The Downmarket Impact of New Multifamily Housing: Evidence from a Honolulu Condo Tower

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Abstract

We test whether new condominium construction generates vacancies in a local housing market through induced moves. Using detailed address-history microdata, we track households who moved into a newly built 512-unit condominium tower in Honolulu, Hawai'i, which included both market-rate and income-restricted units. We identify prior addresses and follow vacancy chains across multiple rounds of moves. The vacated homes were substantially cheaper than the new units and spanned diverse locations and housing types. Income-restricted units produced fewer secondary vacancies, but those vacancies were concentrated at lower price points. Our results show that new condominium construction eases supply constraints and expands local affordability. The distinct filtering dynamics between market-rate and income-restricted units have important implications for inclusionary zoning policies.

Keywords: Housing supply; Urban development; Land-use regulation; Filtering
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1 Introduction

The construction of condominiums is often contentious (Einstein et al., 2019). Critics argue that modern towers primarily serve investors and wealthy households, offering little to improve local affordability (Been et al., 2019, 2024; Elmendorf et al., 2025). For example, in Honolulu, a city councilmember, debating a 26-story condo project asked, "Where is the benefit to the Hawai'i working family?... I don't see it with this property."[1] In contrast, a growing body of economic research argues that new market-rate housing supply generally enhances affordability through housing filtering, in which new units trigger vacancies in lower-priced market segments via household moves (Asquith et al., 2023; Mast, 2023).

We present new evidence of housing filtering from one large development project. Our case is The Central, a 512-unit condominium tower in Honolulu completed in 2021. The focus on a single building allows us to provide highly granular analysis that diagrams the filtering process. The development offers several advantages for analysis: it is large, recent, and contains both market-rate and income-restricted units. This mix allows us to compare filtering patterns across unit types while holding constant building, location, and sales timing. The development was permitted under a state level affordable housing program, which expedites projects with affordable components and parallels inclusionary zoning policies elsewhere.

Using detailed address-level microdata, we trace moving chains originating with the initial residents of The Central and document four main findings. First, we show the building generated a substantial number of local vacancies. We identify 180 specific addresses that became vacant because of moves into The Central. Scaling to account for data coverage suggests the new tower induced more than 500 local vacancies in the three years after construction, by setting off chains of moves. Second, while The Central units were expensive on a per-square-foot basis, the homes vacated by movers were significantly cheaper. Homes left behind by those moving into The Central were about 40% less expensive. Unlike much of the prior literature, which tracks the changing neighborhood characteristics of movers (Asquith et al., 2023; Mast, 2023; Bratu et al., 2023), we focus on the value and characteristics of the actual units vacated. Third, we find that households typically relocate to neighborhoods with higher socioeconomic characteristics compared to where they lived before, providing evidence for improved

[1] *Hawaii News Now*, "Planned Ala Moana luxury condos being marketed in China face City Council opposition" (May 10, 2017).

neighborhood access. Fourth, we find important differences between market-rate and income-restricted units: both induce local vacancies, market-rate units generate relatively more vacancies, and moving chains initiated by an income-restricted unit are more likely to involve low priced units. These findings are important for considering the trade-offs implied by inclusionary zoning policies and the distinction is particularly important in the U.S. context, where debates about inclusionary zoning hinge on the relative effectiveness of each housing type.

Our empirical findings are grounded in a long-standing theoretical literature on housing filtering. Classic urban economic models, such as those developed by Arnott and Braid (1997), demonstrate how housing, as a durable good, transitions across quality tiers over time to reach different segments of the market. Within this theoretical framework, scholars have explicitly modeled the mechanics that our case study observes: Braid (1986) models the dynamics of filtering when a market features distinct income groups, and Braid (1984) evaluates the market effects of government housing interventions within a filtering model. While these foundational papers established the conceptual mechanics of filtering, empirically testing their micro-level predictions has historically been challenging.

Few data sets allow researchers to track individual households at the address level, which is necessary to directly analyze housing filtering (Phillips, 2020). Recent studies have made significant progress using consumer and comprehensive administrative microdata to bridge this gap between theory and evidence (Asquith et al., 2023; Mast, 2023; Bratu et al., 2023). For example, Mast (2023) uses address histories from major U.S. cities to show that new market-rate construction generates vacancies that extend into lower-income neighborhoods. In European contexts, administrative records offer complete coverage of residential moves and detailed mover demographics. Bratu et al. (2023) find that new construction in Helsinki spurs local moves, with social housing projects inducing more vacancies in affordable neighborhoods than market-rate projects. In contrast, Turner and Wessel (2019) use Norwegian census data to examine vacancy chains in Oslo, finding that many new projects fail to generate extensive chains, as units are often occupied by newly formed households or in-migrants rather than freeing up local dwellings.

Despite these advances, observing the exact physical and financial attributes of vacated housing units remains a challenge. Most studies of filtering (Bratu et al., 2023; Asquith et al., 2023; Mast, 2023; Turner and Wessel, 2019) measure neighborhood-level transitions among movers. Bratu et al. (2023), for instance, uses rich individual de-

mographic information of movers, and precise location information of housing units, but does not use unit-specific prices or characteristics. Past results illuminate how new housing improves access to high quality neighborhoods, which is an important determinant of upward mobility (Chetty et al., 2016; Chetty and Hendren, 2018a,b). Yet relying on neighborhood averages can be misleading. High-income households sometimes live in expensive homes within low-cost neighborhoods, so observing moves from such areas does not guarantee that low-cost homes are being vacated.

Our paper complements this literature by addressing this neighborhood-level bias. While our consumer reference data capture only a subset of total moves compared to population-wide administrative registers, our focus on a single building allows us to manually clean and link exact address histories directly to property appraisal and transaction records. This approach yields highly granular data on unit-level attributes, such as assessed values, sale prices, and square footage, allowing us to identify the specific units vacated by movers and to analyze their financial and physical characteristics. By analyzing both unit-level and neighborhood-level data, we can also quantify the bias induced by relying on neighborhood-level measures.

Microdata have also been used to study the neighborhood-change impacts of new construction. Asquith et al. (2023) analyze large multifamily projects across U.S. cities, estimating their impact on local neighborhood rents. They find that new developments broadly improve affordability by lowering local rents, with supply effects outweighing any amenity-driven rent increases. Similarly, Glaeser et al. (2023) argue that gentrification-induced amenity changes are likely small relative to supply impacts. Diamond and McQuade (2019) showed that Low Income Housing Tax Credit (LIHTC) housing developments do generate local price appreciation in lower income neighborhoods but trigger local price declines in higher income neighborhoods. We contribute concrete evidence on local housing supply responses to new construction, which is an important mechanism linking housing production to reduced local housing costs.

In the context of the literature, our paper has the following contributions. First, we advance the empirical measurement of filtering by utilizing precise property-level evidence. While existing studies utilizing administrative data excel at tracking mover demographics, we complement this work by linking exact address histories to assessment and transaction microdata. Second, by studying a mixed-income building with both market-rate and income-restricted units, we offer new evidence on how different types of new housing propagate through the market. Whereas prior studies have focused either on exclusively market-rate or exclusively subsidized developments, we provide the first

within-building comparison of downstream vacancies generated by each type. Third, our findings speak directly to ongoing policy debates by illuminating the distributional and supply consequences of mixed-income housing production. The contrasts we document between market-rate and income-restricted chains offer microfoundations for understanding the trade-offs embedded in inclusionary zoning and related affordability policies.

The paper proceeds as follows: Section 2 describes the study setting; Section 3 discusses data; Section 4 outlines methods; Section 5 presents results; and Section 6 concludes.

2 Honolulu Housing Market and The Central

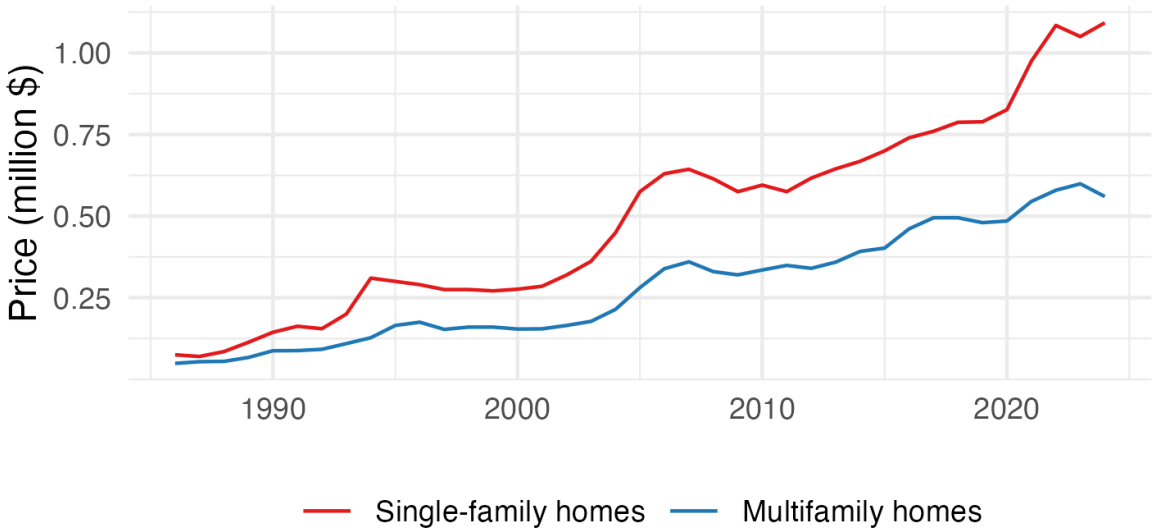
The focus of our analysis is a new construction condominium building named The Central, located in Honolulu, Hawai'i. In this section, we summarize the city's housing market, including supply conditions, demand pressures, and land-use institutions, to frame the affordability challenges that motivated The Central's development and our empirical analysis. We then describe The Central's approval under the state's 201H program, which provides the policy context for the moving chain results that follow.

2.1 The Honolulu Housing Market

High demand and constrained new supply have produced exceptionally high housing prices in Honolulu: the median residential unit is valued at $873,000, placing the county in the top 1% nationally (2023 American Community Survey, 5-year Estimates). The Honolulu housing market has experienced rapid price appreciation (Figure 1). Since 1986, units in multifamily buildings have appreciated at an average annual rate of 6.6%, while single-family homes appreciated at 7.3%. Home price appreciation has far outpaced income growth, prompting significant affordability challenges for local households (Office of the Governor of Hawaii, 2023).

Despite a rapid climb in the price of housing, the rate of new housing construction has fallen sharply in recent decades. Figure 2 shows the distribution of construction dates for Honolulu's current housing stock. After a significant construction boom in the 1970s, the pace of new building slowed. More than half of the existing housing stock predates the 1980s. The combination of rising prices and falling development activity suggests that housing construction in Honolulu is not keeping up with demand, and

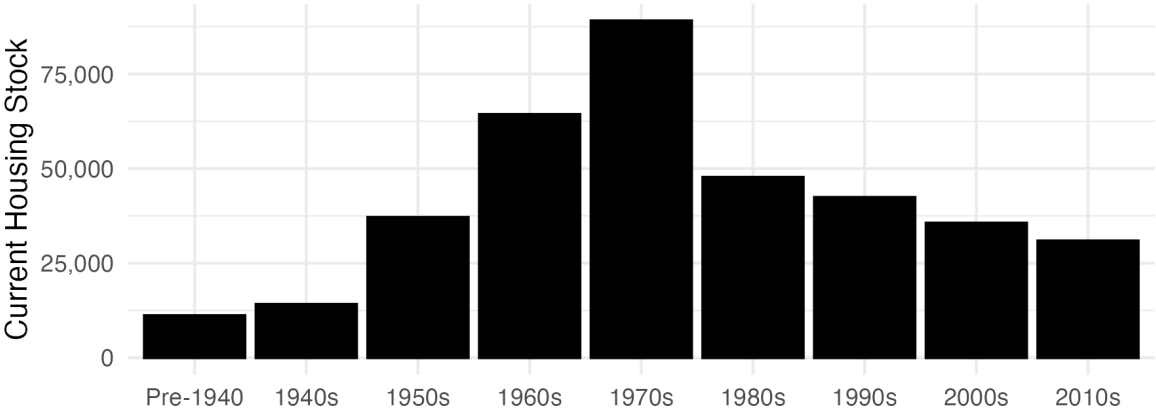
Figure 1: Median Sale Price of Housing Units in Honolulu



Notes: A complete record of local deed transfers are used to compute median sale prices.

that policy interventions might have slowed construction.

Figure 2: Current Housing Stock of Honolulu County by Decade of Construction



Notes: More than half of Honolulu's current housing stock was constructed before 1980. Housing units built since 2020 are not shown. Data Source: 2023 American Community Survey, 5-year Estimates.

The slow pace of construction is frequently associated with regulatory barriers, including long delays to secure needed permits, tight rules on where housing can be constructed, and reluctance to grant zoning and regulatory waivers for proposals that

do not conform to stringent zoning rules and environmental protection criteria (Callies, 2010; Inafuku et al., 2022).

Honolulu operates under a unified city-county government. The City and County of Honolulu is a single entity and is coterminous with the island of O'ahu. Honolulu's population as of the 2020 Census was 1,016,508, a 7% increase from 2010. The island setting provides a clean definition for the local housing market and removes the need to rely on arbitrary census boundary definitions.

Hawai'i has pursued a mix of policies to increase housing supply, especially affordable housing, including county inclusionary requirements, state financing tools (e.g., Low-Income Housing Tax Credit and bond programs), county zoning reform, tax relief, and—centrally for our setting—the expedited approval pathway under Hawai'i Revised Statutes (HRS) Chapter 201H. The project we study, The Central, was approved under 201H. The 201H program functions as a state preemption of local zoning authority, an approach that has gained popularity in the U.S. (Infranca, 2019). While counties and municipalities retain ultimate approval authority, 201H allows the state to determine exemptions from local zoning and development regulations and imposes short approval timelines on local jurisdictions, expediting approvals for qualified projects. We include more details on the 201H program in Appendix A.

2.2 The Central

The focus of our study is The Central, a 43-story, 512-unit condominium building in central Honolulu, completed in 2021. The single tower contains 202 market-rate units and 310 "affordable" (income-restricted) units that were provided to comply with a state-run affordable housing program (201H). The project includes an onsite parking structure and ground level commercial space.

The developer of The Central, SamKoo Pacific LLC, attempted to expedite the permitting of the project by applying for a recommendation for approval through the State's 201H housing program, run through the Hawai'i Housing Finance and Development Corporation (HHFDC). After following the program process, HHFDC approved the application in July 2018. The Honolulu City Council subsequently agreed to the plan and urged the county planning department to expedite remaining permits. The final agreement mandated that 60% of project units would include deed-restrictions that made the units only available to households meeting HHFDC's affordable housing eligibility restrictions. A maximum household income limit was set at 140% of Area Median

Income (AMI),[2] with some units only available to those earning under 120% of AMI and a smaller tranche available to those earning under 100% AMI. Deed-restrictions also included an owner-occupancy requirement, a 10-year state buyback provision if the owner wished to sell the unit in that period, shared-appreciation controls that capped the appreciation an owner could gain during a resale within the 10-year window, and a requirement that any resales are made to buyers who themselves are eligible under the income limits. After 10 years, the deed restrictions expire and the units can transact in the conventional market.

While imposing affordability restrictions reduces unit prices and therefore developer revenue, the 201H agreement also involved subsidies including a $16.1 million low-interest loan to the developer and exemptions from the state's General Excise Tax on the sale of the affordable units. Participation in the program also likely sped up permitting processes and reduced uncertainty about the ultimate approval of the project.

While 60% of units were subject to strict inclusionary zoning rules, the remaining 40% in The Central were sold into the general market, without restrictions. The discrete groups allow us to separately identify the housing supply consequences of market-rate units relative to "affordable" (income-restricted) units.

The Central is located in Honolulu's Ala Moana neighborhood. The surrounding census tract has a median household income of $106,000, roughly matching the county median of $104,000 (2023 ACS, 5-year Estimates). The neighborhood has a 71% college education rate among those 25 and older, significantly higher than the county rate of 38%. Ala Moana is among the most well connected neighborhoods in terms of access to job centers by both car and public transit (Tyndall et al., 2025), being located between the tourist and commercial center of Waikīkī and the central business district.

Local home values and rents in Ala Moana are high, even when compared to the expensive housing market of Honolulu. Median rent is $2,900, 41% higher than the county median, and the median home value is $1.08 million, 24% higher than the county median (2023 ACS, 5-year Estimates).

[2]Area Median Income (AMI) represents the midpoint of family incomes in a given area. Each year, the U.S. Department of Housing and Urban Development estimates the area's median family income and adjusts it for different family sizes so incomes can be stated as a percentage of AMI. At 100% AMI, half of families earn below the median and half earn above.

3 Data

We combine four different data sources to document the vacancy chains initiated by The Central: (i) the project's public "stacking plan" (pricing document); (ii) City and County of Honolulu real property assessment microdata; (iii) comprehensive deed transfers for the State of Hawai'i; and (iv) person-level residential address histories from the consumer data firm Data Axle. Each source contributes a distinct layer to our linked, unit-level panel: the stacking plan provides the initial roster of units and classifies units as market-rate vs. income-restricted; assessment records supply assessed values, unit characteristics, and an owner-occupancy indicator for units in The Central as well as units in the subsequent moving chains; transactions identify initial buyers; and Data Axle address histories reveal prior addresses of residents, allowing individuals to be tracked over time. Figures 3 and 4 provide visual summaries of unit-level home values and the 2024 occupancy/use profile.

3.1 The Central "Stacking Plan" Document

We digitize a publicly available stacking plan for The Central.[3] Stacking plans enumerate every unit and key characteristics by floor, including whether the unit is income-restricted under the project's 201H agreement. We construct a unit-level dataset with all condominium units and a binary indicator for the presence of an income restriction. This unit-level roster is the foundation for the chain-construction and comparative analyses that follow.

3.2 Property Assessments

We link each unit to 2024 City and County of Honolulu real property assessment microdata to recover physical and value attributes (e.g., total assessed value, interior square footage, bedroom count, year built) and the County's owner-occupancy indicator.[4] In addition to identifying unit characteristics in The Central, we use assessment data to compare the values of non-Central homes across rounds (Section 4.2). County assessment records are updated annually. To ensure consistency, we rely exclusively on 2024 assessment values.

[3]The stacking plan is available at `http://www.centralalamoana.com/floorplans.html`

[4]Honolulu assesses different property tax rates based on owner-occupancy status, meaning every housing unit must declare owner-occupancy status annually.

Table 1 provides summary statistics for number of bedrooms, square footage, assessed value, and assessed value per square foot for income-restricted and market-rate units in The Central. The assessed value of market-rate units in The Central averages $1.25 million, while income-restricted units average $784,000. However, the market-rate units are significantly larger, in terms of bedrooms and square footage. On a per square foot (PSF) basis, market-rate and income-restricted units were assessed similarly at $1,205 PSF and $1,117 PSF, respectively.

Table 1: Characteristics of Units in The Central

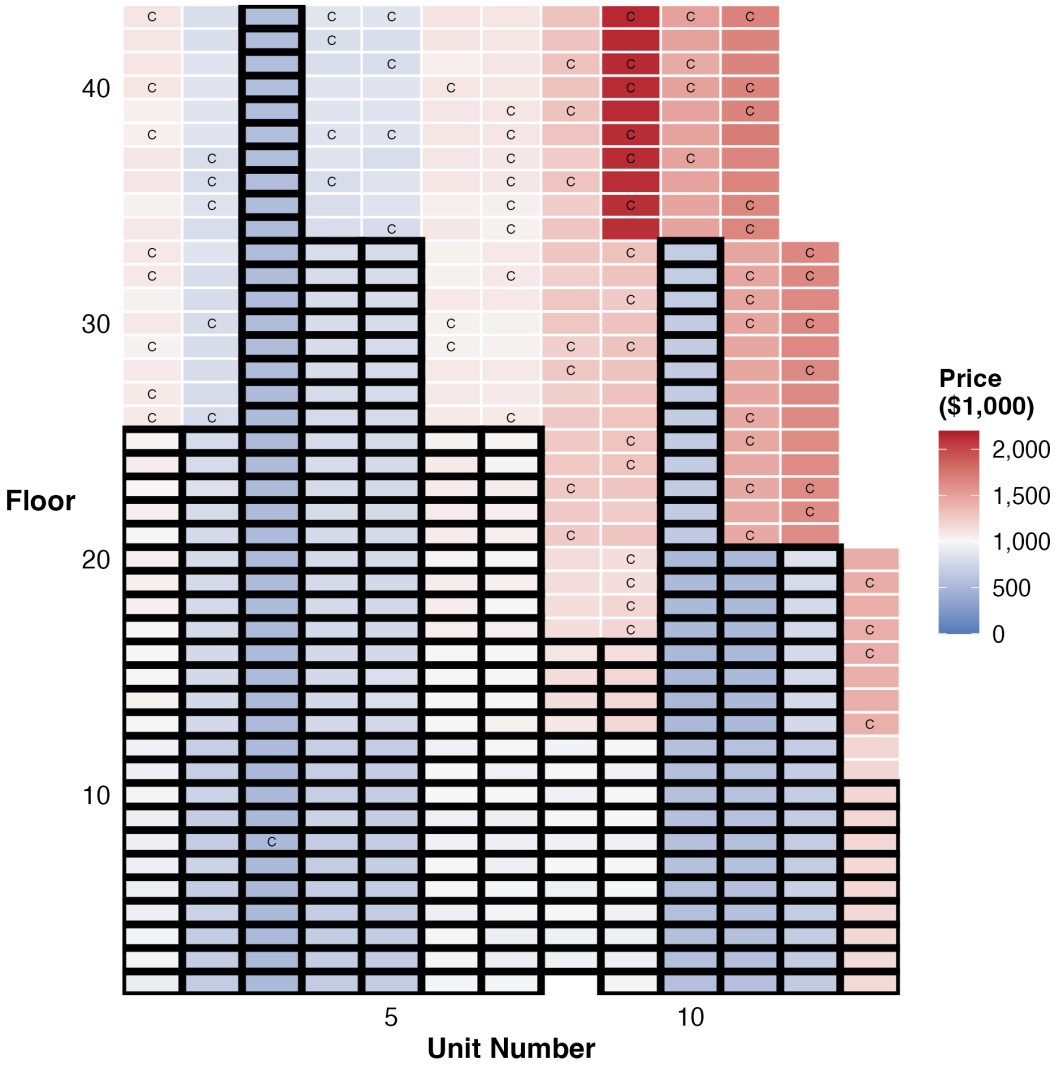
Housing Type	N	Mean	SD	Min	Max
Bedrooms					
Market-rate	202	2.02	0.63	1.00	3.00
Income-restricted	310	1.08	0.86	0.00	3.00
Square Footage					
Market-rate	202	1026.37	203.92	698.00	1507.00
Income-restricted	310	728.57	244.11	397.00	1238.00
Total Assessed Value					
Market-rate	202	1247.66	329.43	786.00	2149.10
Income-restricted	310	784.13	198.48	514.20	1189.20
Price per Sq. Ft.					
Market-rate	202	1204.51	100.93	962.52	1426.08
Income-restricted	310	1117.45	154.89	903.55	1498.42

Notes: Characteristics of units in The Central according to 2024 county assessment records.

Figure 3 visualizes all 512 units in The Central, overlaying three pieces of information: (i) a heat map of units' 2024 appraised values, (ii) an outline around income-restricted units, and (iii) a "C" label for units where the initial transaction was made without a recorded mortgage (cash purchase). The figure makes clear that the within-building price dispersion is substantial by unit type and floor, and it shows the spatial distribution of the income-restricted tranche relative to market-rate units. The 201H agreement allowed the developer to disproportionately concentrate income-restricted units on lower floors, though there is at least one income-restricted unit on every floor of the building. All but one income-restricted sale involved a mortgage issuance, while 40% of market-rate units were "cash sales" made without a mortgage.

Deed restrictions are also meant to ensure local owner-occupancy. Figure 4 sum-

Figure 3: Assessed Values of All Units in The Central



Notes: Heat shading shows the 2024 assessed value of each unit. Dark line borders denote income-restricted units. "C" marks a cash-only sale (no mortgage). Unit 208 was reserved for the building's resident manager and therefore was never offered for sale.

marizes 2024 unit use at The Central. Cells shaded gray are flagged as owner-occupied in the assessor data; red cells are non-owner-occupied. Income-restricted units are outlined. The pattern is consistent with deed restrictions requiring owner-occupancy for the

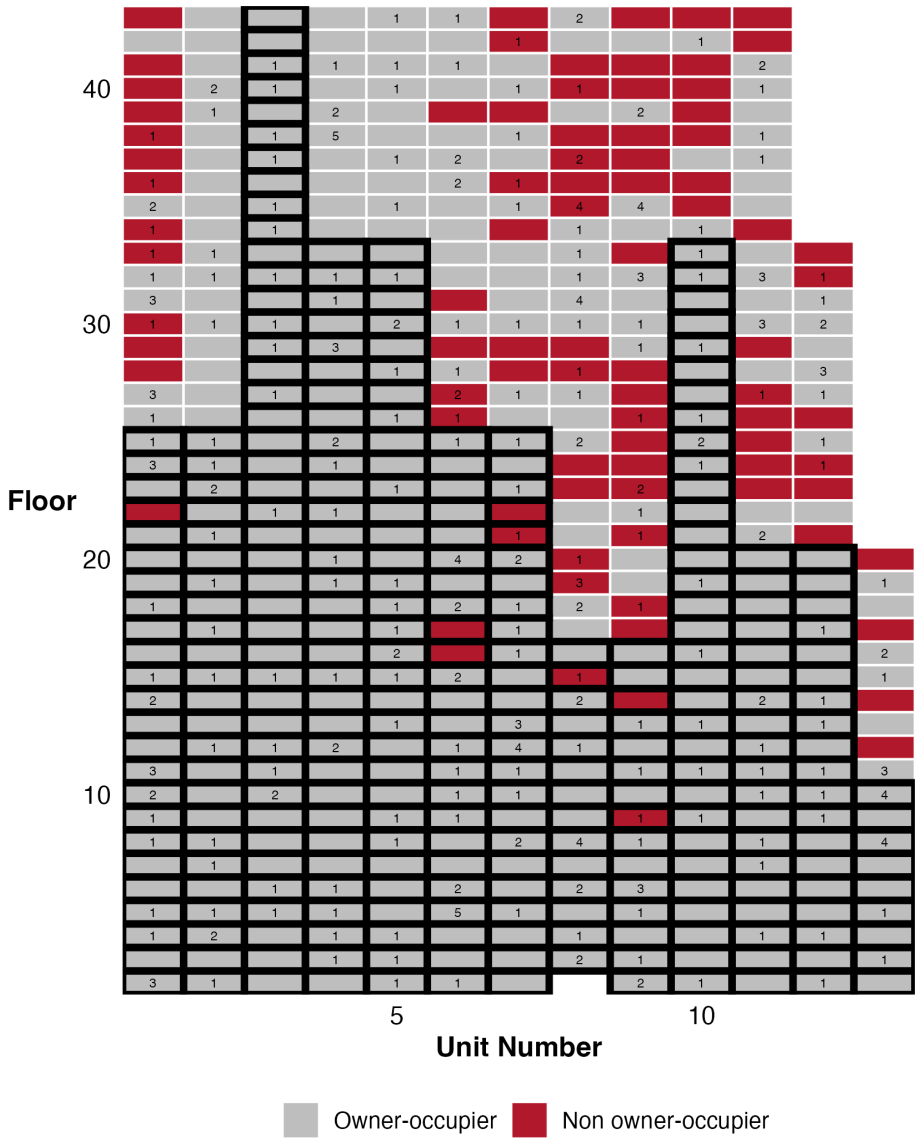
affordable units. While 97% of income-restricted units have a declared owner-occupant in assessment records, 61% of market-rate units have an owner-occupant. Non-owner-occupied market-rate units may be rented to long-term tenants, or they may be left empty. Honolulu has a high demand for short-term vacation rentals; however, local ordinances forbid rental contracts of fewer than 30 days in this neighborhood.

3.3 Property Transactions

We use a full universe of deed transfer records for the State of Hawai'i obtained through an agreement with Title Guaranty, the major property title insurer in Hawai'i. The data includes every real-property transfer in the state during our study window and includes buyer/seller names, transaction dates and prices, unique property identifiers, and an indicator for whether a mortgage was recorded with the transfer (which we use to flag "cash" transactions). We exploit these records to (i) identify buyers of every unit in The Central, which can be cross-referenced with the address history data, and (ii) record initial sale prices and the presence of a mortgage for descriptive statistics.

While Figure 3 records assessed values, we also observe the initial purchase price of each unit. We visualize purchase prices in Appendix Figure B.1. The average market-rate unit sold for 29% below its 2024 assessed value, suggesting initial buyers secured significant windfall profits. The Central sold units during a "pre-sale" phase, which required prospective buyers to pay deposits and assume some risk regarding construction timelines. Because of risk and the cost of capital, pre-sales typically sell below the final market value of a unit (Choi et al., 2012). Income-restricted units were also assigned before construction was completed, with initial sale prices averaging 39% below 2024 assessed values. Income restrictions limit demand for these units, pushing sales prices down farther below market value. The focus of our analysis will be on assessed values, rather than sale prices, to better capture actual differences in housing quality and characteristics across vacancy rounds. The imposition of the income restriction effectively induced a wealth transfer from the developer to the households who were able to successfully qualify for the affordable housing program, assuming they hold the unit to the end of the 10-year deed restriction.

Figure 4: Use of Each Unit in The Central in 2024



Notes: Owner-occupied units are shown in gray while non-owner-occupied units are shown in red. Dark line borders denote income-restricted units. Numbers inside cells indicate the number of people identified in Data Axle for that unit in 2024. Unit 208 was reserved for the building's resident manager and therefore was never offered for sale.

3.4 Residential Address Histories

We use person-level address histories from the consumer data firm Data Axle to identify prior residential locations of individuals associated with The Central, and individuals involved in subsequent induced moves. The version used in this analysis covers all individuals residing in Hawai'i from 2017 to 2024 and includes prior addresses from anywhere in the U.S. Data Axle amasses residential history data from numerous public and private sources, including postal service address changes, property transactions, and through the purchase of corporate data sets from services such as cell phone and internet providers. Individuals are assigned a unique identification number, which is consistent across vintages of the data, allowing individuals to be traced through time. Acolin et al. (2022) examine the validity of Data Axle estimates at a national level and found population counts in a 5-year period (2014 to 2018) were within 80% to 120% of ACS population estimates. Ramiller et al. (2024) tested the representativeness of Data Axle in a particular county and found low-income households, renters, and young adults are likely to be undercounted in Consumer Reference Data, including Data Axle.

We first establish a list of initial residents in The Central. Because the tower was completed partway through 2021, we first observe residents in the 2022 data. However, the 2022 Data Axle roster for The Central reflects initial buyers rather than tenants.[5] We therefore prioritize 2024 Data Axle records to construct the initial pool of residents. Using a slightly later vintage allows time for sales to be finalized, tenants to move in, and rental contracts to be executed.

For The Central in 2024, we identify occupants from Data Axle for 46% of income-restricted units and for 42% of market-rate units. Figure 4 indicates the number of residents that Data Axle can identify who are living in The Central in 2024. Units without an occupant recorded in Data Axle could arise from either the unit being unoccupied, or from incomplete coverage of the Data Axle information. For income-restricted units, the initial buyers are legally required to be owner-occupants in 2024 except under rare extenuating circumstances. If buyers of income-restricted units did sell the unit prior to 2024 they are required to sell it to another owner-occupant who meets the income restrictions. Property tax records confirm that 302/310 (97%) of income-restricted units are owner-occupied. Among owner-occupied, income-restricted units, Data Axle has a 46% coverage rate, which could be taken as an estimate for Data

[5] We cross-referenced 2022 Data Axle records against deed transfer information and found an identical roster of individuals.

Axle's true coverage rate for Hawai'i households. We account for this data limitation in our analysis. Generally, the number of moving chains and induced vacancies we identify will be significantly fewer than the true total due to missing data.

Because address-history data do not achieve universal coverage, we emphasize verified counts as a conservative lower bound for the true number of induced housing vacancies. The lower coverage rate for market-rate units (42% rather than 46%) could suggest some of the market-rate units are vacant, though the difference is small, implying a low prevalence of vacant units.

4 Methodology

This section outlines our empirical strategy for tracing vacancy chains initiated by The Central. We link residents to prior addresses, follow subsequent moves across rounds, and characterize the properties and locations involved. We also introduce the regression framework used to compare housing characteristics by round and by unit type.

4.1 Constructing Moving Chains

Our objective is to trace vacancy chains initiated by the opening of The Central by linking each new resident to the exact dwelling they vacated and, recursively, to the next vacated dwelling in subsequent rounds. In what follows, we define Round 0 as the set of units in The Central, Round 1 as the set of prior homes vacated by those residents who moved into The Central, Round 2 as the homes vacated by the households who subsequently fill the Round 1 homes, and so on across multiple rounds of moves.

We first define an initial roster of occupants in The Central. Using all 512 units, we identify 322 individuals occupying 226 unique units in The Central. We subsequently search for previous addresses for this sample of 322 individuals.

For each individual, we search Data Axle for instances of their unique individual identification number, which returns a history of known addresses. We recover their most recent,[6] pre-Central, known address. We then examine the history of occupants at that address to determine whether the move into The Central resulted in a vacancy.

[6]If there is no record of a prior address for an individual in the previous year before residency in The Central, we look for an address in the prior year. We continue looking backwards in time until 2017, the start of the data set.

If any members of the moving individual's household remain at the initial address, we consider the moving chain terminated, as it did not render an additional vacant housing unit.[7]

We are able to identify 180 prior addresses for the original occupants of The Central.[8] We refer to these as "Round 1" addresses. Of these, 144 housing units were vacated as a result of the move, while 36 retained some members of the original household.

Next, we identify Round 2 addresses. We follow the same procedure but use the 144 vacated addresses identified in Round 1 as the initial roster. We identify the first individuals to reside in the address after it was vacated by the prior occupants. We iterate this procedure to construct Round 3 and Round 4 addresses. The round structure corresponds to the analytical framework that indexes observations by movement round $R_i \in \{0, 1, 2, \ldots\}$.

Every moving chain we identify eventually terminates, which can occur for one of several reasons; (i) the vacant unit is filled by an in-mover who's prior address cannot be found, this could occur because they immigrated from a non-U.S. address or because of incomplete data coverage in Data Axle,[9] (ii) the in-mover forms a new household without vacating their prior unit (e.g., a young adult leaves a parent's home), or (iii) the unit remains unfilled by the end of our observation window and therefore does not induce an observable move. Each of these cases stops the recursion at that link.

We manually look up each address in the City and County assessment microdata to recover location, assessed value, and dwelling characteristics (e.g., square footage, bedrooms, year built). Rental apartment buildings are assessed at the building level rather than the unit level. For these cases we approximate unit values by dividing the

[7]When reviewing moving chains, we correct obvious inconsistencies in the timing of moves within households. If individuals who share a last name or appear together at the same address for multiple years are later observed together at a new address, we treat the move as occurring simultaneously for the household. In some cases, the data show new occupants moving in with an existing household for one year, followed by the original occupants appearing together at a different address the next year. In other cases, one or more household members appear to move a year prior to the rest. In these situations, we manually reconcile the records and assign the move to the earliest year in which any member of the household is observed at the new address, treating it as a single household move.

[8]If two new residents formed a single household at The Central and previously lived separately, both of their prior dwellings are coded as potential Round 1 vacancies—so a single Central unit may create multiple Round 1 vacancies.

[9]We cannot separately identify foreign in-movers from domestic movers who are missing prior-year address data. Among the 226 units in The Central for which we identify an occupant, 77 percent have a recorded prior U.S. address. This implies that at least 77 percent of the initial residents of The Central moved from a U.S. address.

apartment building's total assessed value by the number of dwellings in the building. We also impute the square footage of these units by dividing the total residential floor area of the building equally among the apartments. This imputation method applies to only 4% of our observations.[10] We also find that results are robust to simply dropping these instances. Having property-level information for all homes allows us to compare housing values and features across movement rounds.

Throughout the construction of moving chains, we track the specific unit in The Central that serves as the origin of each chain. We assign each recorded housing unit to either a market-rate or an income-restricted moving chain based on the original unit's type. This assignment allows us to contrast the downmarket effects of the two housing types.

4.2 Regression Framework

We test whether housing characteristics shift across rounds using a simple fixed-effects regression. Equation 1 summarizes the specification. Y_i denotes a characteristic of property i; for example, price per square foot, total assessed value, interior size, bedroom count, or year built. Each property belongs to a movement round $R_i \in \{1, 2, 3, 4\}$, while Round 0 (The Central) serves as the baseline. We include a chain-specific fixed effect Θ_i so that each chain is anchored to its originating Central unit; the coefficients $\beta_j, j > 0$ then capture how a representative chain evolves relative to its own starting point.[11]

$$Y_i = \sum_{j=1}^{J} \beta_j \, \mathbf{1}\{R_i = j\} + \Theta_i + \varepsilon_i, \tag{1}$$

where $J = 4$ is the maximum number of rounds.

The fixed effects are critical for an intuitive reason: not every Central unit generates an observable chain. If we simply compared average Round 1 homes to average Central homes, we would be mixing chains that exist with units that never triggered a move. The results would hinge on which Central units happened to produce chains. For example, if the only units that spawn Round 1 links are the most expensive condos in The Central, the Round 1 homes we observe will still look expensive in absolute terms.

[10] The method does not apply to individually owned rental units (such as owner-rented condominium units) because their characteristics can be directly observed.

[11] Round 0 units' values are absorbed by the chain-specific fixed effects.

They look costly simply because they originate from high-end chains, even though each chain may experience a large drop relative to its own starting point. The chain-specific fixed effects solve this problem by forcing each Round j home to be compared to the exact Central unit that produced it, eliminating bias from differences across the Round 0 stock. We will also report raw averages by round for comparison.

The coefficients β_j are identified using within-chain variation. In practical terms, β_j is the average difference between the Round 0 home and the Round j home within the same chain, conditional on the chain being observed through round j. We present the estimates as estimated marginal means so that they can be read as "typical" round-by-round changes for chains that originate from an average Central unit.

5 Results

We document a clear filtering pattern: movers into The Central commonly vacated other local homes, the vacated homes are substantially less expensive than units in The Central itself, and these price differences persist (and typically widen) into higher rounds. Unit counts are necessarily conservative given address-history coverage, but the direction and magnitude of the gaps are robust across outcomes and sub-samples. Consistent with our chain-termination rules, not all moves generate a downstream vacancy. However, these cases can still improve welfare via reductions in overcrowding; we flag this as a distinct benefit that we discuss separately.

5.1 Identified Moving Chains and Induced Vacancies

We identify 224 prior addresses involved in moving chains induced by The Central, spanning four rounds of moves (Table 2). Of these, 198 are located in Hawai'i and 26 are in the continental U.S., suggesting that 88% of domestic in-movers to The Central came from a local (Hawai'i) address. Observations decline across rounds due to chain terminations and reduced data coverage.

Table 2 shows identified units by round, with vacancies shown in parentheses. Vacated units are those where we confirm that the entire household moved out of the address. In seven of the 224 cases, we observe only the building rather than the specific unit and therefore cannot assess vacancy status. Among the remaining 217 units, 180 were vacated (83%). Non-vacancies typically occur when a household member remains

in the home, ending that moving chain.[12] The 180 verified vacancies constitute a conservative *lower bound* given data limitations.

Table 2: Counts of Units by Round

	Identified addresses (Vacated addresses)		
	Full building	**Market-rate**	**Income-restricted**
The Central (Round 0)	512 (512)	202 (202)	310 (310)
Round 1	180 (144)	70 (63)	107 (78)
Round 2	34 (27)	17 (15)	17 (12)
Round 3	8 (7)	7 (7)	1 (0)
Round 4	2 (2)	2 (2)	0 (0)
Rounds 1-4 Subtotal	224 (180)	96 (87)	125 (90)
Total	736 (692)	298 (289)	435 (400)

Notes: The total number of confirmed prior addresses are listed by round, with the subset of those addresses that resulted in a vacancy shown in parentheses. We encounter three cases where a Round 1 household splits and moves into both a market-rate and an income-restricted unit in The Central. To avoid double counting, we remove them from the Round 1 market-rate and income-restricted subtotals and include them only in the Round 1 total.

We provide a back-of-the-envelope estimate of total induced vacancies by scaling observed vacancies by an assumed data coverage rate. For income-restricted units, deed restrictions require owner-occupancy, so transaction records reliably identify all initial residents. In 2024, Data Axle listed an occupant in 46% of income-restricted owner-occupied units; we use 46% as a rough coverage estimate for Honolulu. We observe 144 Round 1 vacancies; at 46% coverage, this implies 313 in total. By the same logic, the 27 observed Round 2 vacancies represent about 21% of the total (0.46^2), implying 128 Round 2 vacancies. Applying 46% to the full set of chains yields an estimate of 557 induced vacancies overall.

While we can scale for households that are entirely missing from the data, we may also undercount moving chains in cases where households appear in the data but cannot be reliably matched across years. Among units in The Central for which we observe an occupant, 23% cannot be linked to a prior address. Some of these cases likely reflect prior addresses outside the United States, but others may result from failed matching

[12]Cases where household members were left behind include situations where a roommate leaves behind a set of former roommates. We do not count these as creating a vacancy; however, this situation likely induces a vacant room within a housing unit. Ignoring these partial vacancies again makes our estimates conservative.

across years. To the extent that matching failures account for some of these cases, our estimates remain conservative. Finally, this estimate covers only the first three years after The Central opened; the long-run multiplier is likely larger.

Moving chains can legitimately terminate for reasons unrelated to data coverage (e.g., international in-migration, household formation that does not free a prior unit, or units remaining vacant at the end of our observation period). Each mechanism reduces observable links even when filtering occurs, reinforcing that the documented 180 vacancies are a lower bound rather than a full population estimate. The rough calculation implies that the number of vacancies in old housing stock, induced by moves into The Central, exceeds the number of vacancies provided by The Central itself. The finding highlights the importance of considering housing filtering when assessing the full market impacts of new housing production.

Among documented vacancies, the 202 market-rate units produced 87 downstream vacancies (0.43 vacancies per initial unit), while the 310 income-restricted units produced 90 (0.29 vacancies per unit). Thus, market-rate units are more likely to generate a downstream vacancy. The main mechanism is new household formation: movers into income-restricted units are more likely to be a newly formed household, leaving family or roommates at the prior address and thus preventing a vacancy from being created. While this may relieve overcrowding in the unit left behind, it does not result in additional vacancies. Although income-restricted units seem to generate fewer downstream vacancies, as we show in the next section, vacancies that are generated by income-restricted chains tend to include units that are more affordable.

5.2 Overview of Home Characteristics Across Rounds

We compile property characteristics for The Central (Round 0) and for homes in subsequent rounds. Here we include only observations in Hawai'i because the price and housing characteristics data are available only for Hawai'i. By Round 3, chain terminations leave us with only five observations in total. Given the small sample size, our main analysis will focus on Rounds 0-2. The outcomes used in our main comparisons are: total assessed value, assessed value per square foot, interior square footage, bedroom count, and year built. Table 3 provides summary statistics by round. The summary statistics show that home values tend to be lower in higher rounds, while the size of units tend to increase. We also observe that in-movers to the Central tend to move from relatively old housing stock. The subsections below provide a detailed

analysis of these home characteristics.

Table 3: Summary Statistics by Movement Round

Round	N	Mean	SD	Min	Max
Total Assessed Value ($1,000)					
The Central	512	967.01	343.42	514.20	2149.10
Round 1	166	735.56	523.34	112.43	4154.50
Round 2	22	803.75	588.10	122.91	2562.80
Price per Sq. Ft.					
The Central	512	1151.80	142.58	903.55	1498.42
Round 1	166	698.16	286.10	133.05	2533.23
Round 2	21	602.08	168.15	292.18	881.49
Square Footage					
The Central	512	846.06	271.32	397.00	1507.00
Round 1	166	1135.68	892.31	318.00	5214.00
Round 2	21	1398.48	1029.78	353.00	4176.00
Bedrooms					
The Central	512	1.46	0.90	0.00	3.00
Round 1	140	2.49	1.91	0.00	12.00
Round 2	19	2.84	2.12	0.00	9.00
Year Built					
The Central	512	2021.00	0.00	2021.00	2021.00
Round 1	164	1985.22	20.83	1940.00	2019.00
Round 2	22	1986.95	21.87	1954.00	2020.00

Note: The sample does not include the 26 observations outside of Hawai'i. Some properties have missing characteristic values within the County assessment data.

5.3 Home Values Across Rounds

Figure 5 presents results for home values from Equation 1. We display the estimated marginal means, which reflect expected changes in housing characteristics across rounds for a chain initiated by a Central unit with average characteristics. In the context of Equation 1, the difference between Round 0 and Round 1 values are equal to β_1 and the difference between Round 0 and Round 2 values are equal to β_2. We show results for both the full sample of units involved in the chain (black dots) and the subset that actually resulted in a vacancy (gray dots; all previous tenants departed). While the full-sample results show where typical movers came from, the vacancy-only results

reflect the types of units that were actually freed up. Panel A shows that price per square foot (PSF) declines across rounds relative to the project units (Round 0). Units in The Central averaged $1,152 PSF; Round 1 units averaged $715 PSF and Round 2 averaged $642 PSF. Thus, homes left behind by those moving into The Central were valued at 38% less than those in The Central, and homes in the subsequent round were 44% less than in The Central.[13]

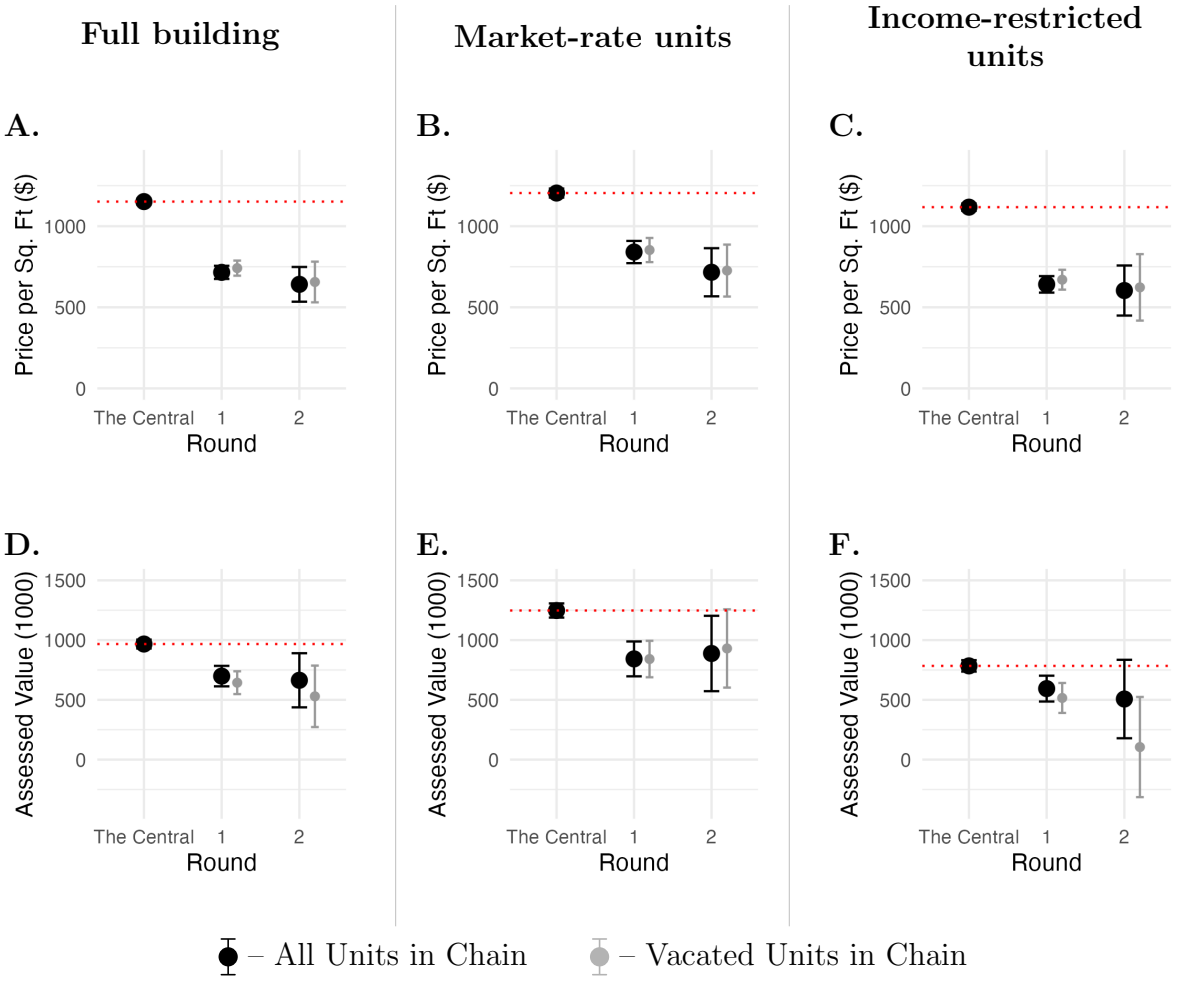
Market-rate and income-restricted subsamples show similar declines across rounds (panels B-C). The assessed PSFs for market-rate and income-restricted units in The Central are similar: $1,205 and $1,117, respectively. The average PSF of units in a chain initiated by a market-rate unit falls by 30% in Round 1 and by 41% in Round 2. For chains initiated by income-restricted units, the drop is 43% in Round 1 and 46% in Round 2. This evidence suggests that income-restricted units tend to induce moves out of lower-priced housing stock relative to market-rate units. Both markets show clear evidence of housing filtering, wherein more expensive new units trigger vacancies in lower-priced market segments.

The Central contains units ranging from studio apartments (zero bedrooms) to three bedroom units. In addition to estimating differences in PSF across rounds for market-rate versus income-restricted units, we also investigate whether these trends differ across the initial number of bedrooms (see Figure C.1 in the Appendix). In every bedroom-size class, Round 1 and Round 2 units are priced below Round 0, confirming that filtering patterns are not specific to a particular initial unit size.

Figure 5 panels D-F show results for the total assessed value of the housing unit. They provide clear evidence that homes left behind by those moving into The Central were significantly cheaper in total assessed value. The average assessed value of a unit in The Central was $967,006. The typical Round 1 unit was valued at $698,676 (28% lower), while Round 2 units were $663,710 (31% lower). Although PSFs for market-rate and income-restricted units were similar, market-rate units tend to be larger, yielding a higher average assessed value. Market-rate units in The Central averaged $1,247,657, while income-restricted units averaged $784,129. The average

[13]As noted in the methodology, we must impute values for rental apartment buildings. The imputation could affect results. If these imputed observations are omitted from the analysis, the first round price drop is estimated at 34% (rather than 38%) and the second round price drop at 41% (rather than 44%). Some of this discrepancy is explained by units in rental apartment buildings being lower quality housing than single-family home or condominium units, which is an effect we would like to capture in the analysis. However, some of the discrepancy may be spurious and simply due to the imputation method, which tends to assign low values to rental apartment units.

Figure 5: Home Values by Movement Round



Notes: Estimates are shown by round for the full sample and for only units that actually resulted in a vacancy. The 95% confidence intervals are shown. Left column panels display full building results, central panels display results from market-rate unit originating chains, and right column panels display income-restricted unit originating chains.

unit left behind by someone moving into a market-rate unit was $842,651 (32% lower), while for income-restricted units the average previous unit was $594,069 (24% lower). In Round 2, market-rate chains involve units priced similarly to Round 1, while income-restricted chains decline further. Standard errors are large in Round 2 due to the reduced sample, limiting inference. Because the income-restricted units in The Central have significantly lower overall value, they tend to attract households from units that are considerably cheaper relative to the overall market. For Round 2, in income-restricted

chains, the typical unit value is only $506,863, significantly below the Honolulu median home value.

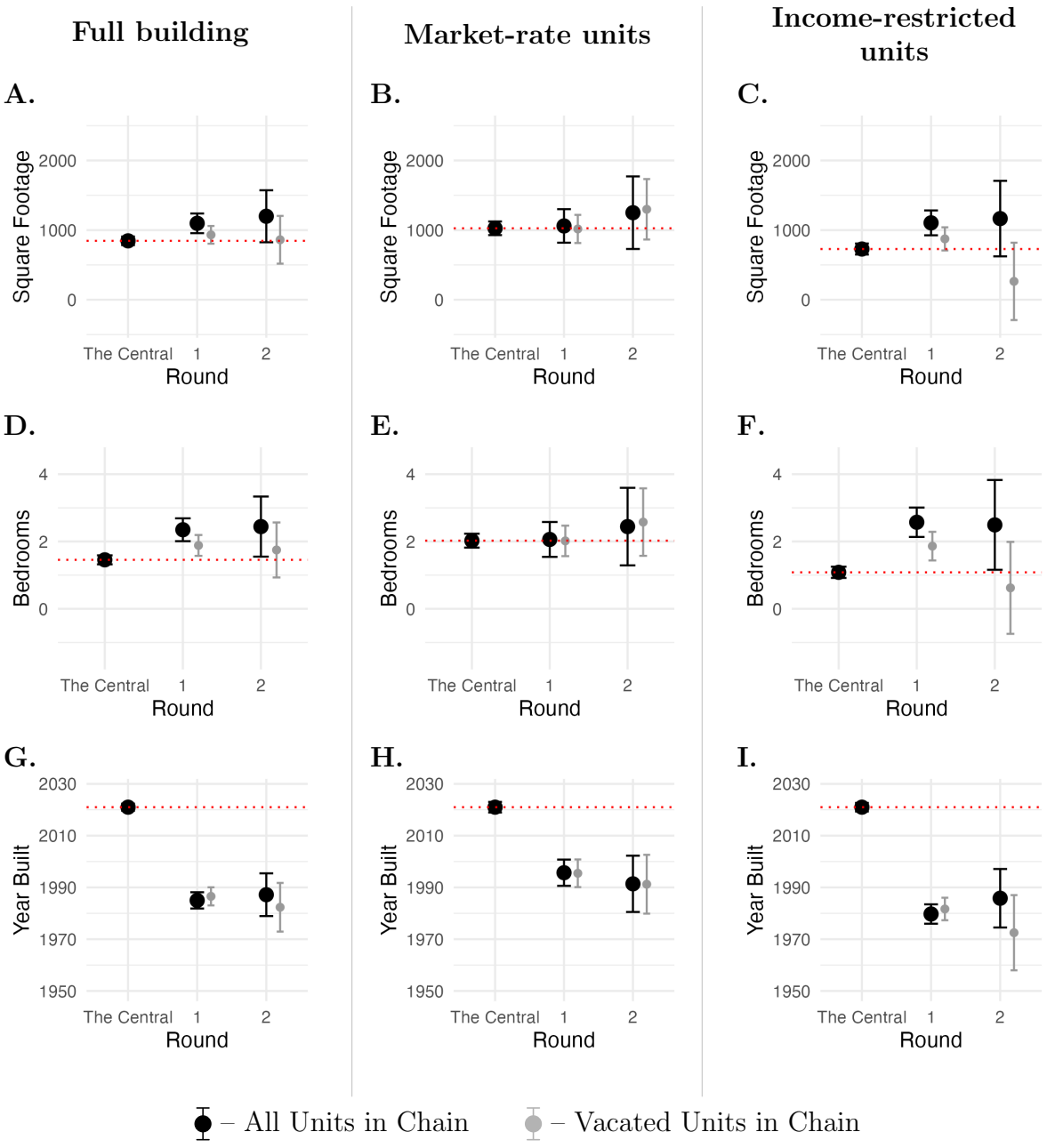
In most Figure 5 estimates, the price decline across rounds is similar between the full sample (black dots) and the subset of vacated homes (gray dots). The exception is total assessed value among income-restricted units (panel F), where the estimated value of actually vacated units is lower than for the full sample of units in the moving chain. The discrepancy reflects the prevalence of newly formed households. Individuals who move out of a parent's home or a home with roommates tend to leave behind a relatively large unit, whereas full households (often single-person households) moving into The Central tend to depart a smaller unit.

5.4 Home Physical Characteristics Across Rounds

We now consider the physical characteristics of the units left behind by those moving into The Central, and whether those units generated vacancies of substantially different housing stock. A distinct criticism of new condominium towers is that they might fail to contribute the types of housing that are desired by the local population. We find that of the 180 homes that were vacated due to The Central, 40 are detached single-family homes, while the remaining 140 were units in multifamily buildings, ranging from duplexes to high-rise condominiums. Figure 6 provides Equation 1 results for two indicators of unit size (square footage and number of bedrooms) and the year of the unit's construction.

Overall, we find evidence that households, on average, downsize when moving into The Central, freeing up larger units. Panel A shows square footage results for the full sample (black dots) and for only units that actually resulted in a vacancy (gray dots). While the average unit in The Central is 846 square feet, the average unit left behind by in-movers was 1,098 square feet (30% larger). The pattern seems to be driven in particular by the income-restricted units (panel C), where households moved out of units with an average size of 1,104 square feet, into units that averaged 729 square feet. However, the downsizing pattern is not as clear when the sample is limited to only units that became vacant, suggesting the downsizing effect is partially driven by cases of new household formation. When an individual breaks away from an existing household, leaving behind former household members at a prior address, they are likely to require less living space. Nonetheless, for the income-restricted chain, patterns from the vacated units still show a marginally significant downsizing effect; vacated Round

Figure 6: Home Characteristics by Movement Round



Notes: Estimates are shown by round for the full sample (black dots) and for only units that actually resulted in a vacancy (gray dots). The 95% confidence intervals are shown. Left column panels display full building results, central panels display results from market-rate unit originating chains, and right column panels display income-restricted unit originating chains.

1 units averaged 20% larger than The Central unit that initiated that chain (see Panel C, gray dots). The small square footage of units in The Central compared to older housing stock suggests the downsizing effect could be partially explained by the fact that apartment units are generally larger in older buildings.

Figure 6 panels D-F show results for the number of bedrooms. The results confirm those of the square footage analysis. We find some evidence of downsizing, but the effect is concentrated in the income-restricted units, and is weaker in the subset of units that actually became vacated. In the Appendix (Figure C.2), we also show downsizing effects separately by number of bedrooms in the initial unit in The Central. Downsizing effects are strongest for the smallest units. The average household moving into a studio apartment left behind a unit that was more than twice as large.

When we examine the distribution of bedroom counts across rounds (Appendix Figure C.3), we see that larger units become increasingly common in later rounds. This pattern is consistent with a filtering process in which small Central apartments free up larger homes further down the chain. Three-bedroom units are more common in Round 1 than in The Central, and more common in Round 2 than in Round 1. In fact, the bedroom distribution converges quickly toward the overall distribution found in Honolulu County. These results address concerns that new condos fail to produce the types of homes needed by families with children. Our findings suggest that, through filtering, The Central indirectly contributes to the supply of larger units. When limiting the sample to units actually vacated, three-bedroom homes represent a smaller share, indicating that some chains end when young adults leave behind parents or roommates in larger homes—a pattern especially common in income-restricted chains. As a result, market-rate units are much more likely to produce downstream vacancies in large housing units.

Figure 6 panels G-I show the effect of movement rounds on the initial construction date of the home. Those moving into The Central, on average, moved from a housing unit that was constructed in 1985, whereas Round 2 homes had an average construction year of 1987. Income-restricted unit moving chains tended to involve even older units. Round 1 income-restricted units had an average construction date of 1979, while for Round 2 units the estimate is 1985. The median housing unit in Honolulu was constructed in 1977. The pattern provides evidence that new units tend to free up significantly older units, which is one reason the vacated units tend to be at lower price points.

5.5 Neighborhood Composition Along the Chains

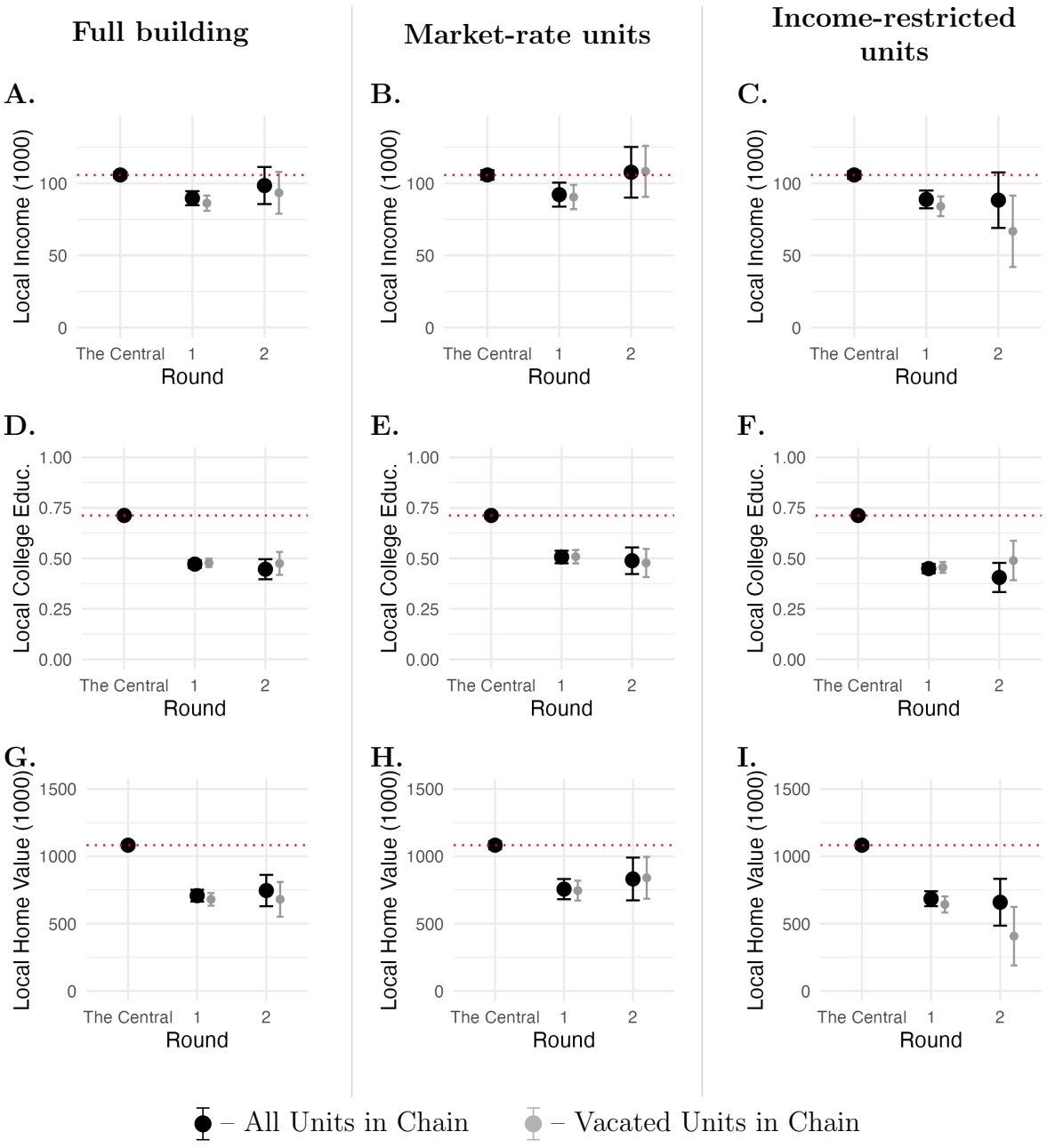
Despite our focus on unit-level home characteristics of housing filtering, we are also interested in whether new housing enables families to move into more socioeconomically advantaged neighborhoods, in addition to higher quality housing. Considerable empirical evidence shows that neighborhood and school environments shape human capital and long-run outcomes (Chetty and Hendren, 2018a,b; Chetty et al., 2016; Chyn, 2018; Laliberté, 2021). If new housing stock enables families to move into more socioeconomically advantaged neighborhoods, it could contribute to long-run social mobility. Figure 7 summarizes the *tract-level* environment of homes across rounds, including neighborhood median income (panels A-C), college-educated share (panels D-F) and median local home value (panels G-I).

The Central is located in a tract with median household income of $105,833, which is similar to the median for Honolulu as a whole ($104,264). About 71% of adult residents in The Central's tract have a college education, significantly higher than the Honolulu rate (38%). For both income and education, we find that the typical moving chain involves a household leaving behind a neighborhood with lower socioeconomic characteristics. For the average moving chain, Round 1 households were in a neighborhood with household income 15% lower and a college education rate 34% lower. The shifts are stronger for income-restricted units than for market-rate units. The results provide significant evidence that households experience upgrades to neighborhood socioeconomic conditions in addition to upgrades in housing unit quality.

Local home values can also be a proxy for neighborhood quality. The neighborhood containing The Central has a median home value of $1,083,000. On average, those entering The Central left behind neighborhoods where the median home value was 35% lower. The effect is larger for income-restricted moving chains than for market-rate chains.

The 35% decline in *local median* property value between The Central and Round 1 homes is in contrast to the 26% decline we identified when using property level data (Figure 5.D). The discrepancy suggests that households moving from lower-priced neighborhoods into The Central are likely to have occupied a unit that was above the average value for the neighborhood they left behind. In our setting, using aggregate neighborhood data to infer price filtering would overstate the magnitude of price differences across movement rounds because of a selection effect where higher wealth households are more likely to leave low-priced neighborhoods to move into new housing stock.

Figure 7: Neighborhood Demographics by Movement Round



Notes: Estimates are shown by round for the full sample (black dots) and for only units that actually resulted in a vacancy (gray dots). The 95% confidence intervals are shown. Left column panels display full building results, central panels display results from market-rate unit originating chains, and right column panels display income-restricted unit originating chains.

5.6 Geography of Moves

In addition to characteristics of homes and neighborhoods in the moving chains, it is also interesting to examine the spatial distribution of the moves. Recall that of the 224 addresses contained in the moving chains, 198 were located in the State of Hawai'i, of which 196 are located in Honolulu (Island of O'ahu) while two are located on Maui. Of the 26 non-Hawai'i U.S. addresses, seven are located in California, with the remainder scattered across other U.S. states.

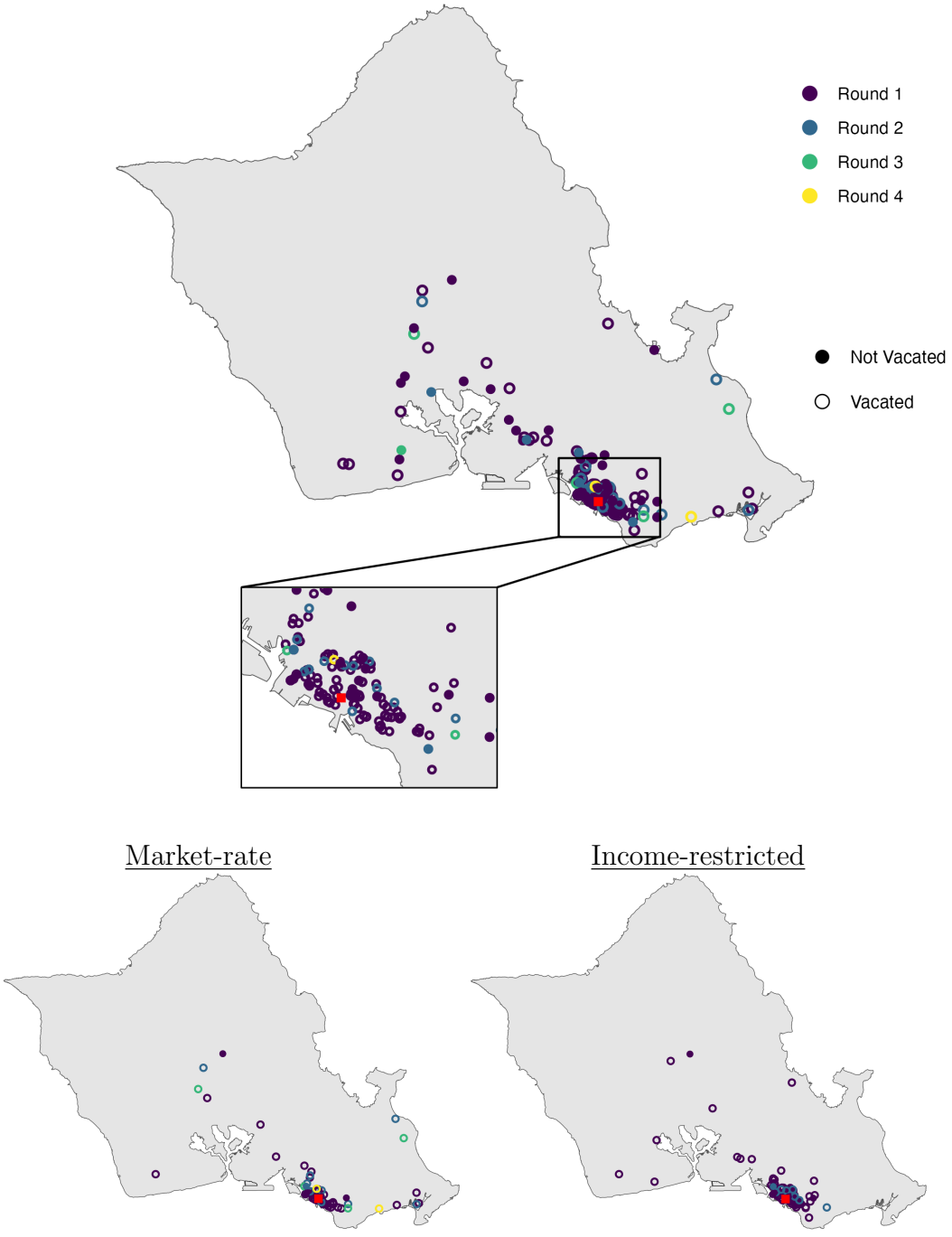
Figure 8 maps the locations of the 196 units involved in moving chains in Honolulu. The majority of Round 1 vacancies cluster in Urban Honolulu, but many extend westward into Central O'ahu. For Honolulu units involved in a moving chain, the average unit is 8.7 km from The Central. Spatial dispersion increases by round. Round 1 units average 8.5 km from The Central, Round 2 units average 9.1 km and Round 3 units average 12.8 km.

Honolulu's population is heavily concentrated in the urban core, so the dispersion of units is fairly consistent with the overall population dispersion of the Island. However, we find no instances of units on the west side of O'ahu. Income and education levels on the west side of O'ahu are generally lower. The pattern suggests that these neighborhoods did not directly benefit from housing filtering. However, filtering effects may have reached these areas but were not observed in the data, or may emerge in later rounds of moves that are not yet captured.

The bottom of Figure 8 divides the moving chain units according to whether they were instigated by a market-rate or income-restricted unit in The Central. We find that market-rate units generated many vacancies on O'ahu's east side, while income-restricted units induced zero vacancies in east side neighborhoods. Housing is generally larger and more expensive on the east side of O'ahu, this suggests a spatial market segmentation where the vacancies induced by income-restricted units will tend to flow through relatively affordable neighborhoods while market-rate initiated moving chains are more likely to reach into affluent areas.

Overall, the dispersion pattern indicates that a single project can induce housing filtering across a significant geographic swath of a housing market and loosen supply across a broad portion of the market, not merely within the immediate neighborhood.

Figure 8: Location of Moving Households



Notes: All properties identified as part of a moving chain, on O'ahu, are shown. The location of The Central is indicated by a red square.

5.7 Relation to Prior Evidence

Current evidence on housing filtering spans multiple countries, each with unique economies and housing markets. Bratu et al. (2023) and Turner and Wessel (2019) both study cities in Nordic countries, featuring strong welfare states, while Mast (2023) provides evidence from the U.S. While the housing market of Helsinki, investigated in Bratu et al. (2023), features a significant social housing sector, Oslo, studied in Turner and Wessel (2019), features a largely market-based, ownership-oriented housing market, with similarities to the U.S.

Our results are qualitatively similar to Mast (2023) and Bratu et al. (2023), who both find that new construction produces vacancy chains that extend to lower priced neighborhoods. We complement these studies by making the filtering process explicit at the property level. Our results contribute microfoundations for neighborhood-level patterns documented previously. Turner and Wessel (2019) argue that rental submarkets function poorly, as vacancy chains are rapidly absorbed by new household formation and in-migration. We directly observe and classify chain termination mechanisms in explaining why local vacancy chains may fail to materialize, but also note that these instances may have the benefits of allowing new household formation to occur and lowering household overcrowding.

Our comparison of market-rate and income-restricted chains within the same building mirrors Bratu et al. (2023)'s comparison of market-rate and social housing buildings. Just as Finnish social housing more directly loosens lower-priced market segments, we find that chains initiated by Honolulu's income-restricted units reach further down the price distribution. Unlike taxpayer-funded social housing, mixed-income buildings constructed under inclusionary zoning rules do not require a direct government expenditure, but do involve a wealth transfer from developers to lower- and middle-income buyers. However, residents across the market could be indirectly harmed by higher home prices and rents if inclusionary zoning policies are sufficiently burdensome to discourage total new housing production, as shown in Schuetz et al. (2011) and Means and Stringham (2012).

5.8 Policy Implications

Our findings speak directly to policy debates. Local opposition to new housing—often termed NIMBYism—frequently questions whether new construction benefits local households (Einstein et al., 2019), and skepticism about supply has evolved into a folk

theory that new housing can reduce affordability (Elmendorf et al., 2025), fueling political resistance (Fang et al., 2023). Our findings counter these claims by showing how new units set off measurable vacancy chains that free up lower-cost housing for others. This mechanism aligns with research showing that loosening supply constraints improves affordability (Büchler and Lutz, 2024; Freemark, 2023) and with classic filtering theory (Sweeney, 1974; Ohls, 1975; Braid, 1984). It also complements past evidence on induced vacancies (Mast, 2023; Bratu et al., 2023) by identifying the specific units and neighborhoods through which these gains materialize. Relatedly, long-run private-market filtering rates estimated in Rosenthal (2014) underscore the broader dynamics that our microdata make visible in a single project setting.

The results further inform program design. Within a mixed-income tower, income-restricted units can help channel vacancies toward lower-priced markets without the direct taxpayer outlays typical of stand-alone social housing. While market-rate units tend to generate a higher total number of housing vacancies in our setting, the chains initiated by income-restricted units successfully reached lower price points and proved particularly effective at accommodating new household formation. This pattern aligns with evidence that subsidized housing can reduce out-migration of low-income households in high-demand areas (Chapple and Song, 2024).

Our findings underscore the efficacy of Hawai'i's 201H program. By streamlining approvals and granting regulatory exemptions to incentivize mixed-income development, the 201H framework effectively acts as a catalyst for new supply. The existence of this program likely enabled the financial and administrative viability of the entire project studied here. Our results demonstrate that such policies not only successfully generate new housing but also initiate meaningful downmarket filtering. Evaluating the broader regional impacts of the 201H program, alongside calculating optimal inclusionary zoning rules, is a valuable direction for future research.

5.9 Limitations

Our analysis is subject to two main limitations that temper the interpretation of the results. First, our address-history coverage is incomplete (Section 5.1). Consequently, our observed links represent a lower bound on the total number of vacancies generated. Furthermore, the small sample size of higher rounds increases uncertainty. Therefore, we focus our inference on the robust Round 1 comparisons and use higher-round results to illustrate the direction and scope of the effect rather than to pinpoint

precise magnitudes.

Second, our analysis focuses on a single new condominium building. The generalizability of these findings to other buildings or cities remains an open question. While multi-building, multi-city analyses could offer a broader context for generalizable results, they are often less able to clearly diagram moving chains and may suffer from biases when the characteristics of vacated units are inferred from neighborhood averages instead of unit-level records. Our methodical approach of manually confirming every movement history in the dataset would be difficult to scale up to larger settings. We argue that our granular analysis is complementary to multi-building studies: it confirms the general results of housing filtering but is better positioned to articulate its microfoundations.

The context of Honolulu as a popular tourist destination also adds to the specificity of the results. The housing ladder in Honolulu may be hampered by the high number of out-of-state vacation-home buyers, whose purchases can sever local moving chains. Additionally, Honolulu faces high rates of housing overcrowding, with a greater number of people per household than the national average. This aspect may contribute to the shorter moving chains observed in our study, as many vacated units are filled by new households. Applying the same analysis to other cities might yield longer chains. Nonetheless, reduced household overcrowding is a potential secondary benefit of new housing supply.

By selecting a recently completed building, we attempt to inform discussions on new condo construction. However, using a recent project limits us to examining three years of post-construction data. While we find significant filtering occurring in these three years, a longer study period would likely reveal more instances of filtering. Our market-rate versus income-restricted results also provide suggestive evidence that the difference in downstream units across the two groups tends to decline with rounds. For example, we find statistically significant differences in unit prices in Round 1, but the difference is smaller and not significant in Round 2. Potentially, a longer observation window would allow us to confirm that the characteristics of downstream units tend to converge between the two types of chains. The convergence process suggests that market-rate and income-restricted units generate different types of local vacancies in the short-term, but restrictions on the initial unit become less important as the vacancy chains propagate across rounds.

Our analysis documents realized vacancy chains associated with the construction of The Central. Without the project, these chains would not have unfolded in the

precise form we observe. However, we cannot claim that any particular vacancy would not have occurred in the absence of the building. Some households that moved into The Central might have chosen to move even if it had not been constructed, thereby vacating the same prior unit. In that counterfactual scenario, however, those households would have occupied an existing vacant unit rather than a newly built one, removing that unit from the pool available to other movers. Accordingly, we do not claim that every observed vacancy represents a net new vacancy relative to a scenario without the project. Instead, the total number of vacancies generated through the observed chains provides an estimate of the scale at which new construction expands housing opportunities within the market.

6 Conclusion

When new housing is built, local residents move into it and vacate older units, which then become available to others. This process sets off chains of moves that extend beyond the initial households and expands affordability through a supply effect. Using address-level microdata linked to assessment records, we document these vacancy chains from a single mixed-income condominium tower and show that the resulting vacancies are numerous, geographically dispersed, and substantially cheaper than units in the new building itself.

Three results stand out. First, we verify a large drop in housing value across rounds relative to the new tower: homes vacated by movers are markedly less expensive on both a price-per-square-foot and total-value basis, and the gaps persist into Round 2. Second, both market-rate and income-restricted units initiate vacancy chains, but with different profiles: market-rate units are more likely to generate a downstream vacancy per initial unit, while chains initiated by income-restricted units reach farther into lower-priced segments. These differences reflect mechanisms we observe directly, particularly chain terminations due to new household formation. Third, vacancy chains are not confined to the immediate neighborhood; induced moves spread benefits across much of the island.

Our filtering estimates are conservative. Coverage constraints imply that the observed links represent a lower bound, and the analysis focuses on a single building. Even so, the results demonstrate how granular, property-level evidence can clarify the distributional pathways through which new construction improves affordability. Future

work spanning multiple projects and cities can assess the durability of these patterns, incorporate administrative income data to measure beneficiary incomes directly, and evaluate longer-run multipliers as chains continue to unfold.

References

Acolin, A., Decter-Frain, A., and Hall, M. (2022). Small-area estimates from consumer trace data. *Cityscape*, 47(27):843–882.

Arnott, R. J. and Braid, R. M. (1997). A filtering model with steady-state housing. *Regional Science and Urban Economics*, 27(4-5):515–546.

Asquith, B. J., Mast, E., and Reed, D. (2023). Local effects of large new apartment buildings in low-income areas. *Review of Economics and Statistics*, 105(2):359–375.

Been, V., Ellen, I. G., and O'Regan, K. (2019). Supply skepticism: Housing supply and affordability. *Housing Policy Debate*, 29(1):25–40.

Been, V., Ellen, I. G., and O'Regan, K. (2024). Supply skepticism revisited. *Housing Policy Debate*, pages 1–18.

Braid, R. M. (1984). The effects of government housing policies in a vintage filtering model. *Journal of Urban Economics*, 16(3):272–296.

Braid, R. M. (1986). The comparative statics of a filtering model of housing with two income groups. *Regional Science and Urban Economics*, 16(3):437–448.

Bratu, C., Harjunen, O., and Saarimaa, T. (2023). JUE insight: City-wide effects of new housing supply: Evidence from moving chains. *Journal of Urban Economics*, 133.

Büchler, S. and Lutz, E. (2024). Making housing affordable? The local effects of relaxing land-use regulation. *Journal of Urban Economics*, 143:103689.

Callies, D. L. (2010). *Regulating paradise: Land use controls in Hawai'i*. University of Hawaii Press.

Chapple, K. and Song, T. (2024). Can new housing supply mitigate displacement and exclusion? Evidence from Los Angeles and San Francisco. *Journal of the American Planning Association*, pages 1–15.

Chetty, R. and Hendren, N. (2018a). The impacts of neighborhoods on intergenerational mobility i: Childhood exposure effects. *The Quarterly Journal of Economics*, 133(3):1107–1162.

Chetty, R. and Hendren, N. (2018b). The impacts of neighborhoods on intergenerational mobility ii: County-level estimates. *The Quarterly Journal of Economics*, 133(3):1163–1228.

Chetty, R., Hendren, N., and Katz, L. F. (2016). The effects of exposure to better neighborhoods on children: New evidence from the moving to opportunity experiment. *American Economic Review*, 106(4):855–902.

Choi, J., Rasmussen, H., and Davison, M. (2012). Fair value and risk profile for presale contracts of condominiums. *The Journal of Real Estate Finance and Economics*, 44(4):472–504.

Chyn, E. (2018). Moved to opportunity: The long-run effects of public housing demolition on children. *American Economic Review*, 108(10):3028–3056.

Diamond, R. and McQuade, T. (2019). Who wants affordable housing in their backyard? An equilibrium analysis of low-income property development. *Journal of Political Economy*, 127(3):1063–1117.

Einstein, K. L., Glick, D. M., and Palmer, M. (2019). *Neighborhood Defenders: Participatory Politics and America's Housing Crisis*. Cambridge University Press.

Elmendorf, C. S., Nall, C., and Oklobdzija, S. (2025). Folk economics and the persistence of political opposition to new housing. *Journal of Economic Perspectives*, 39(3).

Fang, L., Stewart, N., and Tyndall, J. (2023). Homeowner politics and housing supply. *Journal of Urban Economics*, 138:103608.

Freemark, Y. (2023). Zoning change: Upzonings, downzonings, and their impacts on residential construction, housing costs, and neighborhood demographics. *Journal of Planning Literature*, 38(4):548–570.

Glaeser, E. L., Luca, M., and Moszkowski, E. (2023). Gentrification and retail churn: theory and evidence. *Regional Science and Urban Economics*, 100:103879.

Hawai'i Revised Statutes (2024). §201h-38: Housing development; exemption from statutes, ordinances, charter provisions, and rules. Includes 45-day county action and deemed-approval language.

Inafuku, R., Tyndall, J., and Bonham, C. (2022). Measuring the burden of housing regulation in Hawaii. *University of Hawaii Economic Research Organization*.

Infranca, J. (2019). The new state zoning: Land use preemption amid a housing crisis. *Boston College Law Review*, 60:823.

Laliberté, J.-W. (2021). Long-term contextual effects in education: Schools and neighborhoods. *American Economic Journal: Economic Policy*, 13(2):336–377.

Mast, E. (2023). JUE insight: The effect of new market-rate housing construction on the low-income housing market. *Journal of Urban Economics*, 133:103383.

Means, T. and Stringham, E. P. (2012). Unintended or intended consequences? The effect of below–market housing mandates on housing markets in California. *Journal of Public Finance and Public Choice*, 30(1-3):39–64.

Office of the Governor of Hawaii (2023). Proclamation relating to housing. *Emergency Proclamation*.

Ohls, J. C. (1975). Public policy toward low income housing and filtering in housing markets. *Journal of Urban economics*, 2(2):144–171.

Phillips, D. C. (2020). Measuring housing stability with consumer reference data. *Demography*, 57(4):1323–1344.

Ramiller, A., Song, T., Parker, M., and Chapple, K. (2024). Residential mobility and big data: Assessing the validity of consumer reference datasets. *Cityscape*, 26(3):227–239.

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.

Schuetz, J., Meltzer, R., and Been, V. (2011). Silver bullet or trojan horse? the effects of inclusionary zoning on local housing markets in the united states. *Urban studies*, 48(2):297–329.

State of Hawai'i Legislature (2005). Act 196, session laws of hawai'i 2005. Omnibus Affordable Housing Act establishing a focused housing finance and development entity.

Sweeney, J. L. (1974). A commodity hierarchy model of the rental housing market. *Journal of Urban Economics*, 1(3):288–323.

Turner, L. M. and Wessel, T. (2019). Housing market filtering in the Oslo region: Pro-market housing policies in a Nordic welfare-state context. *International Journal of Housing Policy*, 19(4):483–508.

Tyndall, J., Gordner, T., Inafuku, R., Park, J., Driggers, J., and Kim, E. (2025). The Hawai'i Housing Factbook 2025. *University of Hawai'i Economic Research Organization (UHERO)*.

Appendix

A The 201H Program

Each of Hawai'i' s four counties operates an inclusionary housing policy requiring certain new residential projects to provide income-restricted units (or equivalent alternatives). The set aside units are subject to resale and occupancy deed restrictions. These frameworks provide the backdrop against which the state-level 201H program operates.

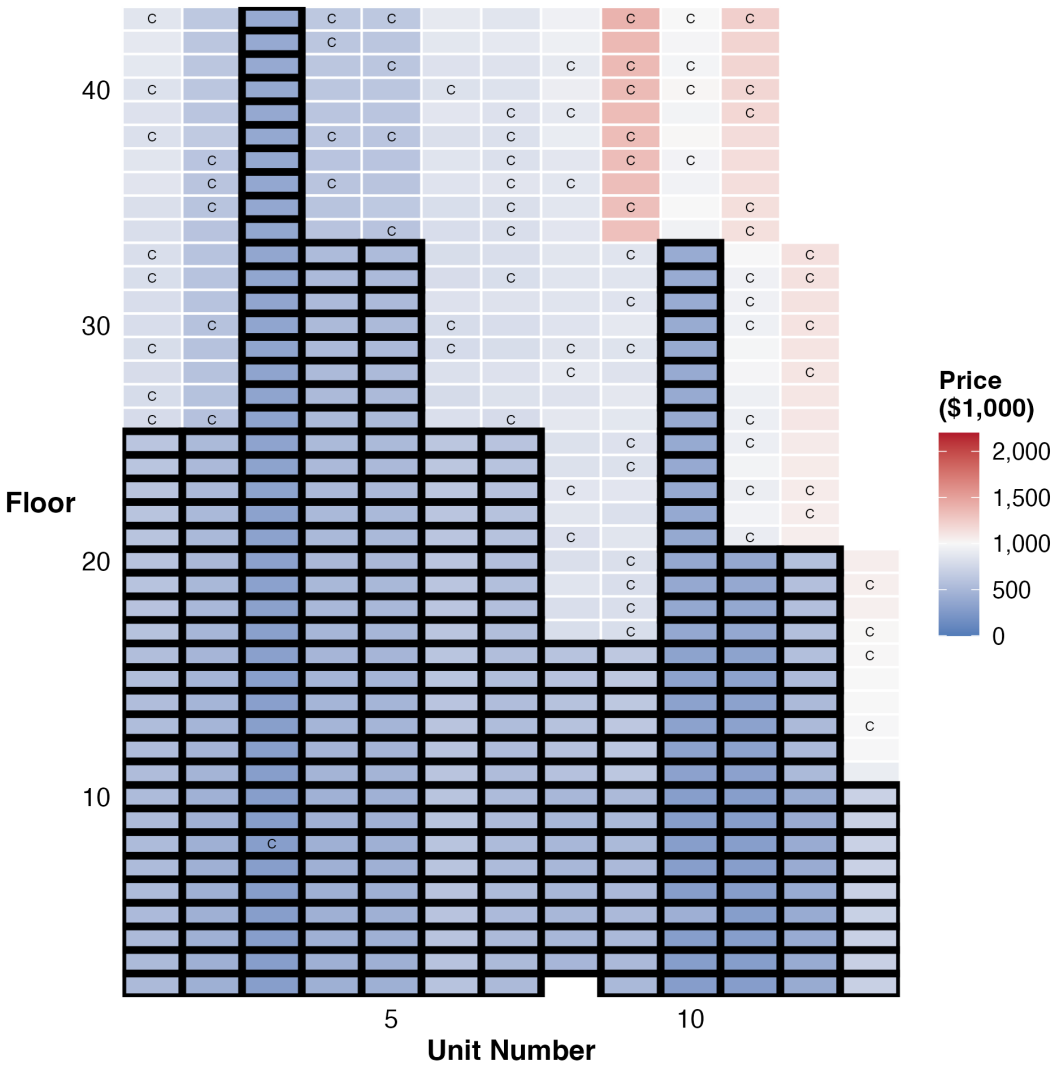
In 2005-2006, the Hawai'i Legislature reorganized state housing functions. Act 196 (2005) created a focused housing finance and development entity and laid the groundwork for separating finance/development from public housing functions (State of Hawai'i Legislature, 2005). Act 180 (2006) repealed former Chapter 201G and codified the present Chapter 201H under which the Hawai'i Housing Finance and Development Corporation (HHFDC) operates.

In the same period, the Legislature clarified that county legislative bodies may approve 201H projects "with or without modifications," rather than only approve or disapprove (Act 217 (2006), as referenced in county legislative records). The stated aim was to streamline approvals for qualified projects while concentrating state resources on producing and preserving affordable housing.

Under HRS §201H–38, HHFDC may develop or assist in the development of housing projects that, if they meet statutory criteria, are exempt from many state and county rules relating to planning, zoning, subdivision standards, and construction. After HHFDC review, the relevant county council must approve, approve with modifications, or disapprove the project by resolution within 45 days; otherwise, it is deemed approved (Hawai'i Revised Statutes, 2024). In practice, HHFDC processes applications, but county councils (and, where applicable, the State's Land Use Commission) render a final decision on requested exemptions (Hawai'i Revised Statutes, 2024).

B Initial Purchase Prices of Units in The Central

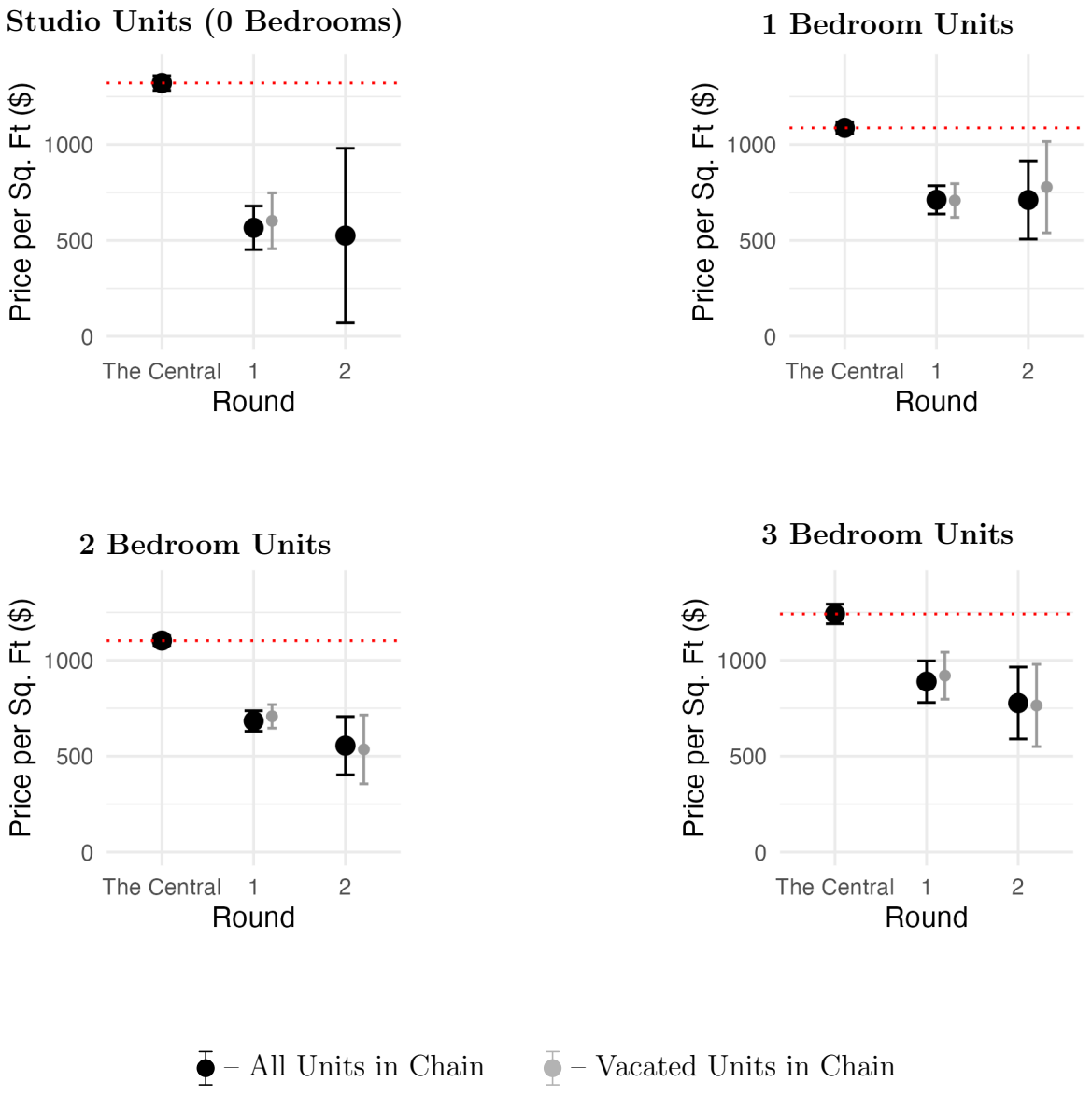
Figure B.1: Initial Purchase Price of All Units



Notes: Heat shading shows recorded initial purchase price (from deed records). Dark line borders denote income-restricted units per the stacking plan. "C" marks a cash-only sale (no mortgage). Unit 208 was reserved for the building's resident manager and therefore was never offered for sale.

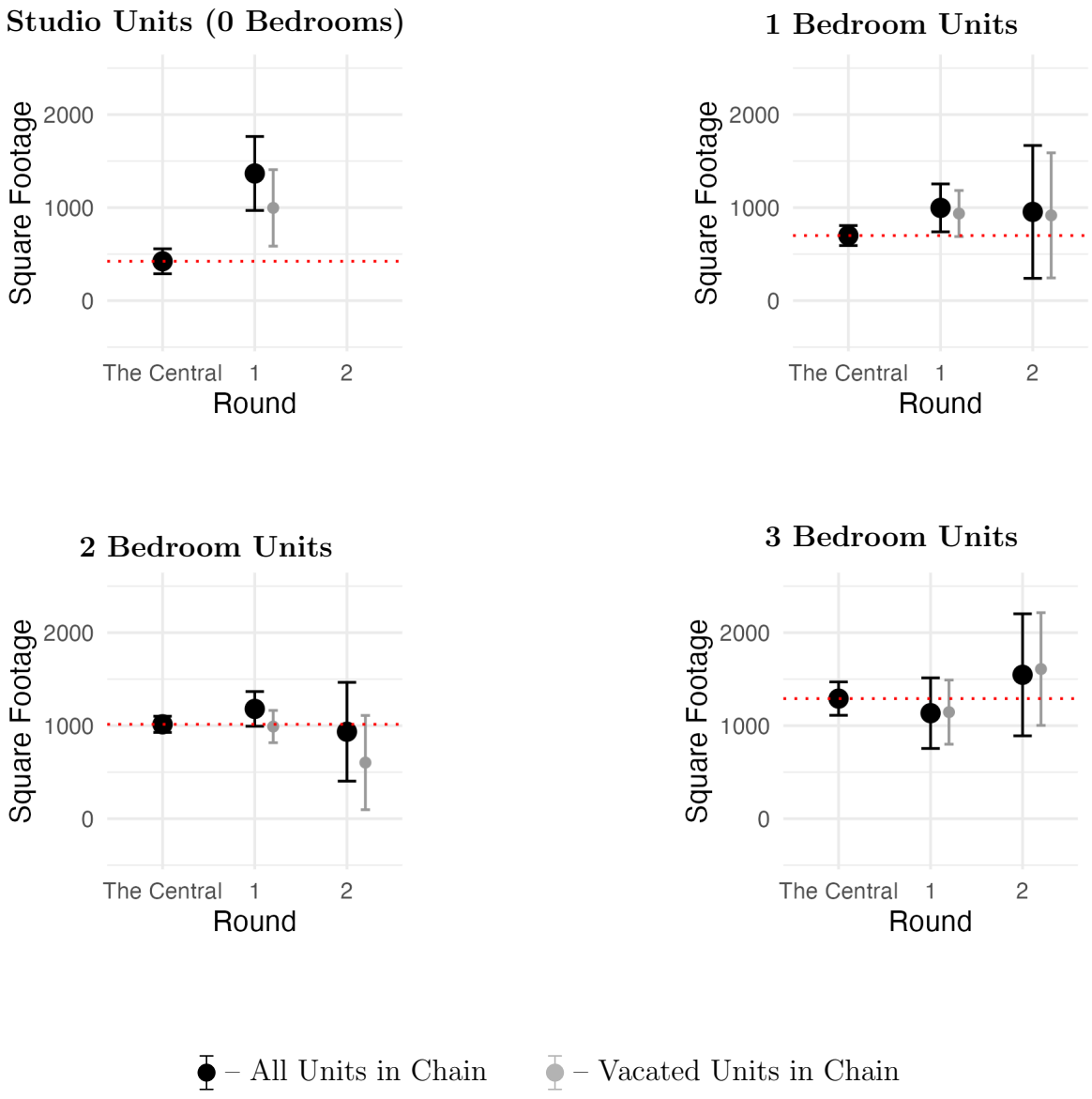
C Results by Bedrooms in Initial Unit

Figure C.1: Home Value per Square Foot by Movement Round and Bedroom Count



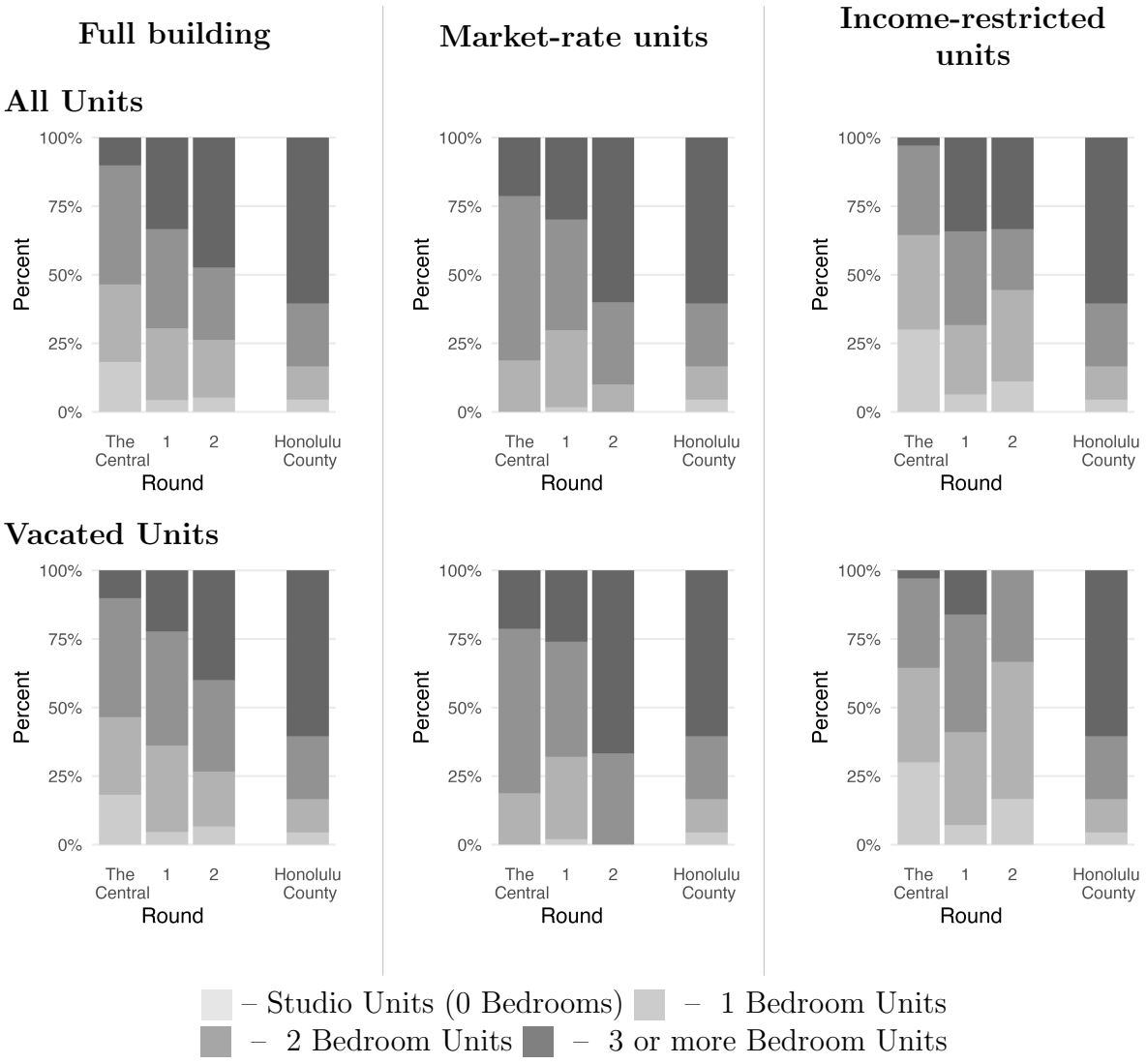
Notes: Results are shown where the sample is limited to chains originating from a Central unit of a specific number of bedrooms. Estimates are shown by round for the full sample (black dots) and for only units that actually resulted in a vacancy (gray dots). The 95% confidence intervals are shown. Points are omitted where no observations of that type exist.

Figure C.2: Square Footage by Movement Round and Bedroom Count



Notes: Results are shown where the sample is limited to chains originating from a Central unit of a specific number of bedrooms. Estimates are shown by round for the full sample (black dots) and for only units that actually resulted in a vacancy (gray dots). The 95% confidence intervals are shown. Points are omitted where no observations of that type exist.

Figure C.3: Percentage of Bedrooms by Movement Round



Notes: Housing types are classified according to bedroom count and shown as a percentage of the total number of units observed in a round. The first row includes both vacated and non-vacated units, while the second row includes only vacated units. The first column shows the full set of units originating from any moving chain, the second column shows those originating from a market-rate unit, and the third columns shows those originating from an income-restricted unit. The 2024 distribution of bedrooms for all units in Honolulu is also shown for comparison.