no longer significant effects for moderate-middle SES residents in the same year.

Figure E10. Predicted Probability of Making a Constrained Move among Non-Mortgage Holders Ages 25-64 by SES from Block Groups by Percent of Units Covered by (a) Just Cause and (b) Rent Stabilization, Using Median Rent Deciles

(a) Just Cause for Evictions



(b) Rent Stabilization



Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database.

Inmigration

Individual-level linear probability model

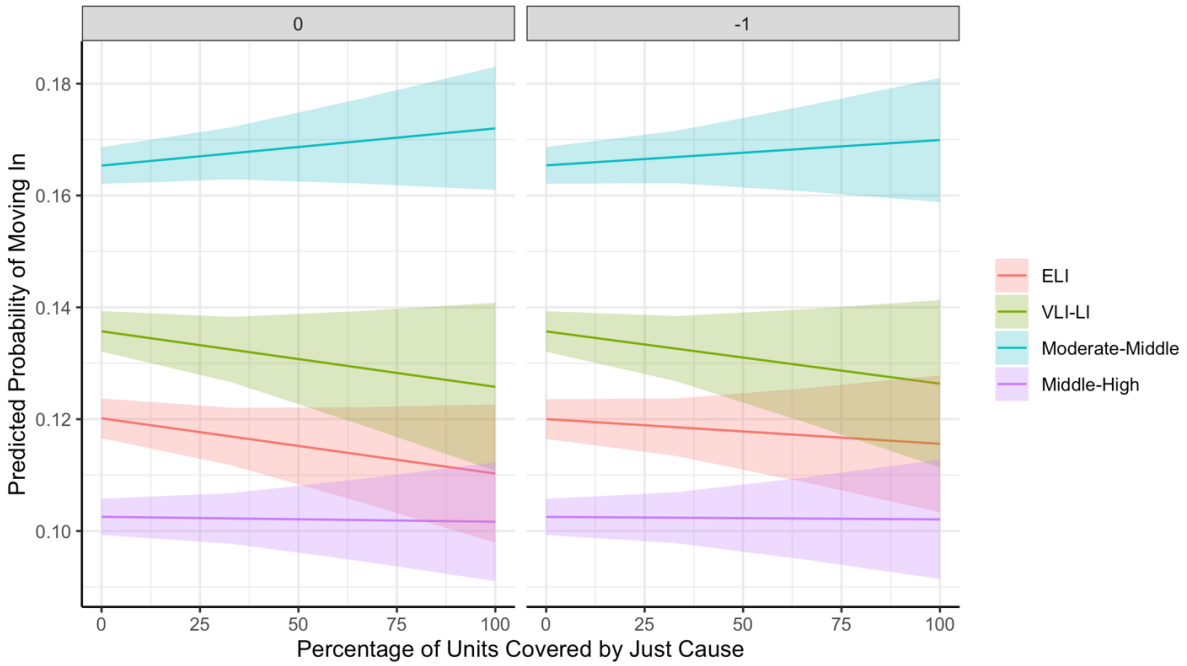
Like the findings for the full sample, tenant protections do not appear to encourage lower-SES renters to move in, but rent stabilization increases the proportions of probable renters who move in who are lower-SES.

We separately examined the effects of tenant protections for non-mortgage holders ages 25-64 for inmigration. This sample could still include those who have paid off their mortgage. The trends in Figure E11 based on the linear probability models predicting the likelihood of moving into a neighborhood on SES and the percentage of protected units are similar to those in the full sample but have wider errors in the estimates, making them insignificant. Nonetheless, rent stabilization still has a positive effect for moderate-middle SES residents the year after, but it has no effects for other groups. Just cause units do not have significant effects for any groups in any year.[36]

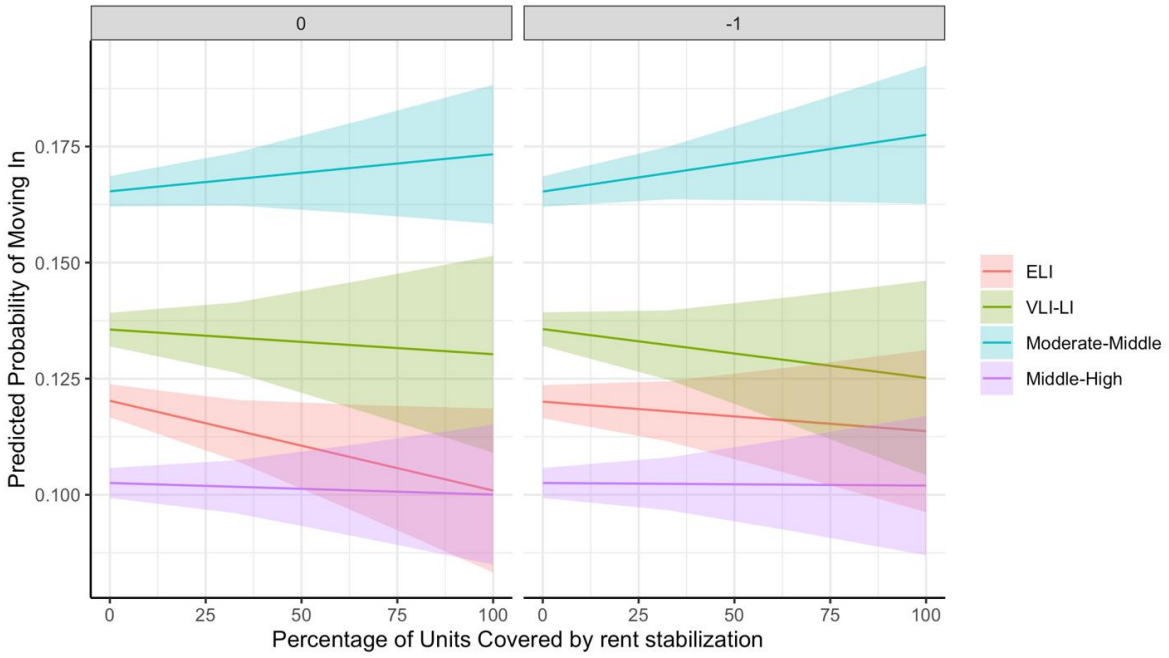
[36] In logistic regression models, there was a slightly negative effect for ELI residents in the same year, and positive effects for middle-high SES residents in both year for rent control units. There were similarly no significant effects for any group in either year for just cause protected units.

Figure E11. Predicted Probabilities by SES of Moving into Block Groups among Non-Mortgage Holders between Ages 25-64 by Percent of Units Covered by (a) Just Cause; and (b) Rent Stabilization

(a) Just Cause for Evictions



(b) Rent Stabilization



Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database.

Inmigration

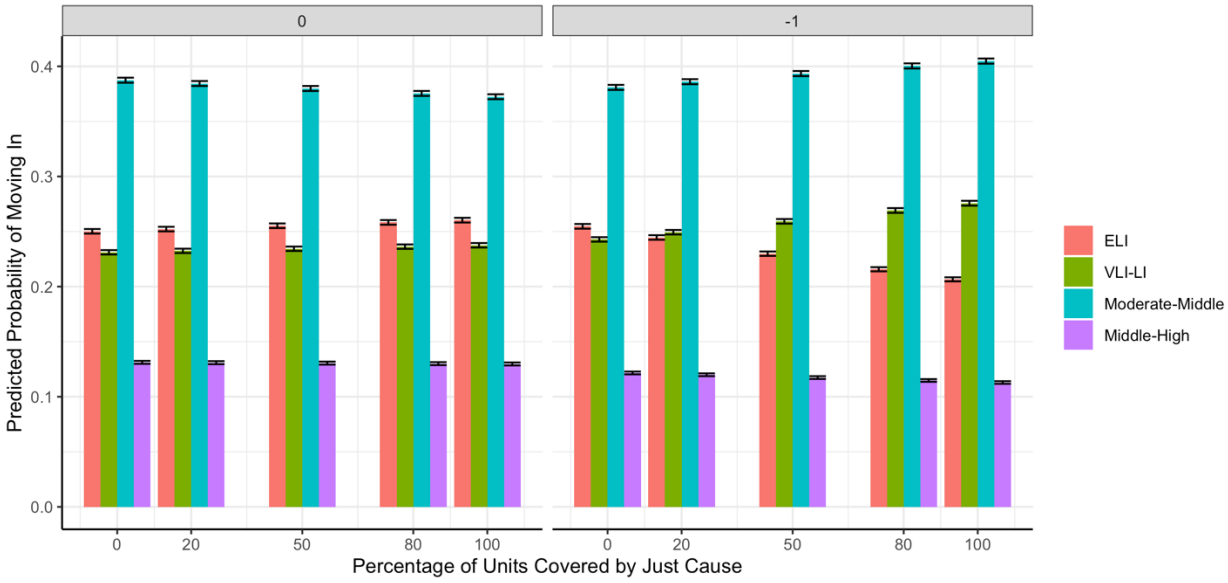
Individual-level multinomial logit model

Figure E12 shows that in the year just cause-covered units are counted, higher shares of just cause units slightly increase the likelihood that non-mortgage holding inmovers are moderate-middle SES and VLI-LI and decrease the likelihood of inmovers being in other SES groups. By the year after, just cause units increase the likelihood that non-mortgage holding inmovers are VLI-LI while decreasing their likelihood of being moderate-middle SES. Increases in the share of rent-controlled units slightly increases the likelihood that non-mortgage holding inmovers will be VLI-LI and moderate-middle SES in both years and the year after respectively, while decreasing the share of ELI and middle-high SES residents who move in in both year that units are measured.

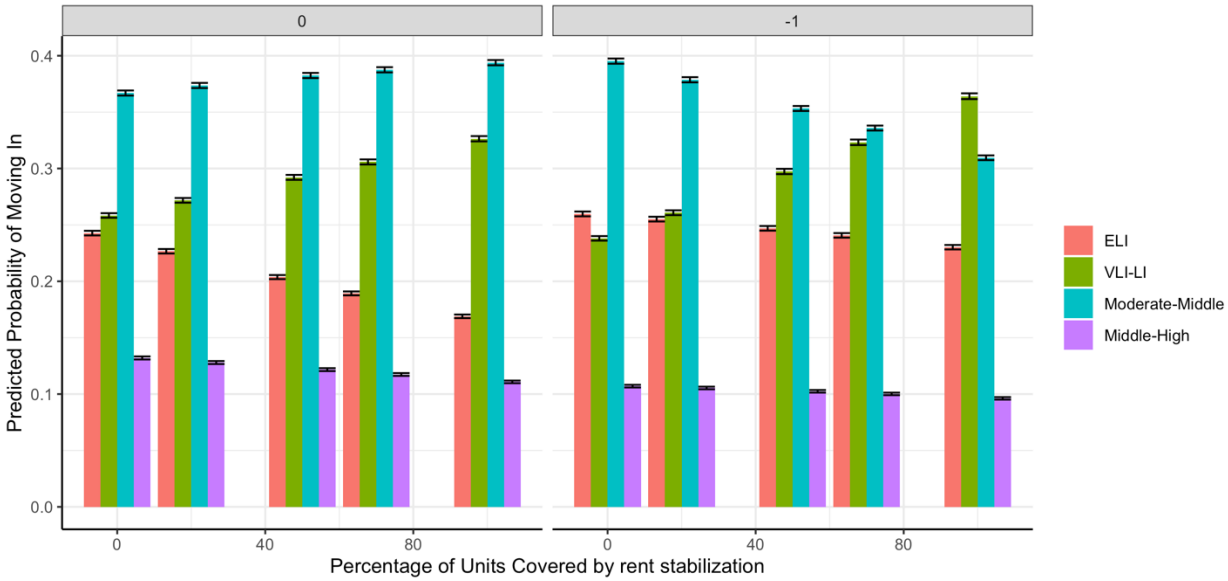
These results and trends likely reflect decreases in the number of residents moving into neighborhoods with higher shares of protected units. This is not surprising given that people are less likely to move out of protected units, hence limiting housing availability for potential inmovers.

Figure E12. Predicted Composition of Non-Mortgage Holding Movers Ages 25-64 into Block Groups by Percent of Units Covered by (a) Just Cause; and (b) Rent Stabilization

(a) Just Cause for Evictions



(b) Rent Stabilization



Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database.

Appendix F. Block Group models, CCP

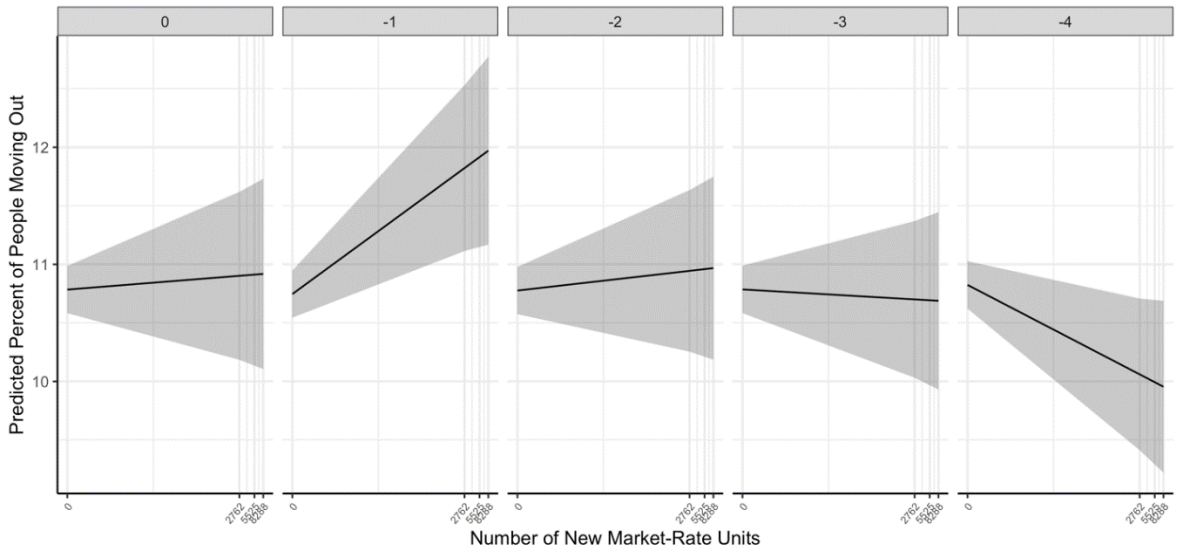
New Production

Outmigration

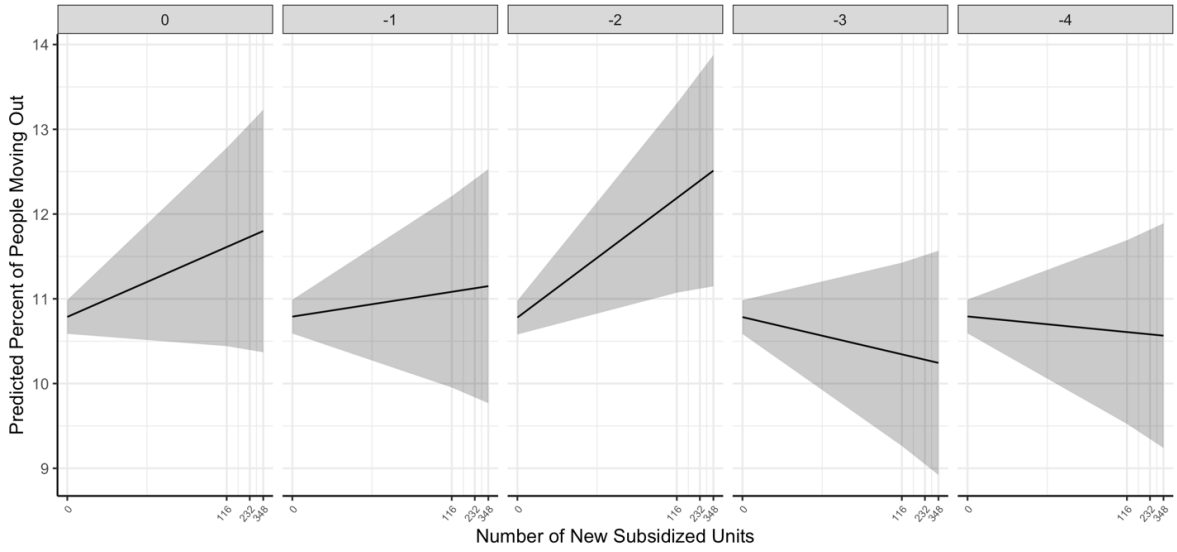
Overall, we find that new production of subsidized units had little to no effect on aggregate block group-level outmigration rates for both the full sample and just among ELI and VLI-LI residents. New production of market-rate units increased outmigration rates in some years but decreased them in others. Figure F1 shows that the production of market-rate units increases outmigration in the first year after units are built and decreases the outmigration rate 4 years after the units are built. The production of new subsidized units increases the outmigration rate 2 years after units are built.

Figure F1. Predicted Block Group Outmigration Rate by Number of New (a) Market-Rate and (b) Subsidized Units

(a) Market-Rate



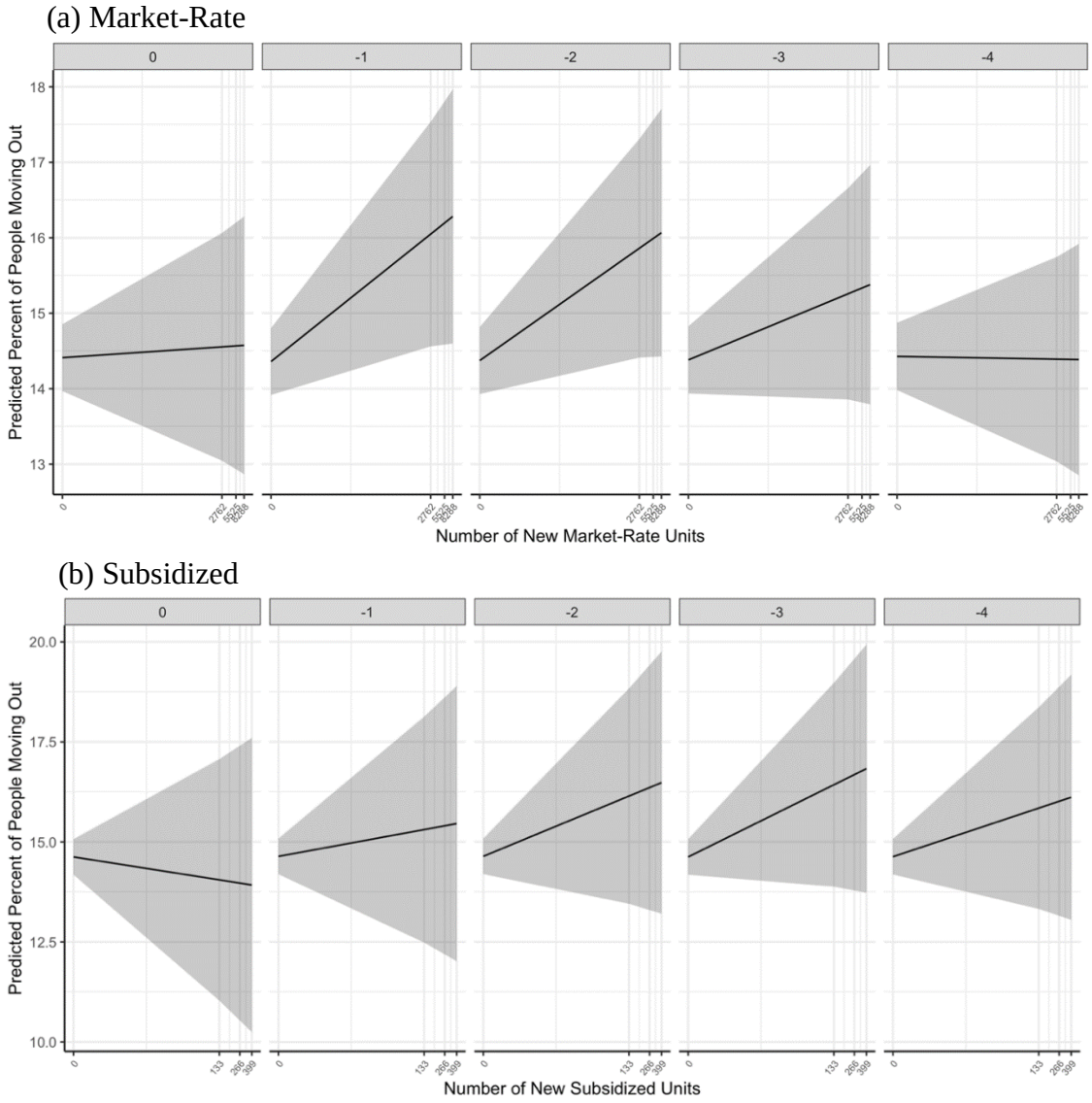
(b) Subsidized



Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database.

Next, we examine the outmigration rates for ELI and VLI-LI residents only. Figure F2 shows that new production of market-rate units had a positive effect on outmigration 1 and 2 years after the units were built. New production of subsidized units had no effects on the percent of ELI and VLI-LI residents who move out in any years. Altogether, these trends are relatively consistent with the results from individual-level models.

Figure F2. Predicted Percent of Low- and Moderate-SES Residents Moving Out with New Units (a) Market-Rate (b) Subsidized

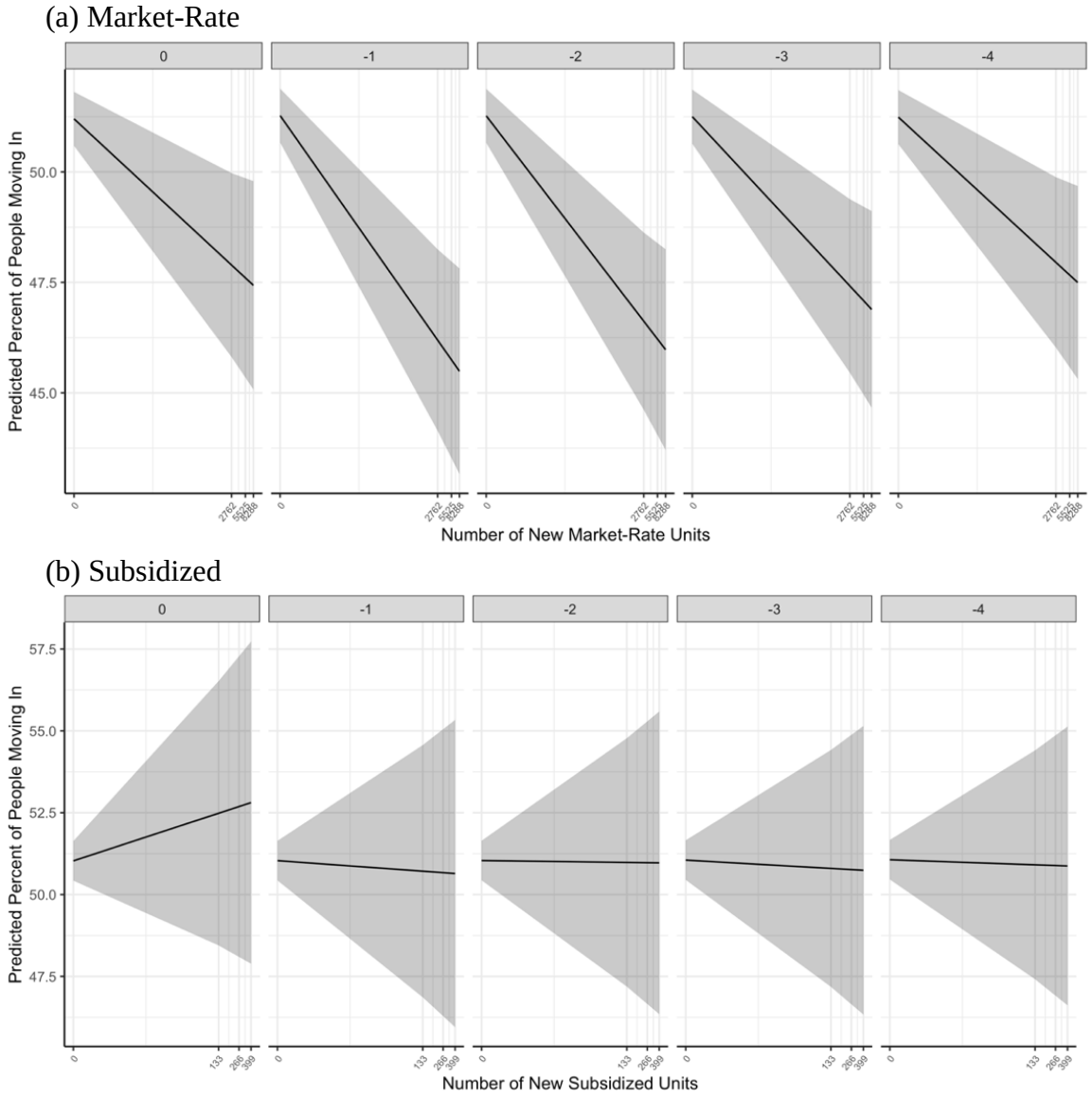


Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Inmigration

The block-group level models show that market-rate units discourage higher proportions of inmovers who are ELI and VLI-LI but subsidized units have no effects. Figure F3 illustrates that new production of market-rate units consistently decreased the percent of inmovers who are ELI and VLI-LI every year. New production of subsidized units did not encourage a higher percent of inmovers who are ELI and VLI-LI in any year. Overall, these results are consistent with the multinomial models.

Figure F3. Predicted Percent of Inmovers Who Are Extremely or Very Low-to-Low-Income with New Units (a) Market-Rate (b) Subsidized



Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

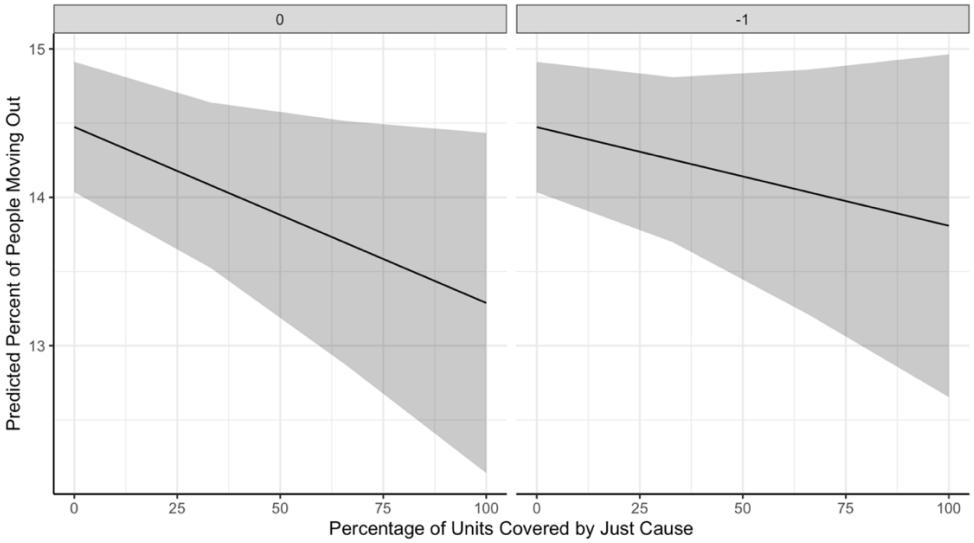
Tenant Protections

Outmigration

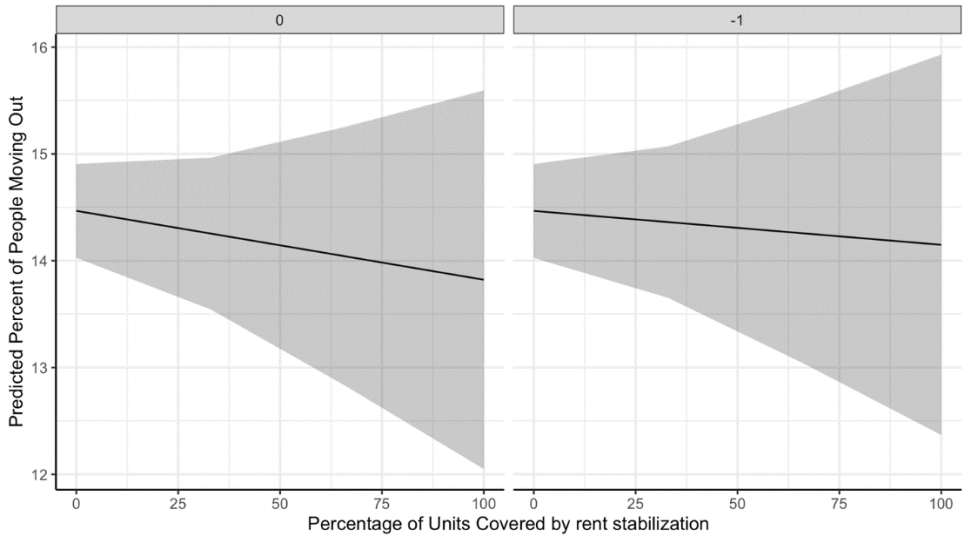
Figure F4 illustrates that the share of units covered by stabilization had no effects on the overall percent of ELI and VLI-LI residents who move. However, increases in the share of units covered by just cause protections reduce the outmigration rate of ELI and VLI-LI residents in the same year.

Figure F4. Predicted Percent of Extremely Low- and Very Low-Income Moving Out by Percent of Units Covered by (a) Just Cause (b) Rent Stabilization

(a) Just Cause for Evictions



(b) Rent Stabilization



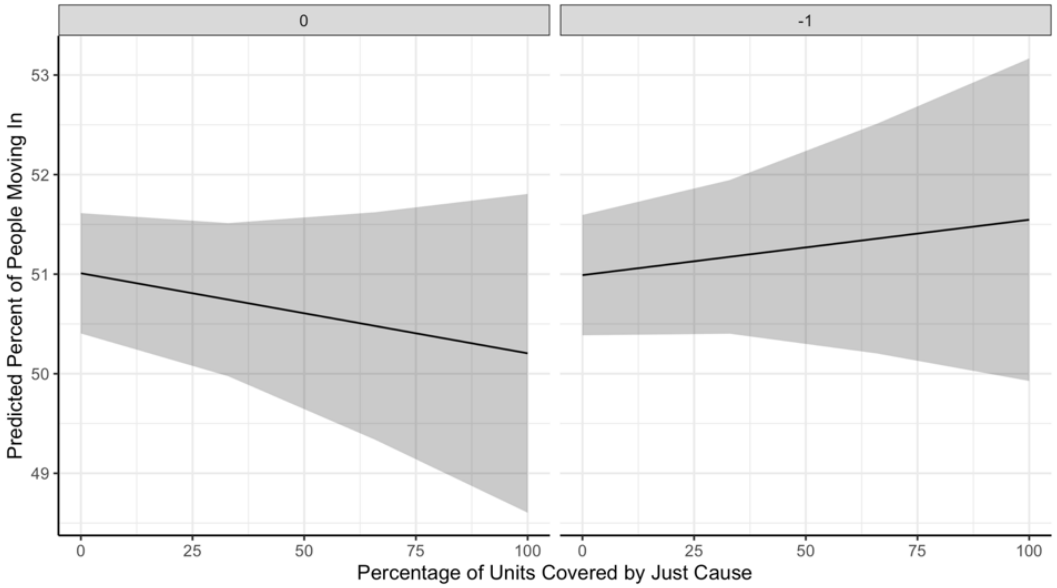
Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database.

Inmigration

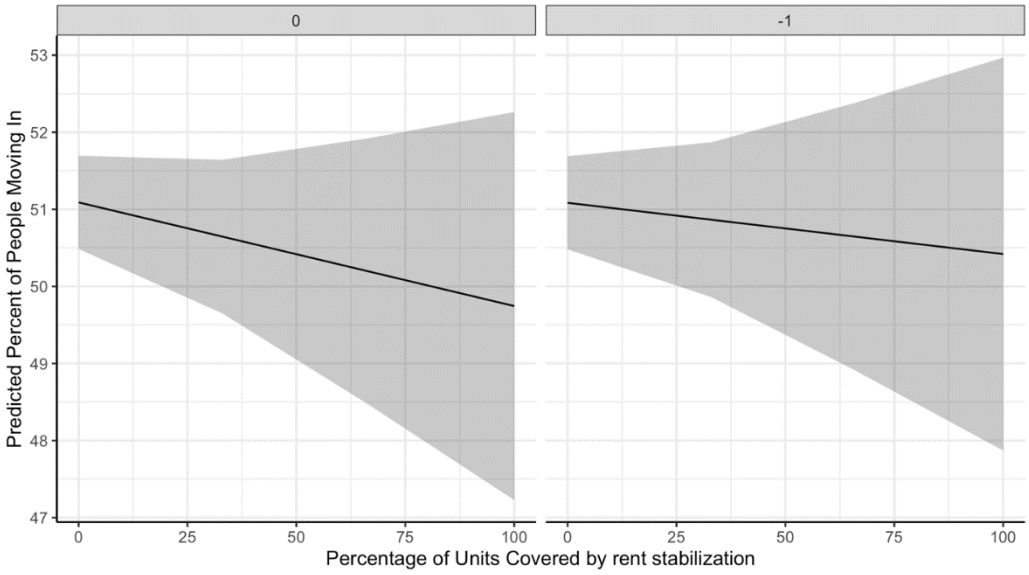
Results from the block-group level models, presented in Figure F5, show that tenant protections have no significant effects on the proportion of inmovers who are ELI and VLI-LI, both in the same year and the year after.

Figure F5. Predicted Percent of Inmovers Who Are Extremely Low- or Very Low-Income by Percent of Units Covered by (a) Just Cause (b) Rent Stabilization

(a) Just Cause for Evictions



(b) Rent Stabilization



Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database.

Appendix G. Sensitivity Analyses, CCP

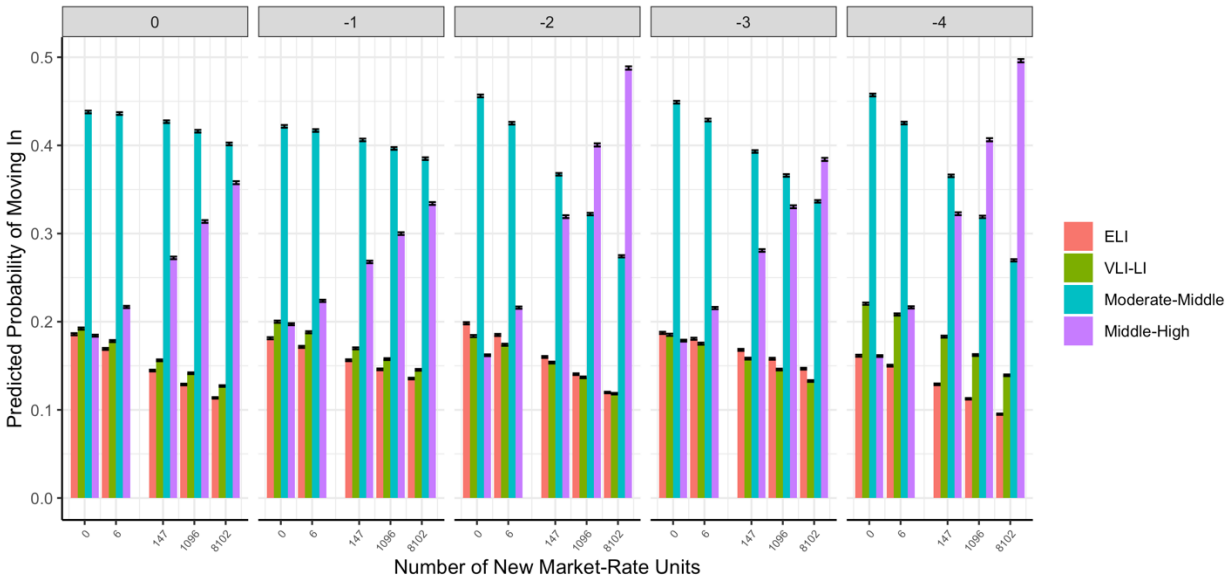
Tract-level moves

To account for the possibility that our results are sensitive to the geographic unit of analysis, we ran models predicting outmigration and inmigration to and from census tracts rather than the census block group. In general, results were consistent across the geographic unit for linear probability models. However, a few differences emerged from the multinomial models predicting the SES composition of inmovers, which is expected since these models examine the surrounding areas of block groups where new production is built or tenant protections are in place. Results are plotted at the same mean and mode values as our main models.

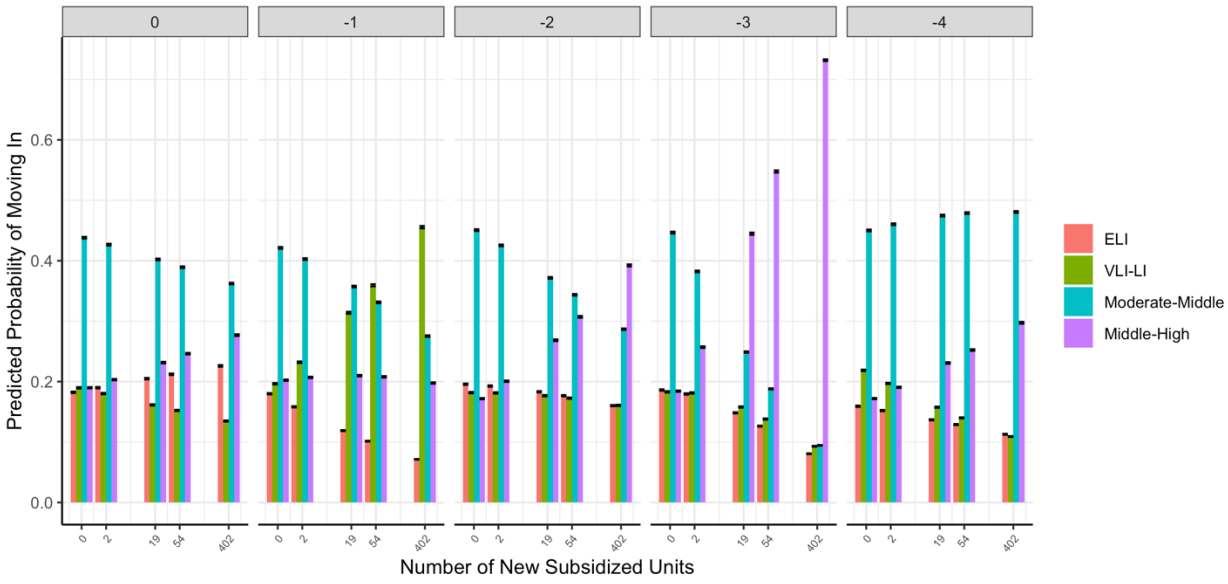
When looking at movers in census tracts containing block groups with subsidized units, the increased number of subsidized units increases the likelihood that inmovers are middle-high SES residents across all years except the year after units are built. Instead, the probabilities that inmovers are moderate-middle SES residents decrease across all years except for 4 years after. VLI-LI residents are more likely to move in 1 year after, where they are also most likely to be inmovers. ELI residents are less likely to be inmovers across all yeas. Trends are more consistent when looking at market-rate units in comparison to subsidized units, with the main difference being that high-SES residents are even more likely to be inmovers, and that probabilities for ELI/VLI-LI are more similar.

Figure G1. Predicted Composition of Movers into Tracts by Number of New (a) Market-Rate (b) Subsidized Units

(a) Market-Rate



(b) Subsidized

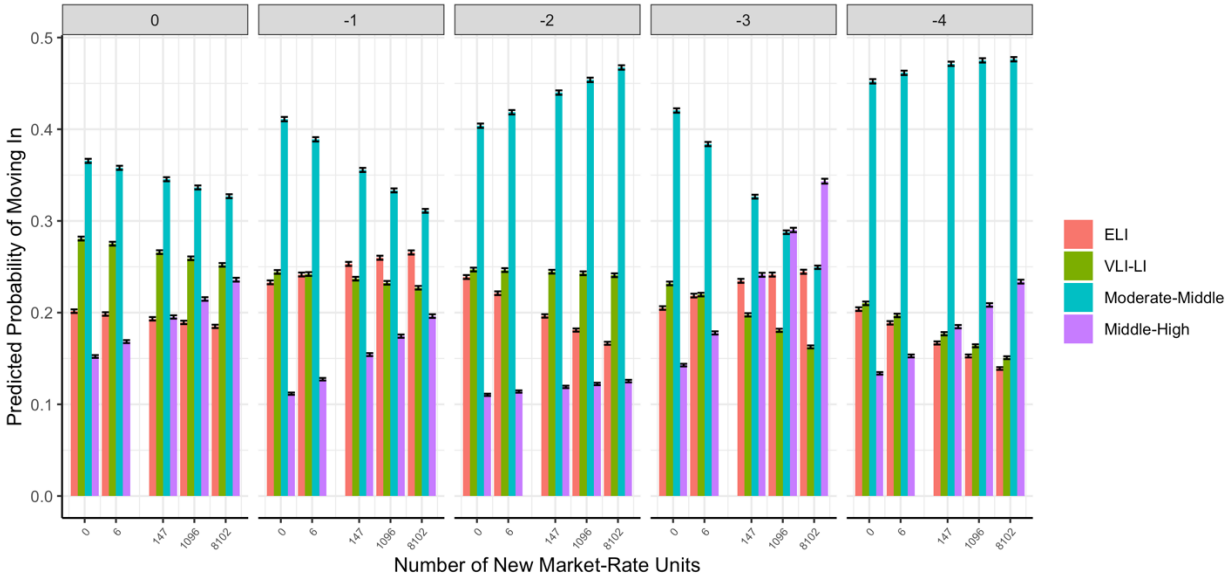


Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

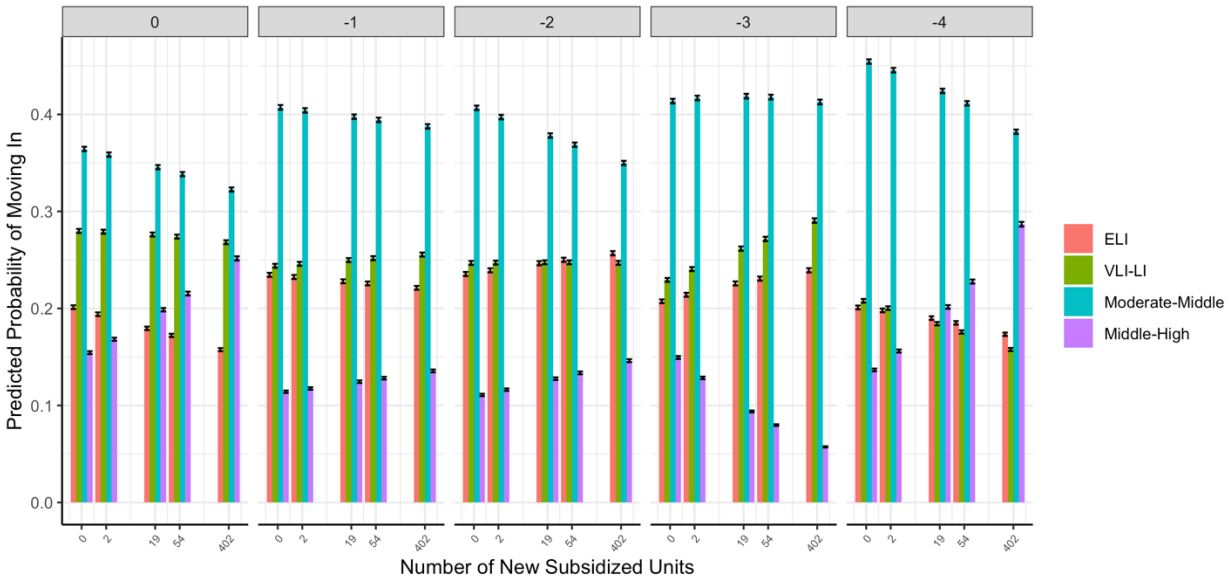
Results for non-mortgage holders ages 25-64 were also consistent across the geographic units for the linear probability models, but there were a few differences for the multinomial models. In these models, for subsidized units, the probability of being an inmover for ELI residents only increases very mildly 2 and 3 years after, whereas in the block group models, they are most likely to be inmovers in the same year. The results for VLI-LI residents are similar. Moderate-middle SES residents are less likely to move in in all years except for years after, and middle-high SES residents are more likely to in all years except 1 year after. For market-rate units, ELI residents are more likely to move in 1 and 5 years after, instead of only 2 years after. VLI-LI residents are less likely to move in in all years instead of being more likely to move in 3 years after. Moderate-middle SES residents are more likely to move in 2 and 4 years after instead of 1 and 4 years after, and middle-high SES residents are similarly more likely to move in in all years.

Figure G2. Predicted Composition of Non-Mortgage Holding Movers Ages 25-64 into Tracts by Number of New (a) Market-Rate (b) Subsidized Units

(a) Market-Rate



(b) Subsidized

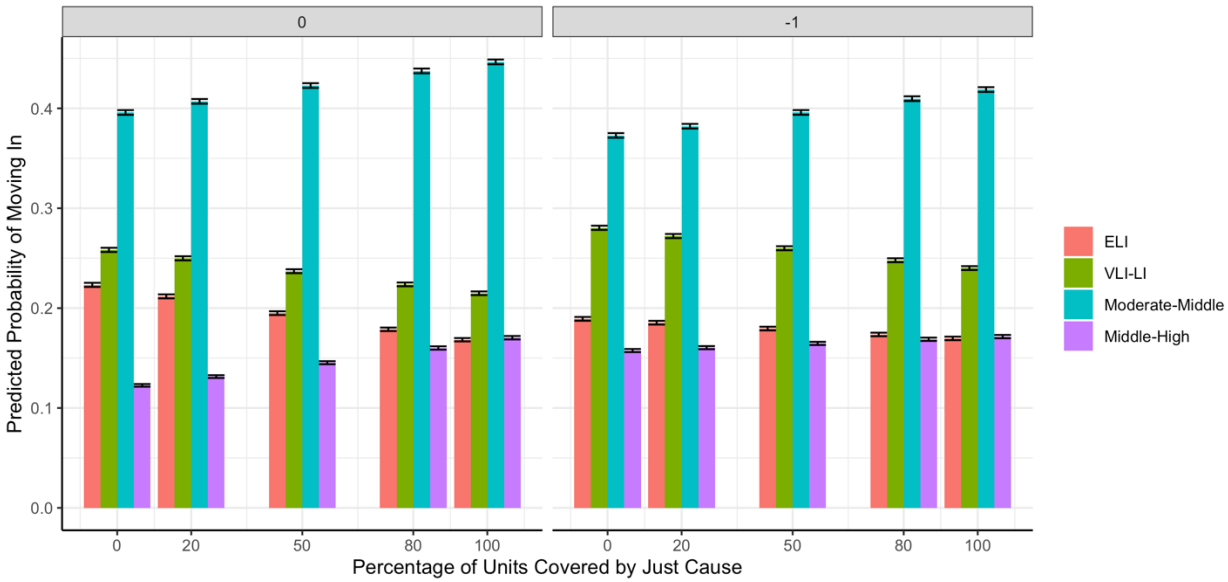


Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

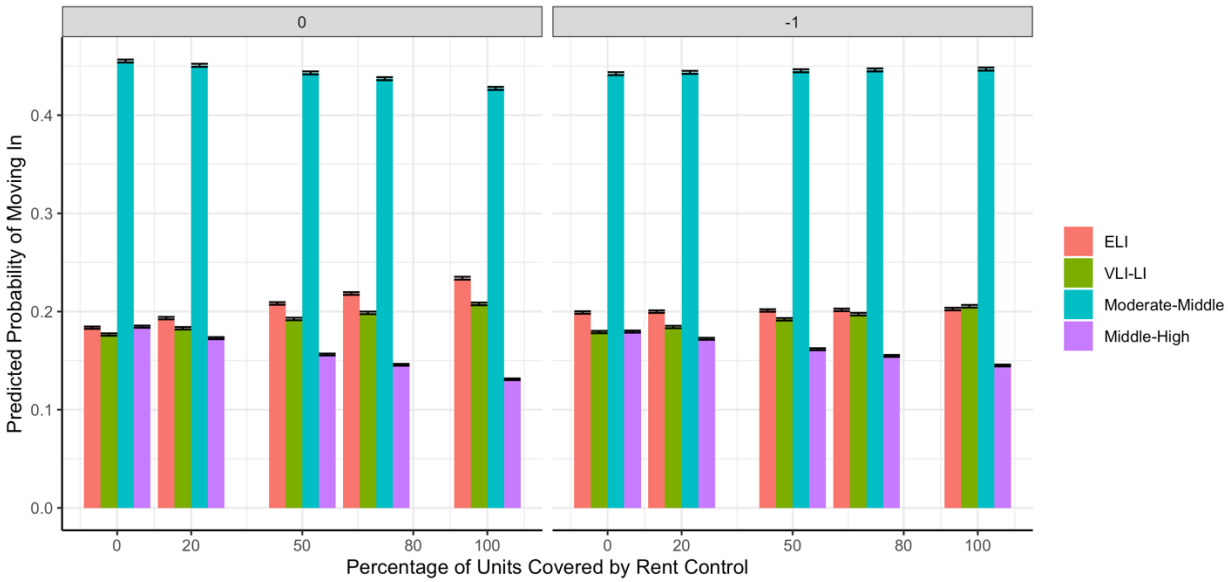
When considering inmigration into tracts containing block groups with tenant protections, there are some differences in the relative probabilities of each SES group moving in. More units covered by rent control in a block group is associated with relatively higher probabilities of lower SES inmovers to the surrounding census tracts, compared to the block group itself. ELI residents are more likely to be inmovers in the year units are covered and slightly more likely the year after, whereas VLI-LI residents are more likely to in both years. Moderate-middle SES residents are less likely to be inmovers in the same year but slightly more likely to by the year after. Middle-high SES residents are less likely to be inmovers in both years. For the share of just cause protected units, the effect is significant and negative for ELI residents and positive for moderate-middle SES residents in both years but negative for VLI-LI residents. Middle-high SES residents are more likely to be inmovers across both years. While moderate-middle SES residents are still the most likely to be inmovers, the probability of being an inmover is higher for ELI and VLI-LI residents overall in these models than in the block-group models.

Figure G3. Predicted Composition of Movers into Tracts by Percent of Units Covered by (a) Just Cause (b) Rent Stabilization

(a) Just Cause for Evictions



(b) Rent Stabilization

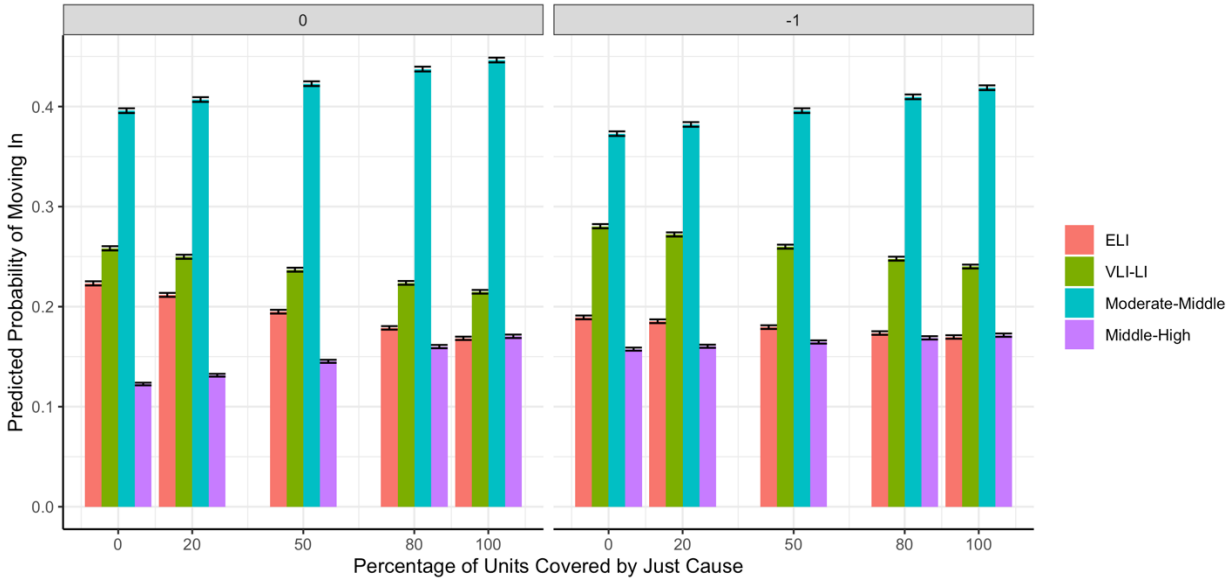


Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

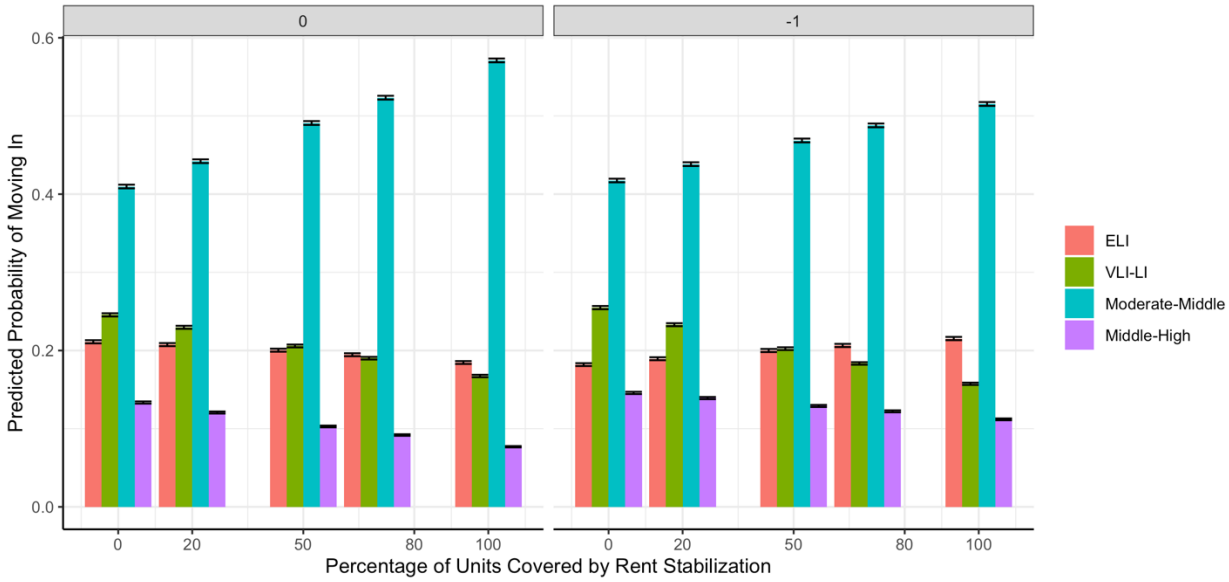
When considering the composition of inmigration of non-mortgage holders aged 25-64, it appears that rent control encourages inmigration of moderate-middle SES residents and of ELI residents the year after units are covered, but discourages it for everyone else. Just cause eviction protections discourage inmigration of ELI and VLI-LI residents but increases the probabilities of being an inmover for moderate-middle and middle-high SES residents.

Figure G4. Predicted Composition of Non-Mortgage Holding Movers Ages 25-64 into Tracts by Percent of Units Covered by (a) Just Cause (b) Rent Stabilization

(a) Just Cause for Evictions



(b) Rent Stabilization



Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Major Cities

We ran models separately for four select cities—Oakland, San Francisco, San Jose, and Santa Rosa. Recall that our predicted plots are based on the "average" case, which is the region East Bay (excluding Oakland). In these models, we removed the region variable and instead ran each

model separately for residents in our sample in each city. Note also that there were no units covered by tenant protections in Santa Rosa and no units were covered by just cause eviction protections prior to 2017 in San Jose. Results are plotted at the mean and mode values of the control variables for each city. Overall, we found that results are sensitive to the particular city, which is not surprising given the differing housing contexts of each city.

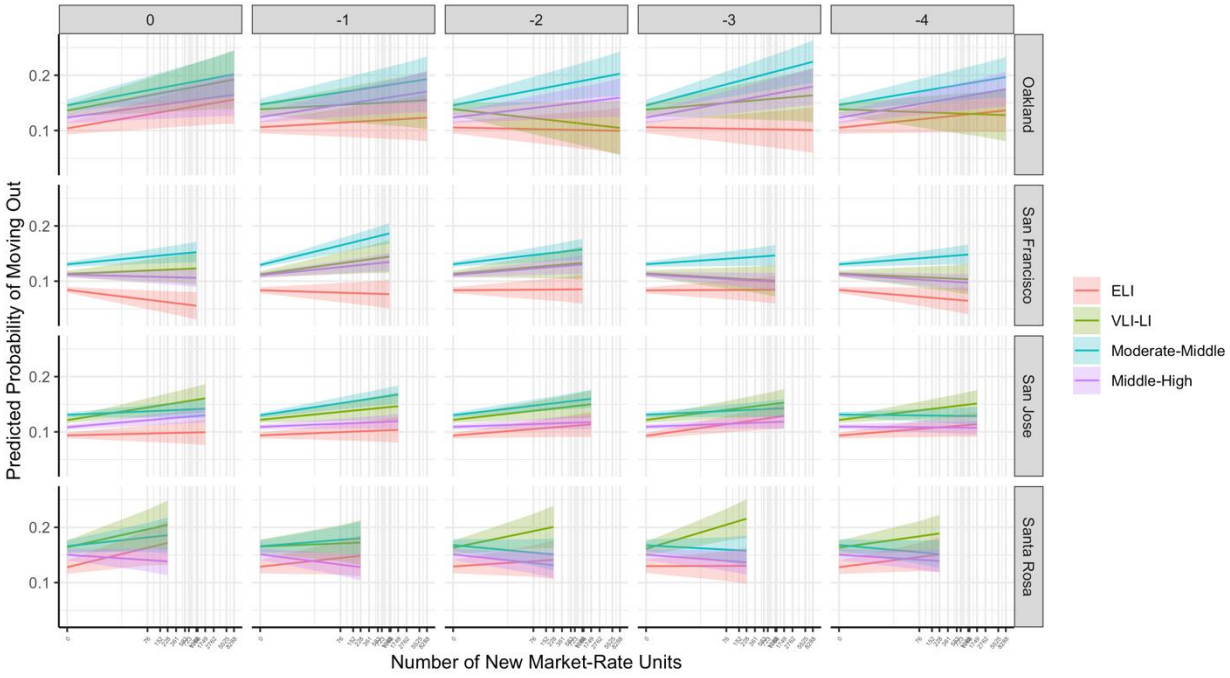
Outmigration

In Oakland, VLI-LI residents are more likely to move out in the year new subsidized units are built and ELI residents are more likely to do so 4 years after. In San Francisco, moderate-middle SES residents are more likely to move out in the year new subsidized units are built. In San Jose, VLI-LI residents are more likely to move out the year after. Effects of new market-rate production on ELI residents differ across all cities. Increases in market-rate units increases outmigration of ELI residents in some years in all cities except San Francisco where the effects are negative in some years. For VLI-LI residents, effects are positive in all cities except Oakland, where the effects vary between positive, negative, or insignificant over time. Effects are consistently positive in all cities except Santa Rosa, where the effects vary between negative and insignificant over time. Finally, effects are positive for middle-high SES resident in Oakland but vary between positive and negative in San Francisco and are insignificant in San Jose and Santa Rosa.

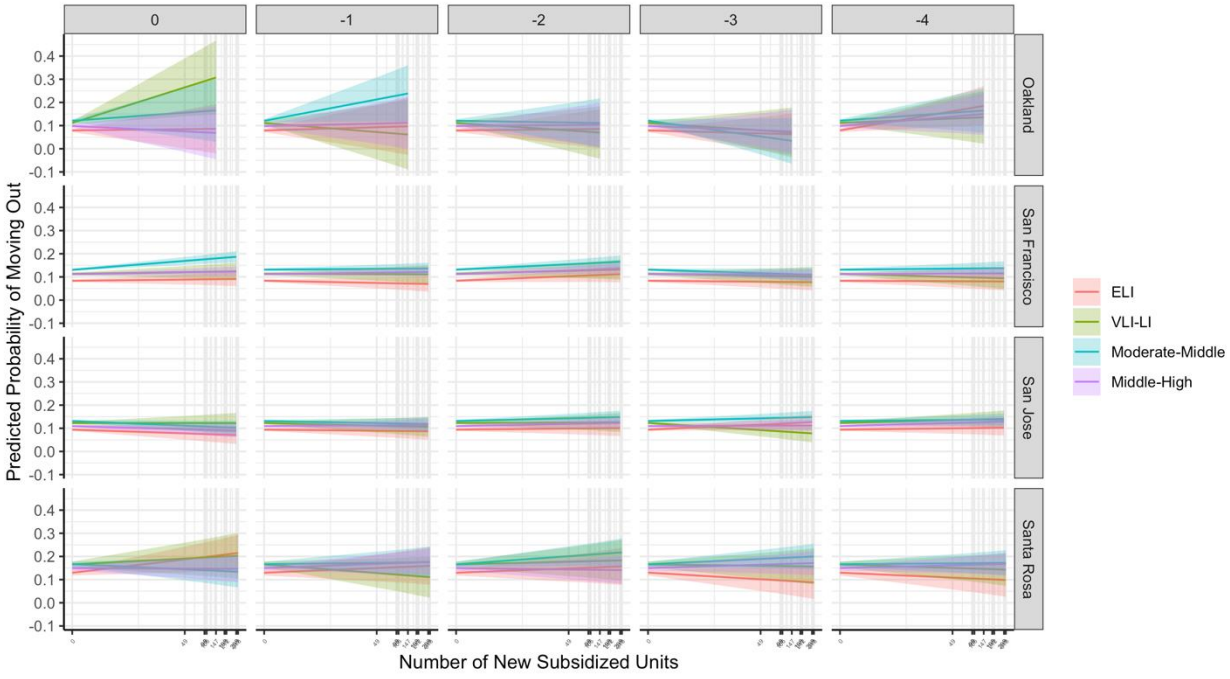
In Oakland, increases in rent control decrease outmigration for ELI, moderate-middle and middle-high SES people the year after units are covered but in San Francisco the effect is positive for moderate-middle SES residents in the same year and the year after. Increases in the percent of units covered by just cause protections generally increase outmigration for everyone in Oakland and San Francisco in the year units are covered but decrease it for everyone by the year after. Errors are wider for San Jose, which only adopted just cause protections in 2017, so did not have any just cause units in t-1.

Figure G5. Predicted Probabilities by SES of Moving Out of Block Groups by Number of New (a) Market-Rate (b) Subsidized Units

(a) Market-Rate



(b) Subsidized



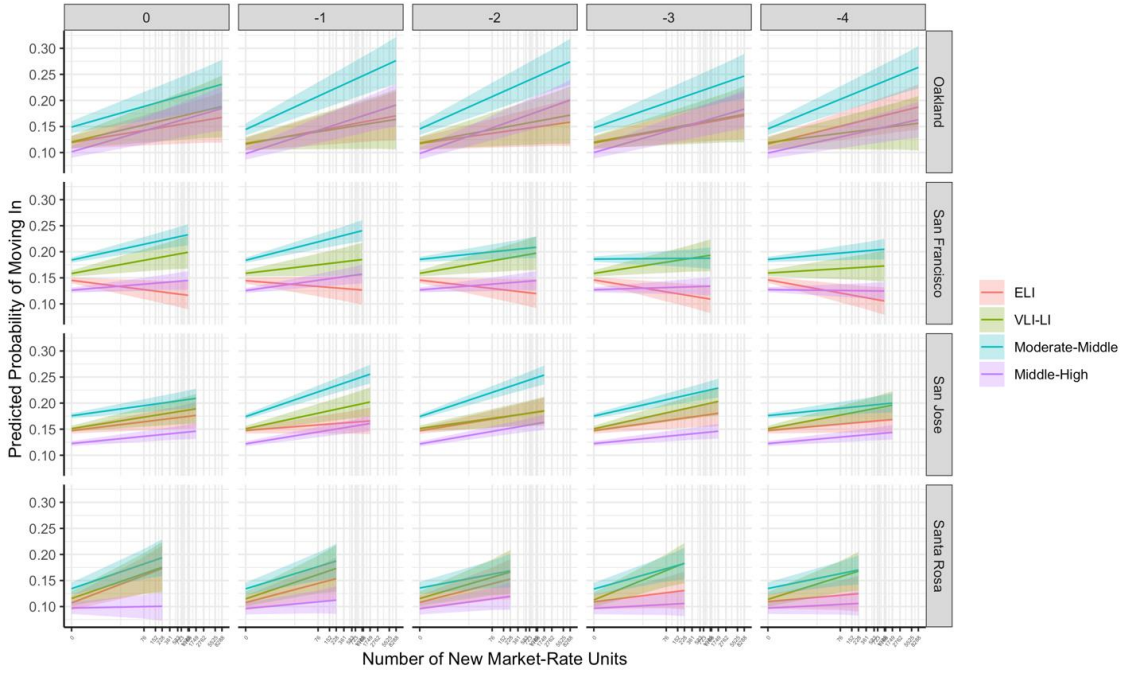
Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Inmigration

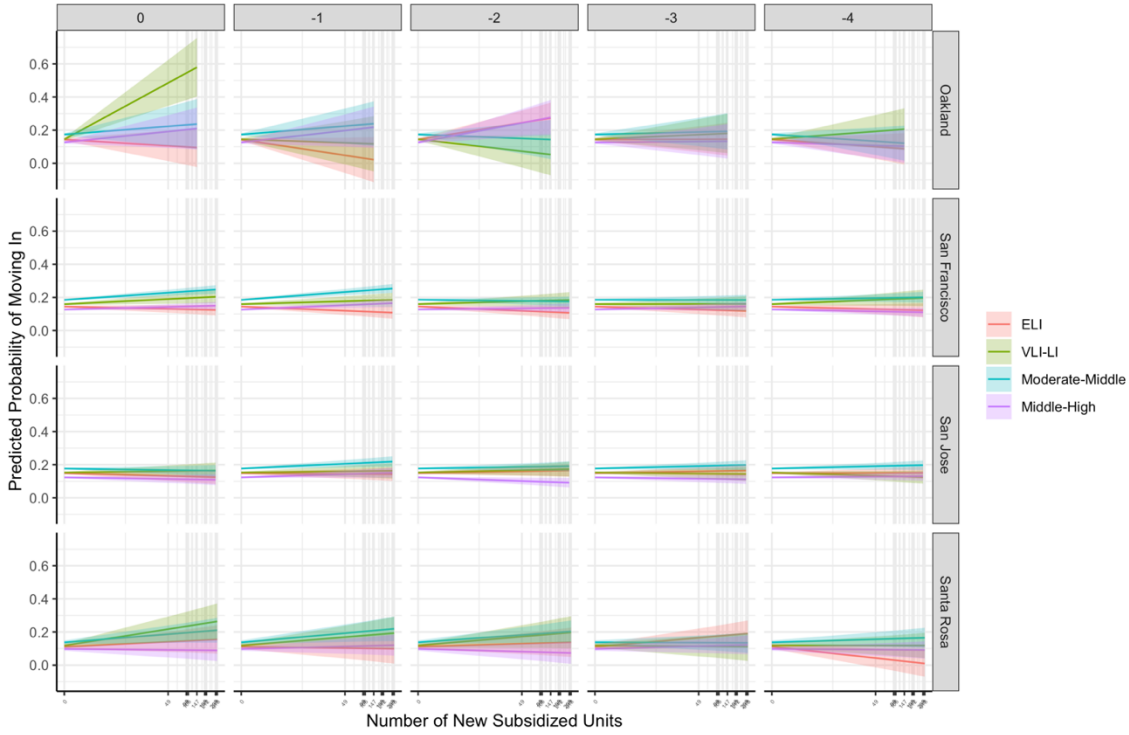
Construction of new subsidized units generally encouraged inmigration for a few years for all SES groups except ELI residents, and market-rate units generally encouraged inmigration for all SES groups in the main models. This is inconsistent across cities for subsidized units, with varying effects by SES. For example, in Oakland there is a positive effect only for VLI-LI residents in the year units are built and for ELI residents 2 years after. In San Francisco and San Jose there is a positive effect only for moderate-middle and high-SES residents the year after units are built but a negative one for ELI residents in San Francisco. Results in Oakland and San Jose are consistent with the findings from the main models, while in Santa Rosa results are consistent for all except middlde-to-high-SES residents for whom there are no significant effects. ELI residents stand out in San Francisco as having the opposite results from the main models for new market-rate production. In the main models, tenant protections increase the inmigration of moderate-middle SES residents but discourage inmigration for ELI residents, which is generally the case across the cities for rent control. One difference is that VLI-LI residents are also more likely to move in in the year units are covered by rent control. Just cause for eviction protections have no significant effects in San Francisco and Oakland, and estimates are too imprecise in San Jose due to the lack of block groups with protections over the period.

Figure G6. Predicted Probabilities by SES of Moving into Block Groups by Number of New (a) Market-Rate (b) Subsidized Units

(a) Market-Rate



(b) Subsidized

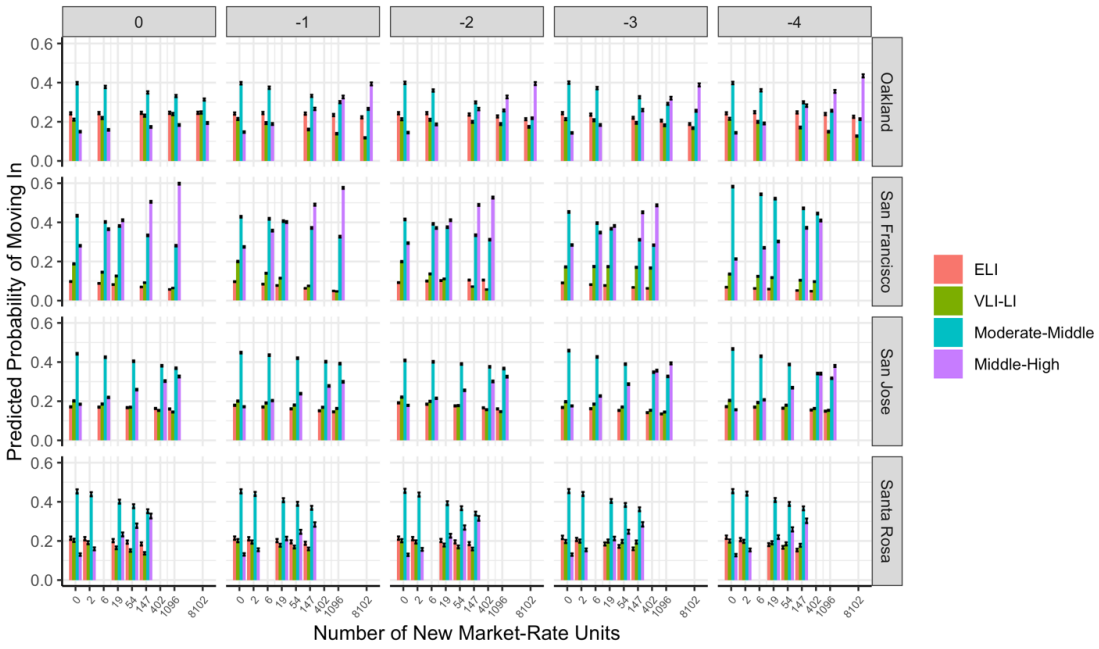


Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

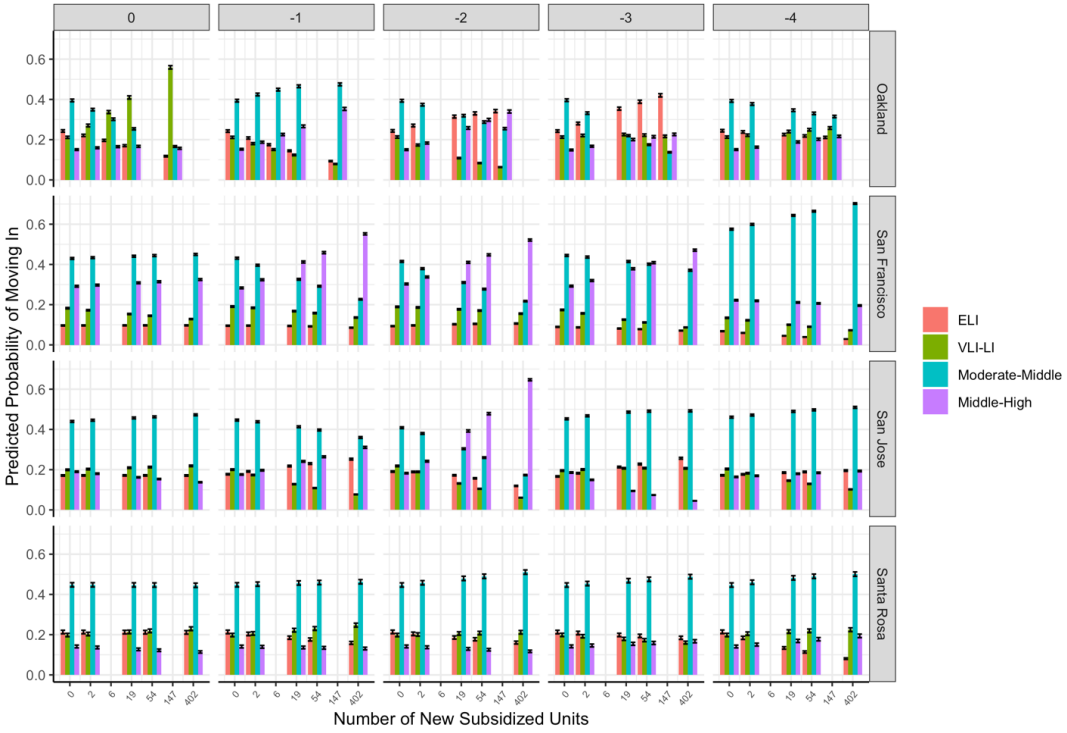
The predicted relative proportion of inmovers by SES on new production and tenant protections, based on multinomial logit models, differs markedly by city. In Oakland, for example, construction of subsidized units increases the proportion of inmovers who are ELI and VLI-LI in some years, whereas new subsidized units consistently increase the likelihood that inmovers are middle-high SES in San Francisco. Moderate-middle SES residents are consistently most likely to be inmovers in Santa Rosa. Market-rate units increases the proportion of inmovers who are middle-high SES but decrease it for everyone else in all cities, but the baseline proportion of inmovers who are ELI and VLI-LI is lowest in San Francisco. Rent control and tenant protections have little effects on the relative SES composition of inmovers, but the baseline proportions are very different across cities. Moderate-middle SES residents are still most likely to be inmovers everywhere, but the second most likely group is ELI residents in Oakland, middle-high SES residents in San Francisco, and ELI or VLI-LI residents in San Jose. San Jose stands out in the year units are covered (2017 only for San Jose) by just cause protections for the dramatic increase in proportion of inmovers who are middle-high SES. Due to the smaller sample sizes and scarcity of new production and tenant protections, we were not able to estimate models for non-mortgage holders ages 25-64 for each city.

Figure G7. Predicted Composition of Movers into Tracts by Number of New (a) Market-Rate (b) Subsidized Units

(a) Market-Rate



(b) Subsidized



Source: FRBNY Consumer Credit Panel/Equifax Data, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

ELI/VLI Residents

We ran alternative models combining extremely low- and very low-to-low-income ("ELI" and "VLI-LI") residents into one SES group to test whether results for the ELI/VLI combined group would be more similar to Berkeley's very low-SES groups. In these models, the effects of new subsidized units on outmigration are strong and positive for ELI/VLI-LI residents 2 years after units were built but not otherwise. This is the same in the non-mortgage-holding sub-sample. The results are still different from Berkeley's results showing a negative effect for very low-income households starting the year after units are built. The effects of new market-rate units on outmigration are positive for ELI/VLI-LI residents with effects lasting up to 3 years after units were built. In the non-mortgage-holding sample of residents ages 25 to 64, there were effects only in the same year, the year after and 3 years after. This is similar to Berkeley results showing an increased likely to move out among very low-income households in all years.

The linear probability models predicting the effect of subsidized units on inmigration showed positive effects for ELI/VLI-LI residents 2 years after units were built. In the non-mortgage holding subsample, there were weak positive effects lasting up to 3 years after. This is similar to Berkeley results showing positive effects for very low-income households 2 years after units are built, but dissimilar from Berkeley results showing a negative effect 3 and 4 years after. Market-rate units have a positive effect on ELI/VLI-LI inmigration in all years, but, in the non-mortgage holding subsample, there are only weak positive effects 1 and 3 years after units are built. This is consistent with results from Berkeley.

The multinomial probability models predicting the composition of inmovers showed that both subsidized and market-rate units decrease the probability that inmovers are ELI/VLI-LI in all years. However, the non-mortgage holding sample between 25-64 years old showed that ELI/VLI-LI residents are most likely to be inmovers, with positive effects for subsidized units in the same year and the year after units are built. This is generally consistent with Berkeley results showing a negative effect for very low-income households in the year, 2 and 3 years after units are built but inconsistent with Berkeley results showing a positive effect in the other years. When considering market-rate units, ELI/VLI-LI people are less likely to be inmovers across all years as the number of new units increased, but are still nevertheless most likely to be inmovers overall. In the non-mortgage holding sample, ELI/VLI-LI residents are less likely to be inmovers than are moderate-middle SES people at higher number of market-rate units in the same year, 1 year, and 2 years after units are built. This is consistent with Berkeley results showing a negative effect for very low-income households in all years.

Models predicting outmigration on the share of rent controlled units show negative effects for ELI/VLI-LI outmigration in the year after covered units are counted. This is also the case in the non-mortgage holding sub-sample. Just cause protections also decrease ELI/VLI-LI outmigration the year after in both the full and non-mortgage holding sub-sample. This is overall consistent with Berkeley results showing a negative effect for very low-income households in both years.

Models predicting inmigration show that increases in units covered by rent control reduces inmigration of ELI/VLI-LI people in the year units are covered in both the full sample and the subsample of non-mortgage holding individuals ages 25 to 64. Results are the same for just cause

protected units. This is overall consistent with Berkeley results showing a negative effect for very low-income households in both years.

The multinomial probability models predicting the composition of inmovers showed that inmovers are more likely to be ELI/VLI-LI as the percent of units covered by rent control and just cause increased in both years. In the non-mortgage holding subsample for individuals ages 25-64, ELI/VLI-LI residents are again most likely to be inmovers. Increases in percent of units covered by rent control increase the probability that inmovers are ELI/VLI-LI in both years, and only in the year after for percent of units covered by just cause, where there were no effects for them in the same year. This is overall consistent with Berkeley results showing a positive effect for very low-income households in both years.

Appendix H. Block Group-Level Models, Infogroup

New Production

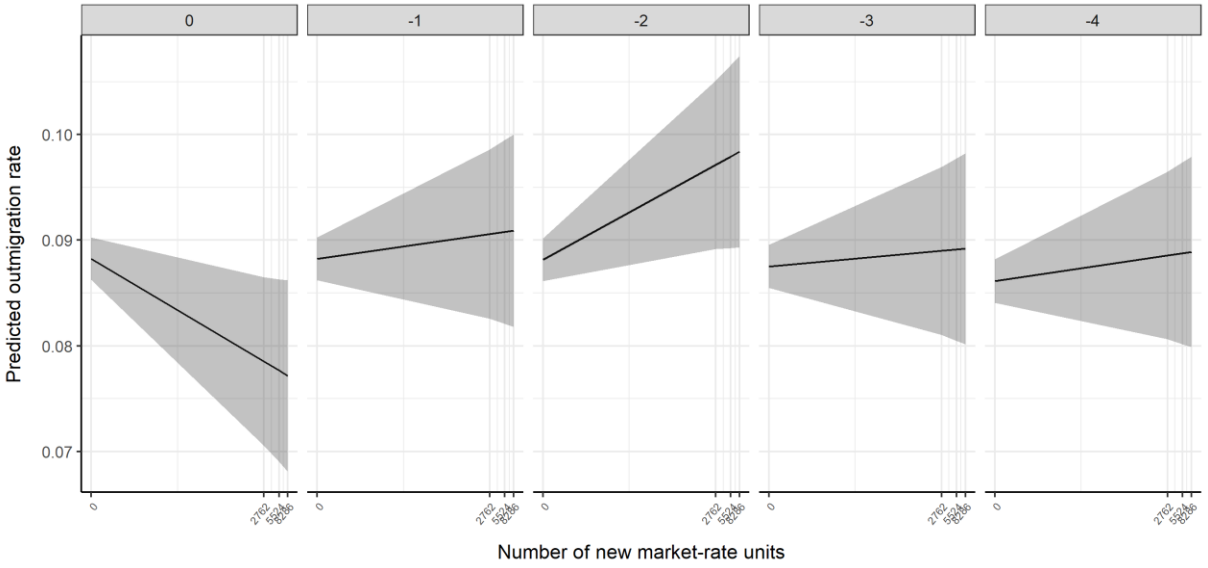
Outmigration

Block group models present the aggregate out- and inmigration rates for the affected block groups, instead of individual household impacts. These thus offer less precise estimates of household movements; for example, we do not know if an individual household moving out lived in the area prior to the housing market intervention (such as new construction or just cause). New production of market-rate units had mixed effects on outmigration rates. Overall, after an initial decrease in outmigration rate, it increases sharply after 2 years before stabilizing (Figure H1a). For low- and moderate-SES households (Figure H2a), outmigration also declines in year 0 and increases sharply after 2 years, and continues to increase through year 4, albeit at a decreasing rate.

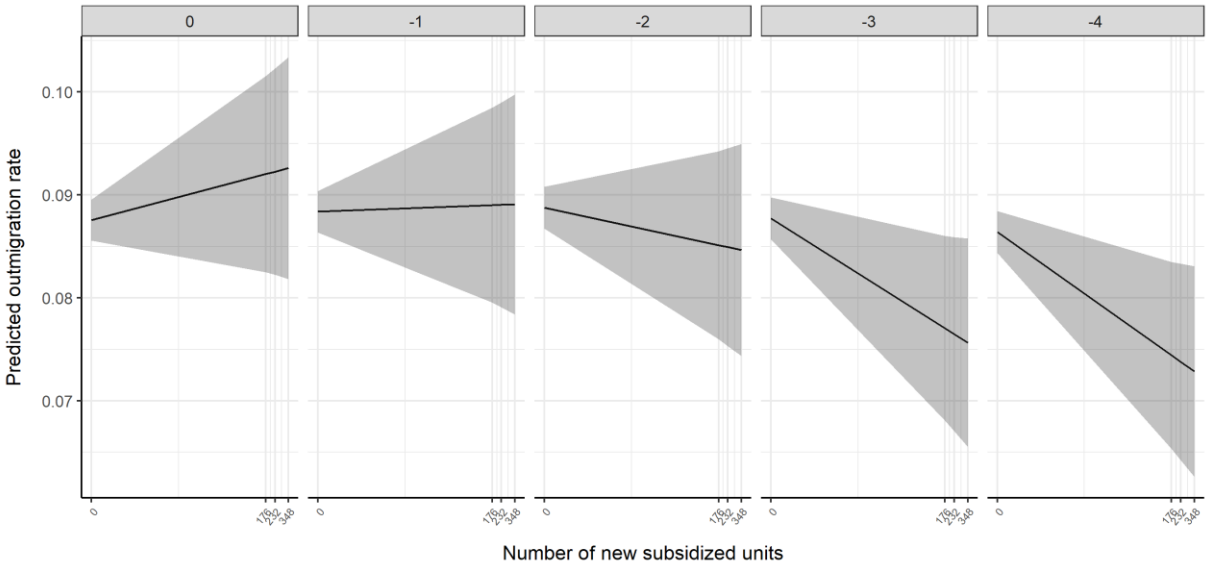
With new production of subsidized units, overall outmigration rates increase through year 2, but then decrease in year 3 and 4 (Figure H1b). For low- and moderate-SES groups (Figure H2b), results are mixed in the first 2 years, but by the third year outmigration declines.

Figure H1. Predicted Block Group Outmigration Rate by Number of New (a) Market-Rate and (b) Subsidized Units

(a) Market-Rate



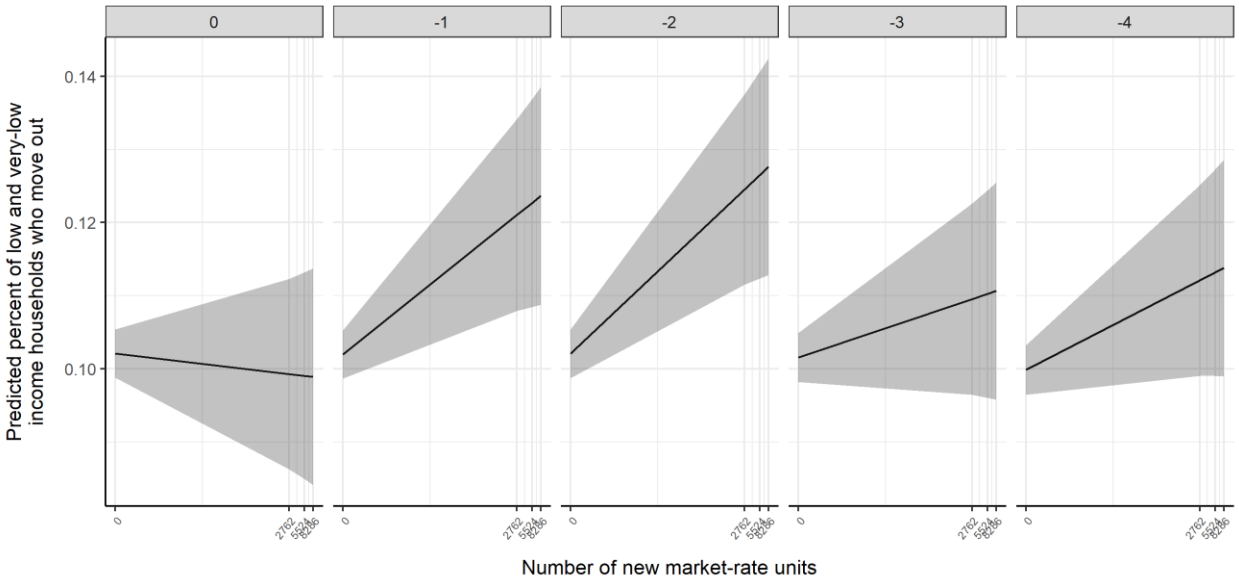
(b) Subsidized



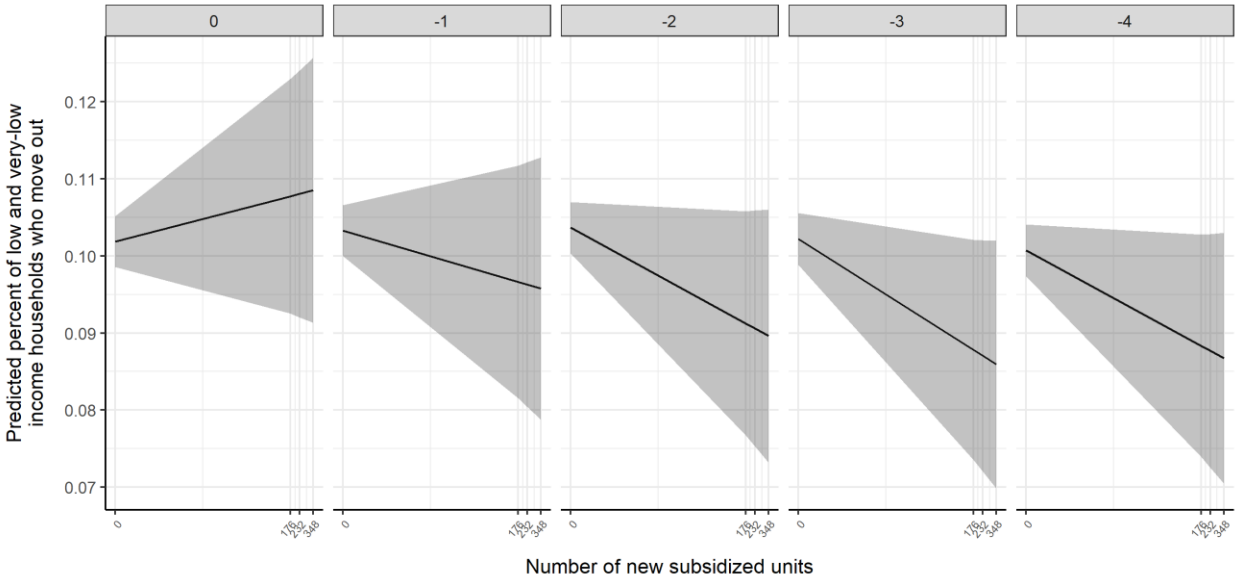
Source: Infogroup, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Figure H2. Predicted Percent of Very Low- and Low-Income Residents Moving Out with New (a) Market-Rate and (b) Subsidized Units

(a) Market-Rate



(b) Subsidized

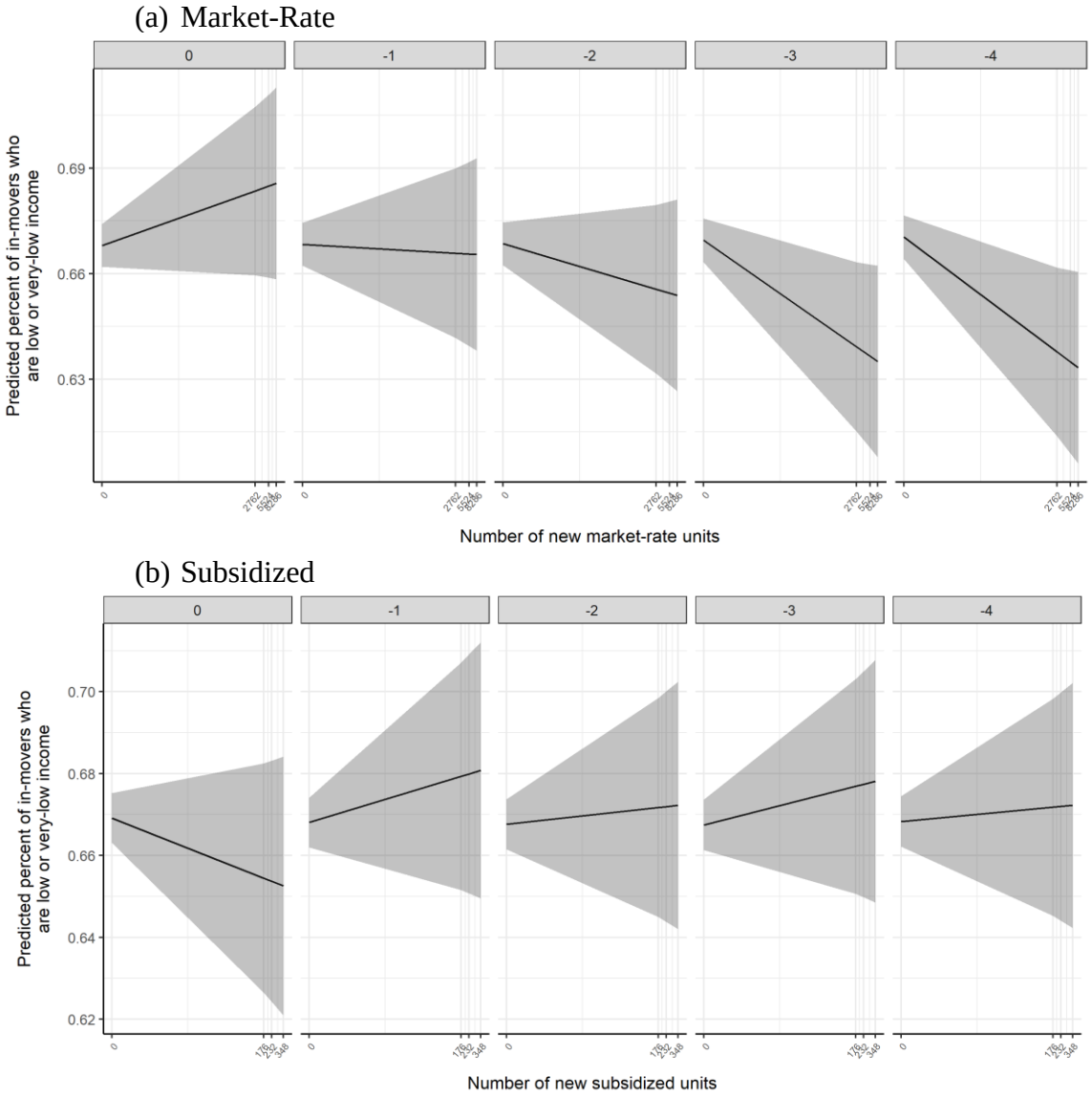


Source: Infogroup, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Inmigration

Looking at aggregate inmigration rates at the block group level (Figure 18) reveals that market-rate construction is associated with overall decreases in inmigration, except for in the year of construction. In contrast, new subsidized units increase overall inmigration, except for in the year of construction. These results use multinomial logistic regression models predicting whether very low-, low-, or middle-income residents relative to high-income residents move into neighborhoods.

Figure 18. Predicted Percent of Inmovers Who Are Very Low- and Low-Income with New (a) Market-Rate and (b) Subsidized Units



Source: Infogroup, UDP New Housing Production Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

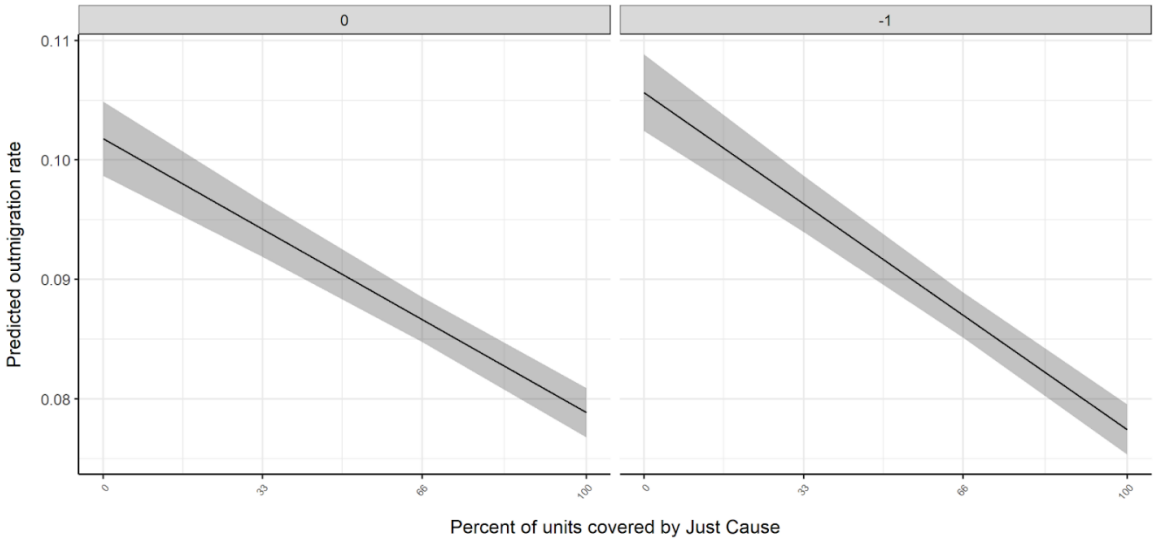
Tenant protections

Outmigration

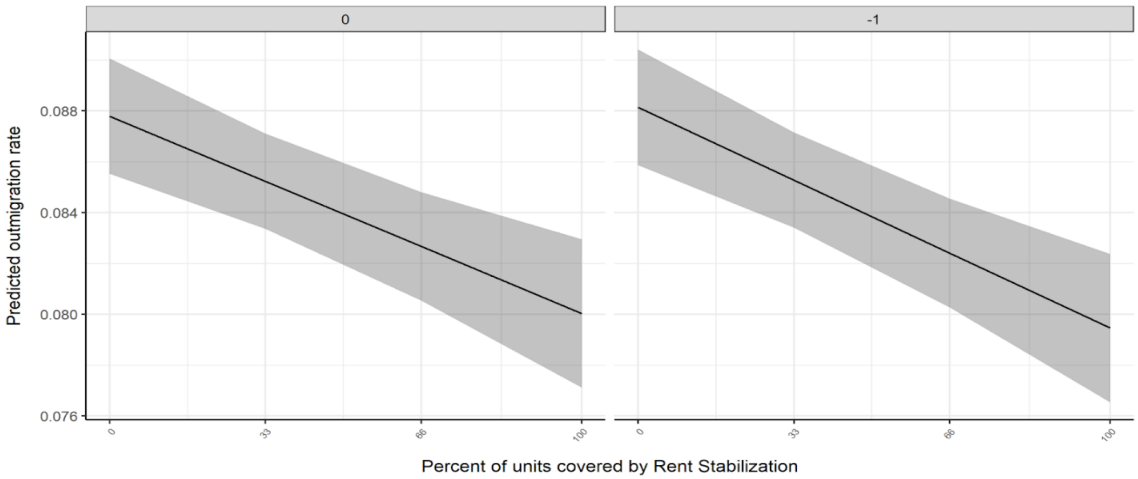
Looking again at aggregate outmigration at the block group level, Figure H1 shows sharp declines in outmigration with increasing shares of units covered by just cause, as well as somewhat more moderate declines associated with rent stabilization. Figure H2 confirms these results looking only at very low- and low-income households.

Figure H1. Predicted Block Group Outmigration Rate by Percent of Units Covered by (a) Just Cause and (b) Rent Stabilization

(a) Just Cause for Evictions



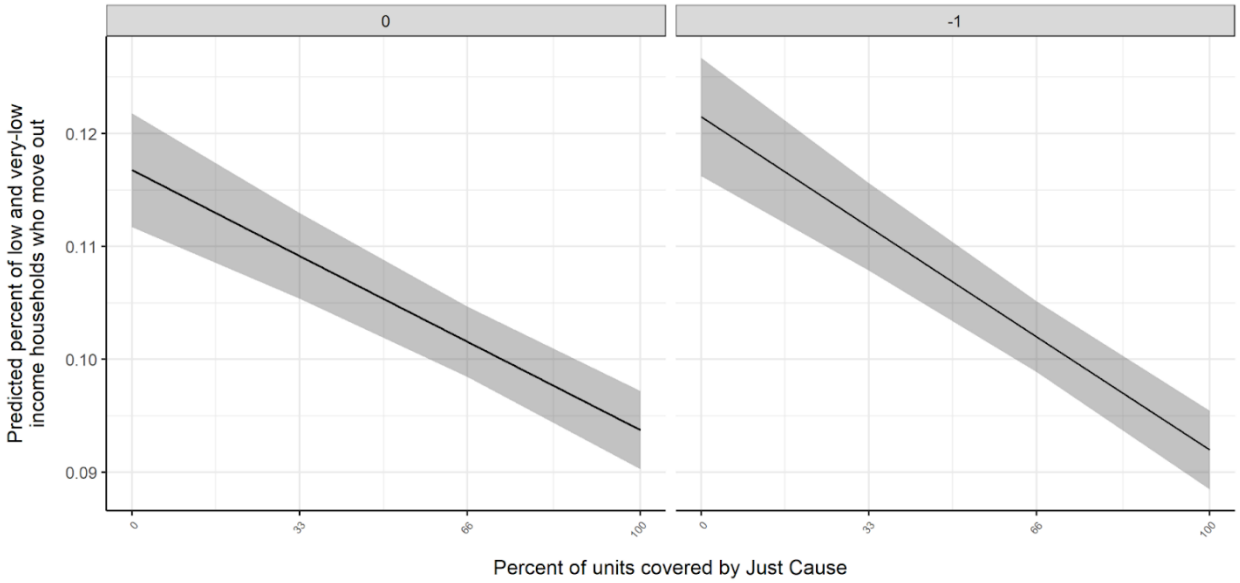
(b) Rent Stabilization



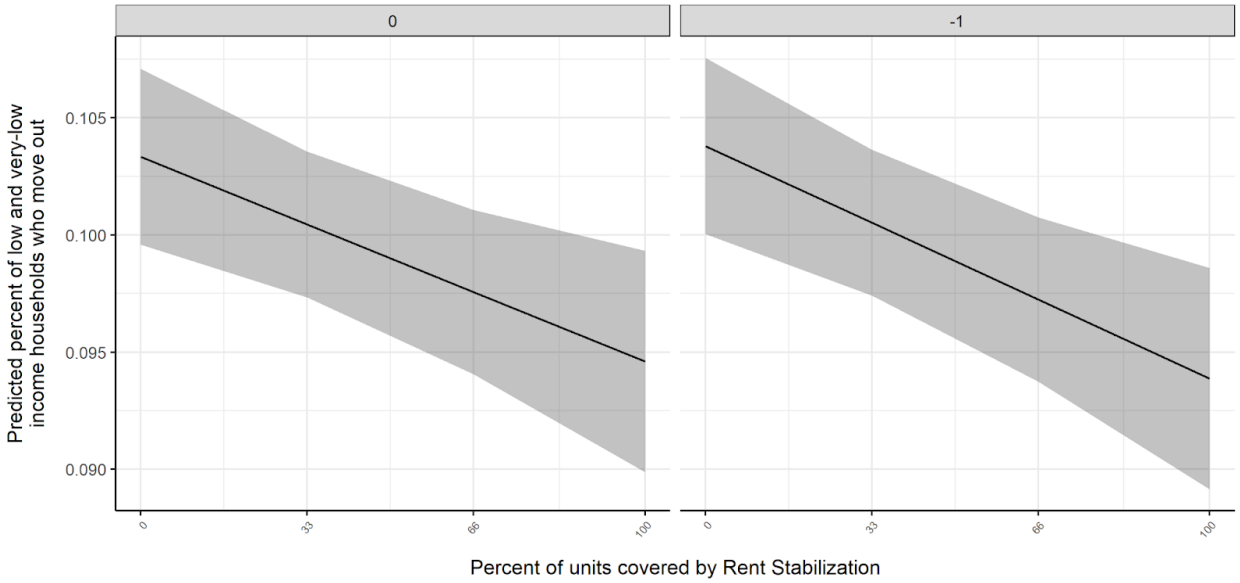
Source: Infogroup, UDP Tenant Protection Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Figure H2. Predicted Percent of Very Low- and Low-Income Households Moving Out by Percent of Units Covered by (a) Just Cause and (b) Rent Stabilization

(a) Just Cause for Evictions



(b) Rent Stabilization



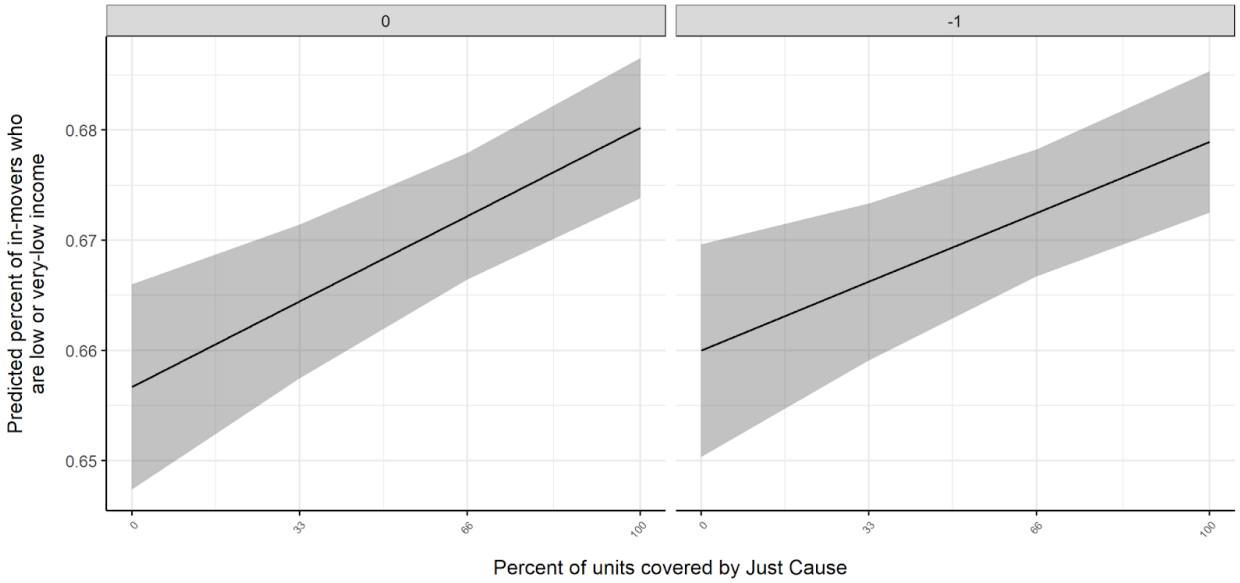
Source: Infogroup, UDP Tenant Protection Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Inmigration

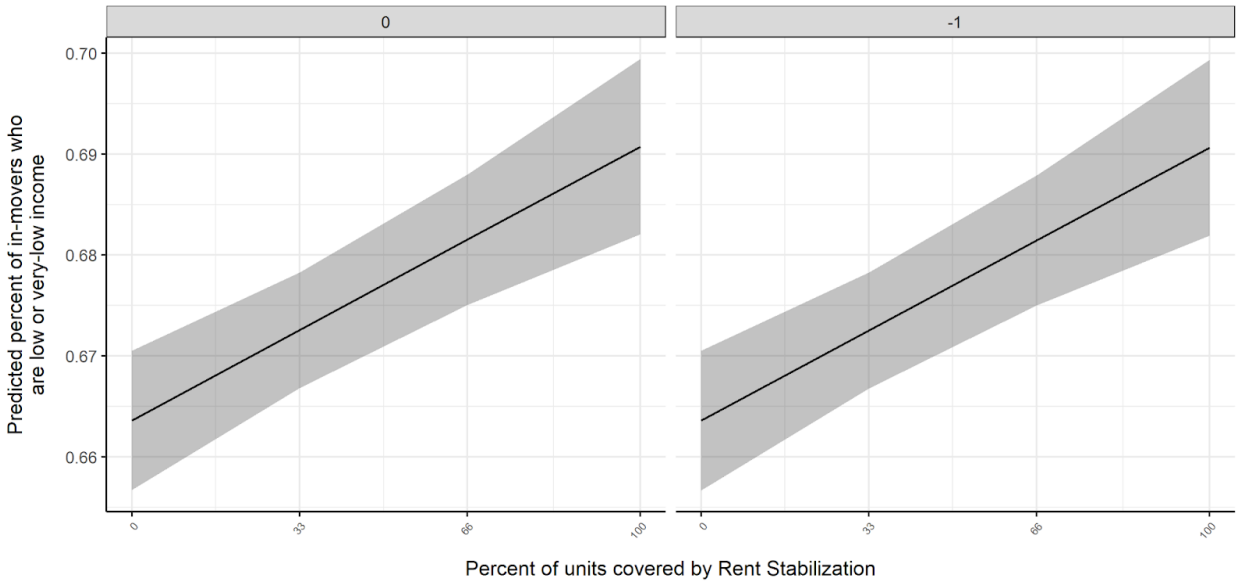
The block-group level models looking at aggregate results (Figure H3) show that tenant protections predict a significantly greater share of inmovers who are very low- and low-income, both in the same year and the year after.

Figure H3. Predicted Percent of Inmovers Who Are Very Low- and Low-Income by Percent of Units Covered by (a) Just Cause and (b) Rent Stabilization

(a) Just Cause for Evictions



(b) Rent Stabilization



Source: Infogroup, UDP Tenant Protection Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Appendix I. Sensitivity Analysis, Infogroup

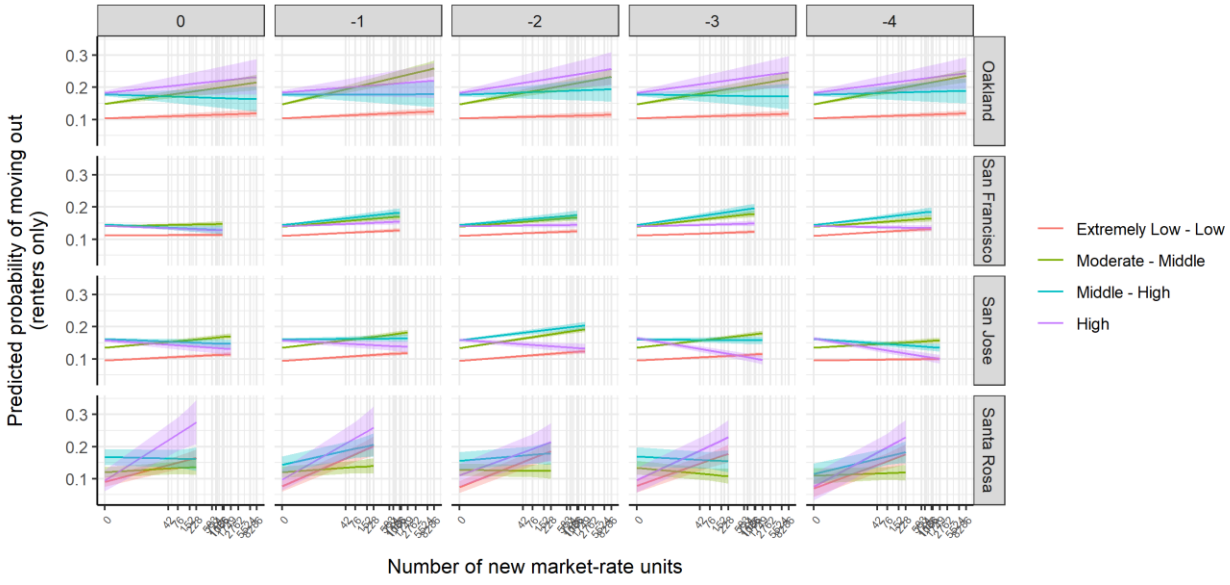
Major Cities (Oakland, San Francisco, San Jose, and Santa Rosa)

In order to determine whether our effects were robust across different geographies, we ran regression models separately for four select cities that contrast in terms of location, housing policies, and density—Oakland, San Francisco, San Jose, and Santa Rosa. (There were no units covered by tenant protections in Santa Rosa and no units were covered by just cause eviction protections prior to 2017 in San Jose.) Results of the sensitive analyses follow.

Outmigration

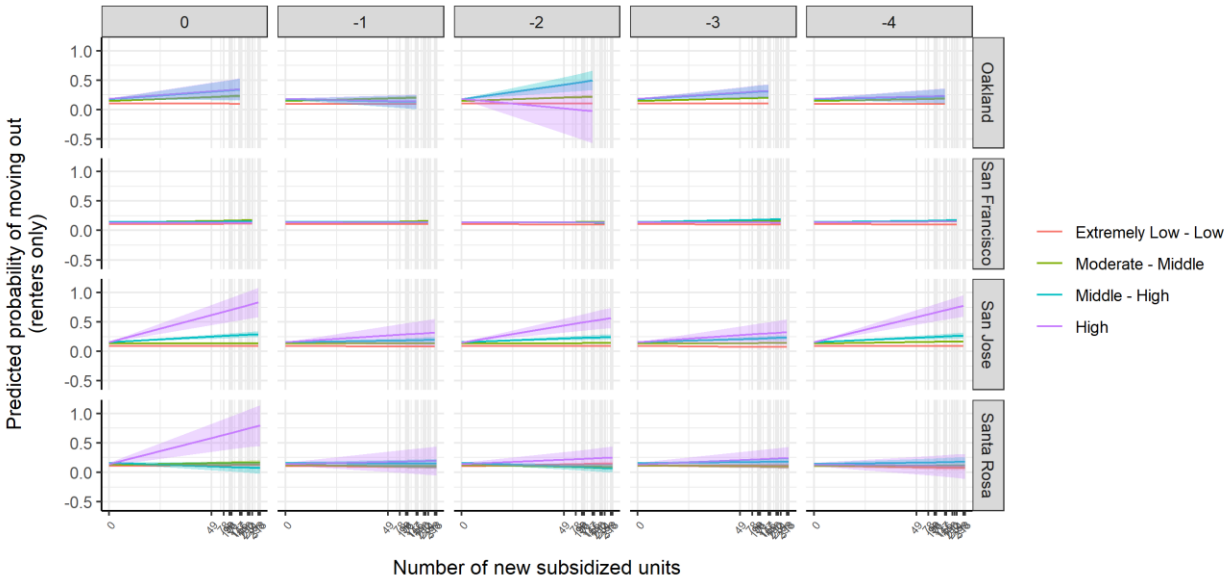
Across the cities, market-rate construction is associated with slight increases in outmigration, with some notable exceptions for high-income groups, for whom outmigration is flat or decreases in San Francisco and San Jose. In general, new housing construction has the least impact on low-SES households in these cities except for Santa Rosa. In contrast, subsidized housing construction seems to have little or no impact on outmigration across the selected cities.

(a) Market-Rate Units



Source: Infogroup, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

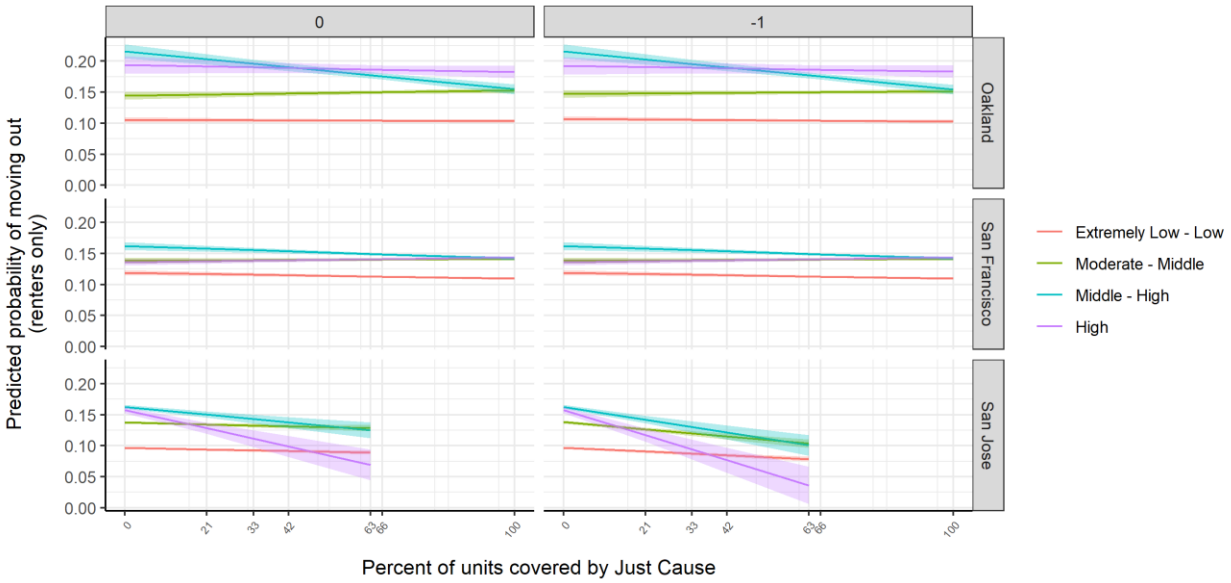
(b) Subsidized Units



Source: Infogroup, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

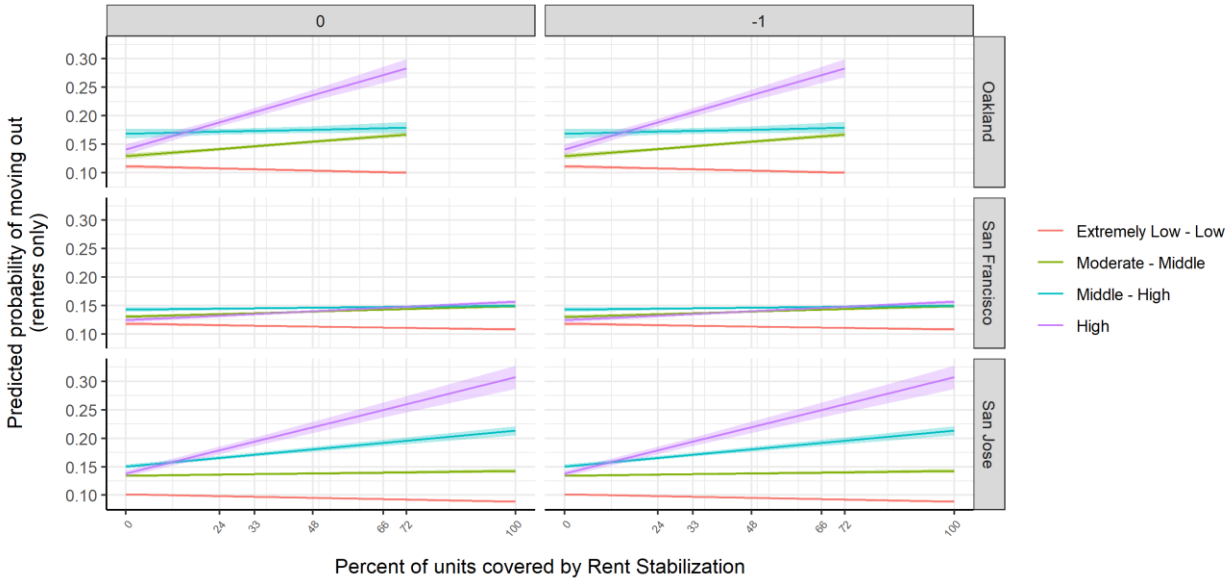
Just cause ordinances are generally associated with stable or declining outmigration rates across cities, with the steepest declines for middle-SES households. In contrast, rent stabilization ordinances are generally associated with increased outmigration from the core cities for all SES groups except low-SES households, who are more likely to remain in place.

(c) Just Cause for Evictions



Source: Infogroup, UDP Tenant Protection Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

(d) Rent Stabilization

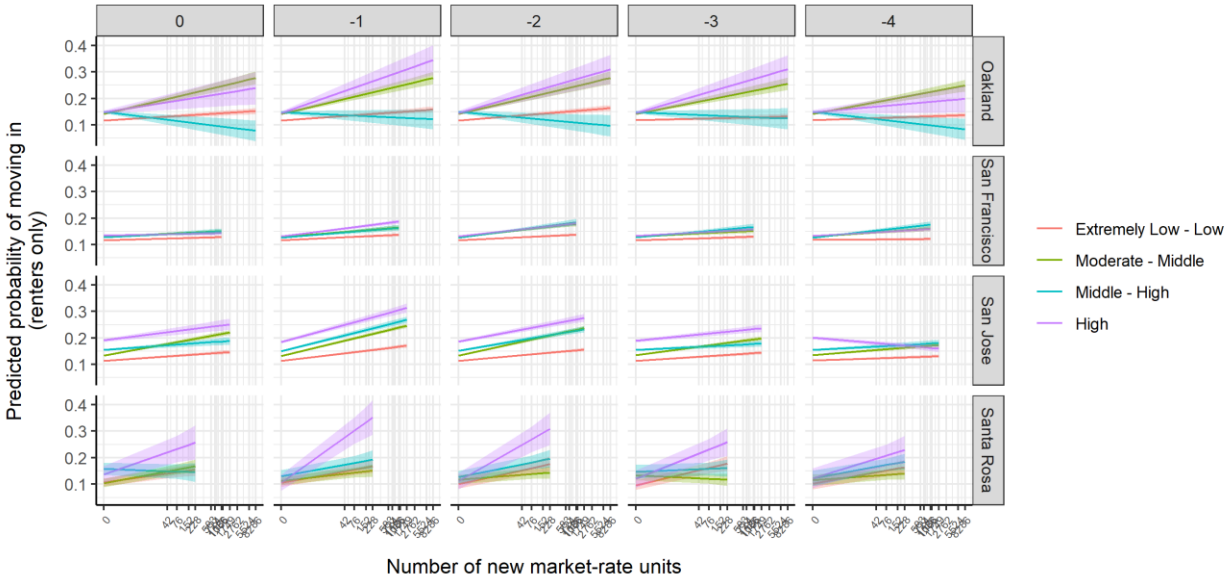


Source: Infogroup, UDP Tenant Protection Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

Inmigration

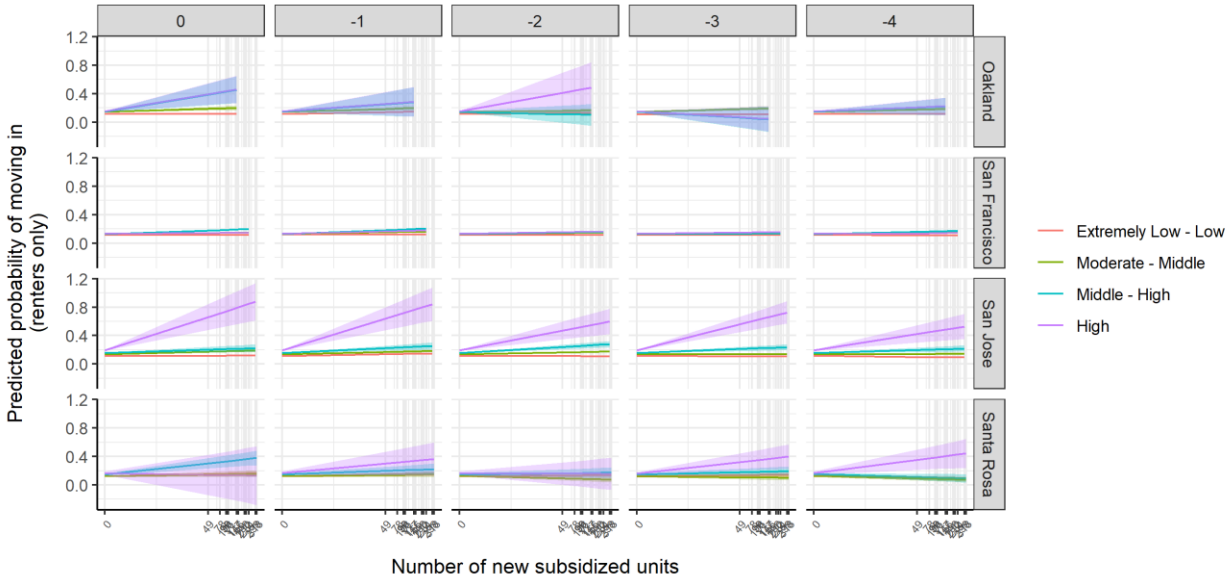
For most cities and income groups, market-rate production spurs increased inmigration; one notable exception is middle-SES households in Oakland, where inmigration decreased. The construction of subsidized units has little impact on inmigration with the exception of high-SES households, who are more likely to move into San Jose and Santa Rosa.

(a) Market-Rate Units



Source: Infogroup, UDP Tenant Protection Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

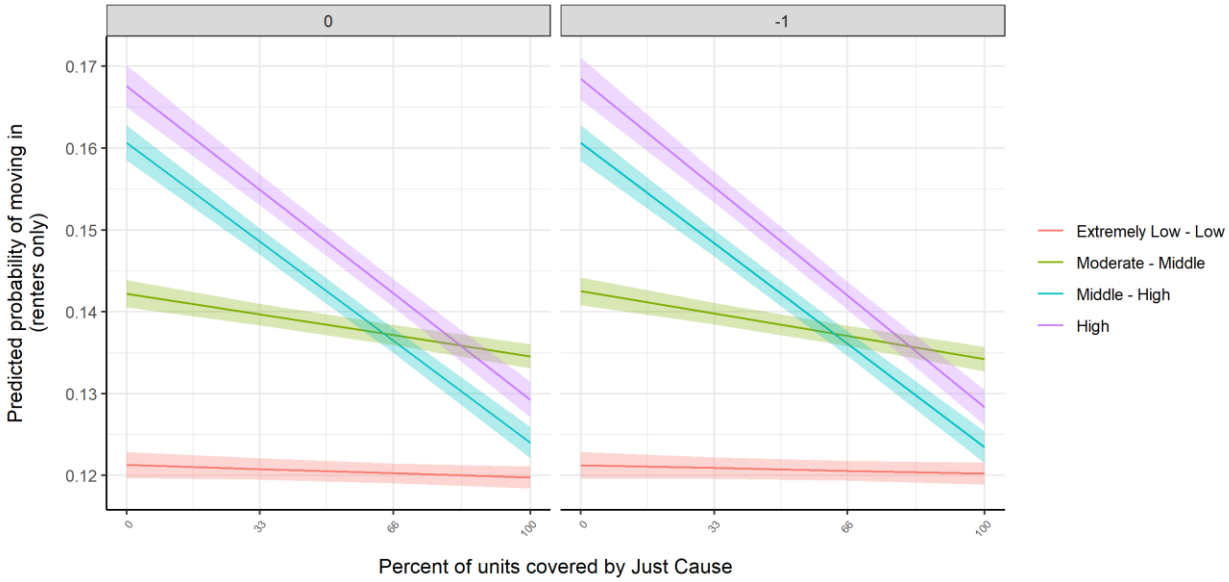
(b) Subsidized Units



Source: Infogroup, UDP Tenant Protection Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

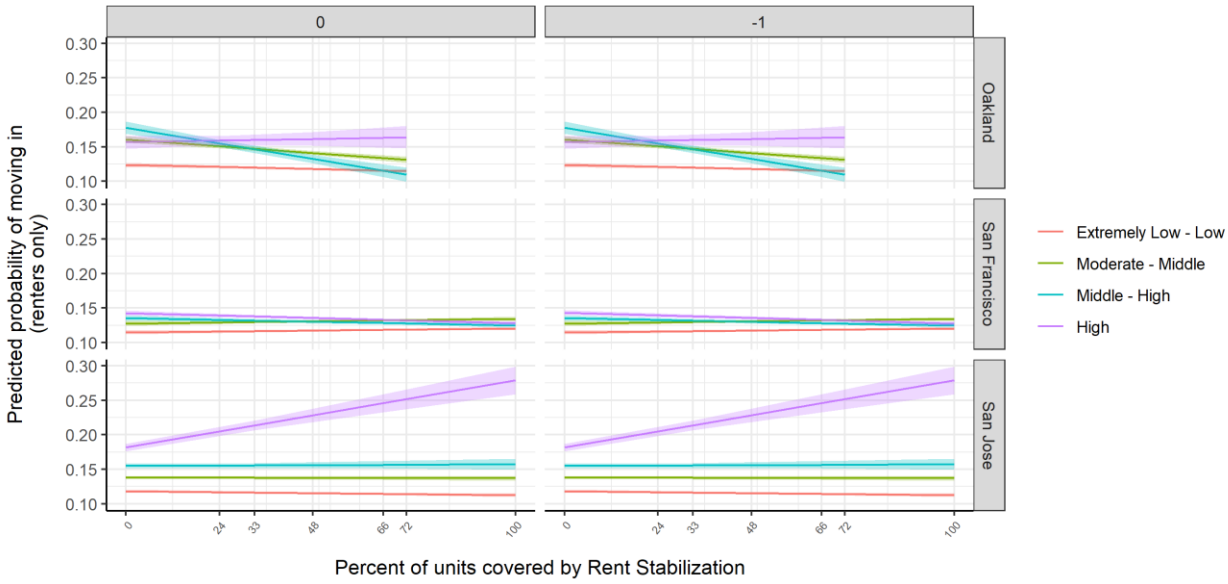
Just cause ordinances are associated with declines in inmigration across SES groups, particularly for middle-SES households in Oakland and middle- and high-SES households in San Jose. However, low-SES households in San Francisco and San Jose experience slight increases in inmigration rates. Rent stabilization ordinances are associated with flat or decreasing inmigration across cities and SES groups with the exception of high-SES households moving into San Jose.

(c) Just Cause for Evictions



Source: Infogroup, UDP Tenant Protection Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database

(d) Rent Stabilization



Source: Infogroup, UDP Tenant Protection Database, 2000 US Census, and the 2016 Neighborhood Housing Preservation Database