Finding Home When Disaster Strikes: Dust Bowl Migration and Housing in Los Angeles[*]

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Abstract

When natural disasters strike, the impact on housing markets can be far-reaching. This paper explores the unique dynamics of natural disaster-induced migration on the housing market, focusing on the 1930s Dust Bowl migration to Los Angeles—the top migrant destination. We use U.S. Census-linked and geocoded address data to document that the arrival of Dust Bowl migrants significantly impacted the city's housing market. We show that houses inhabited by Dust Bowl migrants had lower price growth over the decade. Critically, we uncover valuation spillovers within highly granular neighborhoods, where houses inhabited by non-migrants experienced lower price growth modulated by how close they were to Dust Bowl migrants. Our analysis of potential mechanisms suggests that these effects were primarily driven by the economic vulnerability of migrants rather than generalized discrimination. Our research contributes to understanding how natural disaster-induced migration shapes housing markets and the dimensions in which climate refugees differ from other migrants.

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1 Introduction

Natural disasters are causing human displacement on an unprecedented and escalating scale. The Internal Displacement Monitoring Center reports that in 2023, natural calamities forced 26.4 million people worldwide to abandon their homes. This global trend is mirrored in the United States, where the impact is equally significant. According to the Census Bureau's Household Pulse Survey, approximately 700,000 Americans were permanently displaced by natural disasters in 2023—a figure comparable to the entire Washington, D.C. population. With climate change, there is broad consensus in the scientific community that the frequency and severity of climate-related disasters, such as floods, droughts, wildfires, and hurricanes, will increase in the following decades (Cattaneo et al., 2019). This expected upsurge in natural disasters will force more people to leave their homes and relocate to different regions (Missirian and Schlenker, 2017).

This paper investigates the impact of migration from areas affected by natural disasters on the housing markets of receiving regions. While recent research emphasizes the importance of migration for climate change adaptation and lessening the adverse welfare effects of natural disasters (Desmet and Rossi-Hansberg, 2015; Cruz and Rossi-Hansberg, 2021; Bilal and Rossi-Hansberg, 2023), the influx of climate migrants can substantially affect the economies of the areas receiving them. Understanding the economic implications of climate-induced migration, especially on housing markets, is vital for local authorities and policymakers to effectively prepare for the potential influx of people escaping natural disasters.

We study the impact of migrants arriving from the American Dust Bowl in the 1930s on the housing market in Los Angeles, California. The American Dust Bowl of the 1930s is often regarded as one of the most devastating natural disasters in U.S. history. It was characterized by severe droughts and massive dust storms, which ravaged the Great Plains and forced a large number of residents to flee the region. About 2.5 million people in the affected area were displaced between 1935 and 1940, with 34% of the farm population fleeing between 1935 and 1937 alone (Worster, 2004, p.49).[1] While many migrants dispersed to various parts of the country, Los Angeles emerged as a major destination, receiving a significantly larger share of Dust Bowl migrants than other cities. Our analysis shows that Los Angeles County, CA, received five times more migrants from Dust Bowl areas than the next leading destination, Cook County, IL. This concentration of migrants motivates our focus on the Los Angeles housing market.

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[1] This mass migration is famously captured in Steinbeck's (1939) novel, *The Grapes of Wrath*, which tells the story of an Oklahoma family moving to California in search of work and better wages.

Importantly, the context of the American Dust Bowl helps isolate confounding factors through which refugees from natural disasters may influence local housing markets. For instance, when displaced populations differ from the incumbent population in terms of race, ethnicity, culture, or language, it becomes challenging to separate the effects of climate migration from those of discrimination. The Dust Bowl migration, however, provides a unique opportunity to study the impact of large climate-induced displacement on housing markets, as it largely involved white, U.S.-born migrants moving to areas with similar demographic characteristics. While these similarities do not completely rule out the possibility of prejudice, they certainly lessen the assimilation challenges typically faced by refugees.

A key empirical challenge in our study is addressing potential endogeneity in the location choices of Dust Bowl migrants within Los Angeles. Migrants may have selected into specific neighborhoods or properties based on unobservable characteristics that could also influence housing market outcomes, potentially biasing our estimates. To address this concern, we employ a multi-faceted identification strategy. First, we focus on a single city, Los Angeles, to abstract away from city selection in the destination choices of disaster-induced migrants (Long and Siu, 2018; Hornbeck, 2023; Kleemans, 2023). Second, we leverage highly granular census-linked data and compare the evolution of the exact same address over the decade, alleviating selection concerns on the time-invariant characteristics of a property. Third, we leverage highly granular fixed effects at very small neighborhood definitions, effectively comparing properties within extremely localized areas. This approach controls for changes in unobserved neighborhood characteristics that might influence both migrant settlement patterns and housing prices. Fourth, we utilize a rich set of pre-migration property and resident characteristics from the 1930 Census, including initial property values, to account for common house price trends in the 1930s associated with these characteristics. Fifth, we compare the evolution of homes inhabited by Dust Bowl migrants to those inhabited by other internal U.S.-born migrants, a more appropriate comparison group with similar mobility patterns. Finally, in the assessment of the mechanisms, we also exploit variation in the severity of environmental degradation in migrants' origin areas, comparing outcomes for migrants from high-erosion versus low-erosion counties (Hornbeck, 2012, 2023).

Given the strategy presented above, this study requires georeferenced address-level data to track house price evolution over a decade and group them within granular neighborhoods. To address this challenge, we develop a novel methodology that integrates information from multiple historical datasets, including the complete count U.S. Census records and contemporary geographical data. This approach yields a unique, comprehensive sample of houses in Los Angeles that enables us to: (i) examine detailed house and resident characteristics from U.S. Census records, including house prices; (ii) assess their geographic locations, and (iii) link addresses across the 1930 and 1940 Censuses. This sample serves as the basis for our analysis allowing for a highly granular, address-level analysis of housing market dynamics in response to disaster-induced migration.

Our analysis of detailed micro-level historical U.S. Census data reveals significant direct effects of Dust Bowl migration on Los Angeles housing markets. Employing a rigorous address-level comparison within narrowly defined neighborhoods, we find that properties inhabited by Dust Bowl migrants experienced substantially lower price growth over the decade compared to similar addresses in the same small neighborhood. Specifically, our preferred specifications indicate that houses occupied by Dust Bowl migrants saw a 4 to 5 percentage point lower appreciation rate relative to comparable properties inhabited by other migrants. This effect remains robust across various fixed effects specifications and control variables, suggesting a strong and consistent impact of Dust Bowl migration on housing prices. Moreover, we observe that these negative price effects were more pronounced for properties that were owner-occupied in 1930. We also find that addresses receiving Dust Bowl migrants experienced significant increases in household size and total number of residents. Properties that housed Dust Bowl migrants saw, on average, a 4.7 percentage point higher growth rate in household size and a 9-10 percentage point higher growth rate in the total number of residents compared to other migrant-inhabited addresses. This suggests a pattern of more intensive use of housing units by Dust Bowl migrants.

We also uncover substantial spillover effects. Non-migrant property in close proximity to Dust Bowl settlers or in areas with higher concentrations of Dust Bowl migrants experienced lower price appreciation over the decade. Additionally, we find suggestive evidence of residential sorting, with incumbent renters showing a higher propensity to move when located closer to Dust Bowl migrant concentrations. This spatial dimension of impact underscores the broader economic consequences of large-scale, climate-induced migration in urban areas.

We then investigate the potential mechanisms that could explain our findings, focusing on three main possibilities: discrimination, disinvestment, and overcrowding. To test these different hypotheses, we compare the heterogeneity in the effects based on the severity of the Dust Bowl in the migrants' origin, as measured by top-soil erosion (Hornbeck, 2012, 2023). Our analysis suggests that the negative price effects are not primarily caused by overcrowding, as both high-and low-erosion migrant addresses show similar increases in occupancy, yet only the former experience slower price growth. Furthermore, we find little evidence of widespread discrimination against Dust Bowl migrants as a group, given the differing impacts between high- and low-erosion migrants. Instead, our results point to economic factors as the main drivers of the observed housing market effects, aligning more with the disinvestment channel.

Taken together, our results suggest that the influx of Dust Bowl migrants into Los Angeles during the 1930s had a significant and multifaceted impact on the local housing market. The presence of migrants not only affected house price growth rates of properties they directly occupied but also seemed to have influenced the perceived attractiveness and economic dynamics of their local communities.

Related Literature. Our research relates to the literature investigating migration prompted by weather changes and natural disasters and its implications for both migrants and the economies of the areas they move to. The majority of existing studies investigate the effects of climate disaster-induced migration on various aspects, including labor markets, health, and education (McIntosh, 2008; Imberman et al., 2012; Cattaneo and Peri, 2016; Deryugina et al., 2018; Boustan et al., 2020; Deryugina and Molitor, 2020; Oliveira and Pereda, 2020). Despite recent research, there is a notable scarcity of research focusing on the impact of natural disaster-induced arrivals on the evolution of cities and housing markets. One recent contribution on this front is Busso and Chauvin (2023), which studies the impacts of weather-induced rural-urban migration on labor and housing markets in Brazil. We contribute to this literature by studying the micro-level impacts of the arrival of disaster-induced migration on the evolution of housing and neighborhoods in the destination city. Our study is more closely aligned with the findings of Daepp et al. (2023), who observed a decrease in house prices in Texas after the arrival of individuals displaced by Hurricane Katrina. In the paper, racial sorting is a fundamental mechanism driving the main results on house prices. We contribute to this literature by examining the consequences of the most severe natural disaster in U.S. history, the American Dust Bowl of the 1930s, to housing in Los Angeles, a setting where race and ethnic disparities did not play a crucial role.

Our paper also aligns with the literature studying the impacts of migration on housing and neighborhood dynamics. In general, previous studies show that migration generally increases the demand for housing in the destination, which, in the short run, translates into higher prices

(Saiz, 2003, 2007; Greulich et al., 2004; Howard, 2020).[2] A branch of this literature focuses on how the arrival of minority populations influences neighborhood dynamics and housing markets (Boustan, 2010; Accetturo et al., 2014; Saiz and Wachter, 2011; Moraga et al., 2019; Shertzer and Walsh, 2019; Akbar et al., 2022; Boje-Kovacs et al., 2024). In particular, many of these studies find that house prices can decrease in response to the arrival of people from a different race, ethnicity, culture, or country if the arriving group is perceived as "undesirable" to incumbent residents. We contribute to this body of literature in two key ways. First, we examine the impact on housing resulting from the arrival of people displaced by a long-lasting natural disaster. Second, we focus on the arrival of a population of immigrants with similar race and ethnicity to the incumbent population, allowing us to isolate racial and ethnic discrimination channels, commonly highlighted in the literature.

Our study is also connected to the existing literature on the historical westward internal migration in the U.S. (Bazzi et al., 2023; Zimran, 2022) and the economic consequences of the 1930s American Dust Bowl (Hornbeck, 2012; Long and Siu, 2018; Hornbeck, 2023; Moscona, 2022; Noghanibehambari and Fletcher, 2022; Sichko et al., 2025). While previous studies have primarily focused on the effects in origin areas, on the aggregate economy and political preferences, or the migrant's labor market outcomes, our research provides a detailed analysis of how this major environmental disaster shaped urban development and housing dynamics in a key destination city, Los Angeles, CA. By focusing on Los Angeles, we can conduct a much more detailed analysis, offering insights into the consequences of the Dust Bowl on urban growth patterns, residential sorting, and property values.

We contribute to the existing literature in many ways. First, we comprehensively analyze how a major climate-induced migration event impacts housing markets in destination areas, focusing on direct and spillover effects. Second, our study leverages unique, highly granular historical data, including geocoded addresses and linked census records, allowing for a more nuanced understanding of neighborhood dynamics and residential sorting patterns. Third, we distinguish between migrants from high-erosion and low-erosion areas, providing novel evidence on how the severity of environmental shocks at the origin matters at the destination. Fourth, our analysis of both price effects and occupancy changes offers a multifaceted view of how housing markets adjust to sudden influxes of climate migrants. Finally, our work provides valuable insights that can inform current policy debates on climate change adaptation and urban resilience.

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[2] See Jia et al. (2023) for a recent review on how internal migration in the U.S. interacts with housing markets.

2 Historical Background

2.1 The American Dust Bowl

The 1930s Dust Bowl was one of North America's most severe environmental disasters in the twentieth century.[3] While it predominantly affected the Great Plains—especially Oklahoma, Texas, New Mexico, Colorado, and Kansas—it also damaged farther states like South Dakota, Montana, Wyoming, and Nebraska. Traditionally known as "America's breadbasket," this region faced several years of relentless drought, exacerbated by decades of extensive farming without crop rotation and other soil conservation techniques. These conditions led to excessive topsoil erosion, generating massive dust clouds, sometimes called "black blizzards," that blanketed the land. Panels A through D in Figure 1 show historical photographs capturing the extent of wealth destruction caused by the devastating events. This phenomenon caused extensive damage to farmland, crops, homes, infrastructure, and equipment, turning once-fertile fields into barren wastelands.

The socio-economic impact of the Dust Bowl was profound. There were many accounts of increased incidence of respiratory diseases (e.g., asthma, dust pneumonia) (Worster, 2004). Recent research also finds significant negative health effects of in-utero and early-life exposure to the Dust Bowl (Noghanibehambari and Fletcher, 2022). Drought, dust, and economic hardship of the Depression forced thousands of families to abandon their homes. Many of these displaced families, often called "Dust Bowl refugees," embarked on long journeys toward the West, particularly California, searching for work and better living conditions. Figure 1 shows two families and their children migrating from the Great Plains depicted in some of the most iconic Depression-Era portraits by acclaimed photographers Ben Shahn (Panel E) and Dorothea Lange (Panel F) for the Farm Security Administration.

This mass migration reshaped the demographic and cultural landscape of the United States. The terms "Okies" and "Arkies," initially referring to those from Oklahoma and Arkansas but later used for all migrants from the Dust Bowl region, became synonymous with the struggle of these individuals.[4] In their new communities, these migrants often

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[3] An excellent summary of the unique aspects of the Dust Bowl is in Hansen and Libecap (2004). This background section draws heavily on their description and sources.

[4] The Library of Congress' Dust Bowl Collection has several accounts of stigmatization. Many faced derogatory remarks due to their accent, appearance, and cultural practices.

(A) Kansas, 1935: A "Black Blizzard" Arriving **(B) Kansas, 1936: Approaching Dust Storm**

(C) South Dakota, 1936: Abandoned Equipment **(D) Oklahoma, 1936: Abandoned barn amid dust**

(E) Arkansas, 1935: A destitute family **(F) California, 1937: A migrant mother and child**

Figure 1. The 1930s Dust Bowl Climate Disaster in Historical Photographs. Photograph credits in each panel: (A) FDR Library Digital Archives; (B) Kansas Historical Society; (C) USDA (via Wikimedia Commons); (D) Arthur Rothstein for the Farm Security Administration (via Library of Congress); (E) Ben Shahn for the FSA (via NY Public Library); (F) Dorothea Lange for the FSA (via Library of Congress).

faced exclusion from social and cultural activities and hostility from established residents who perceived them as threats to local jobs and social order.

Perhaps the best symbol of the Dust Bowl's profound impact on American history and popular culture is Steinbeck's (1939) classic novel *"The Grapes of Wrath."* The novel intimately portrays the struggles faced by one Oklahoma family, the Joads, as they journeyed westward to California. Steinbeck's vivid depiction of their journey and the broader plight of Dust Bowl migrants struck a chord with readers, becoming a critical and commercial success.[5] The book became a defining piece of American literature and culture, as inequality and human rights themes resonated deeply during the Great Depression Era.[6]

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[5] A year after its debut, the novel was turned into a movie directed by John Ford with Henry Fonda as Tom Joad.

[6] The novel's impact on American culture was so significant that it not only won the National Book Award and the Pulitzer Prize but also influenced subsequent labor policy changes aimed at improving the lives of the poor and dispossessed. First Lady Eleanor Roosevelt, upon reading the book, called for congressional hearings that resulted in

2.2 Los Angeles: The Arrival of Dust Bowl Migrants

Figure 2 shows the top 20 county destinations for Dust Bowl migrants during the Great Depression, excluding the areas affected by the disaster. It shows that the Joads in Steinbeck's (1939) novel were not an exception. Many migrants saw California—especially Los Angeles—as a place of opportunity to escape the poverty and hardships of the Dust Bowl region (Todd et al., 1940). By far, Los Angeles County was the most common destination for those who left the Great Plains. Figure 2 shows that over 75,000 Dust Bowl migrants lived in Los Angeles County in the 1940s. They represented about 5.34% of the local LA working-age population in 1935 and more than a fifth (22.5%) of the total internal immigration flow to LA between 1930 and 1940.

Beyond the availability of detailed historical and geographical information about LA, these outstanding magnitudes in total migration also explain why we focus on Los Angeles to study the housing consequences of climate-forced migration. The Chicago area was the second largest destination of Dust Bowl migrants, although Cook County, Illinois, received less than one-third as many immigrants. Naturally, the literature on the Dust Bowl migration has investigated the prominence of California as a destination. For instance, Long and Siu (2018) shows that the likelihood of Dust Bowl migrants moving to California was comparable to other internal migrants, suggesting that the Californian "pull factor" was similar for Dust Bowl and non-Dust Bowl migrants. This feature helps our empirical setting, as we benefit from this comparable "pull factor" among different groups of migrants to compare the evolution of their house prices when living in Los Angeles.

Despite the clear preponderance of Californian counties in the top 20 (e.g., Kern, San Diego, Tulare, Alameda, San Francisco, and Fresno), other locations on the West (e.g., Denver, Colorado; Multnomah County, Oregon, in the Portland area; and King County, Washington in the Seattle area) and the American Midwest (Cook County, Illinois; Jackson County, Missouri, in the Kansas City area) also received a remarkable number of Dust Bowl migrants.

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reform to labor laws governing migrant camps. The crowning of Steinbeck's (1939) masterpiece came in 1962 when it was cited prominently by the Nobel Committee, awarding him the Nobel Prize in Literature for *"his realistic and imaginative writings, combining as they do sympathetic humor and keen social perception."* Our analysis focuses on the period that precedes the novel's influence on American culture and, therefore, is not impacted by the labor policies adopted due to its remarkable success.

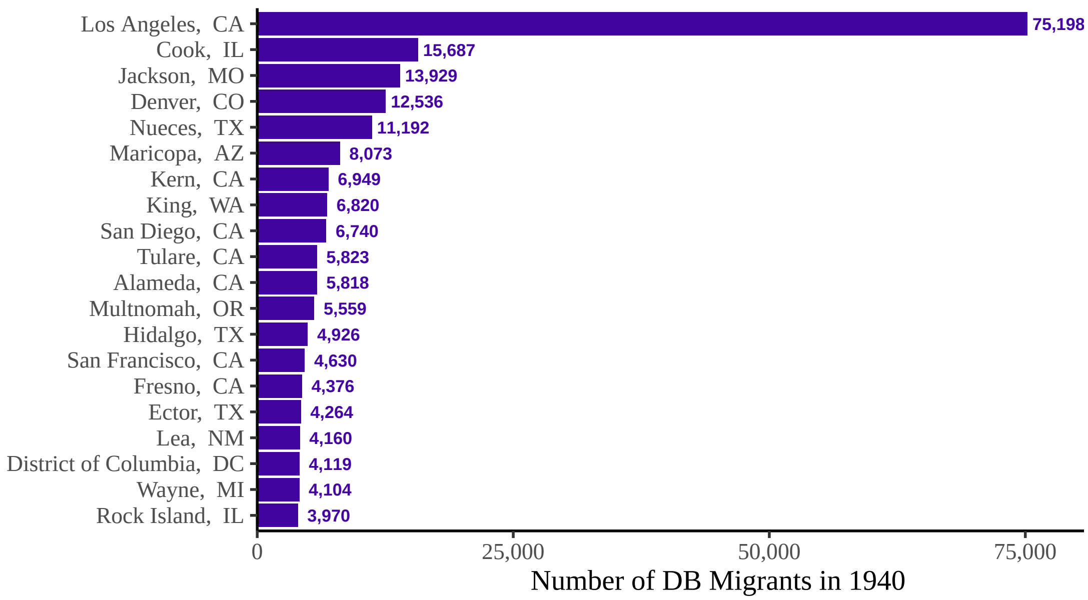

Figure 2. Top 20 Destinations of Dust Bowl Migrants. This figure focuses on the top 20 counties receiving Dust Bowl migrants in the 1930s, which were not affected by the disaster. It plots the number of migrants a county received in the 1930s as seen from the 1940 Census. Dust Bowl migrants were identified based on their county of origin in 1935, according to the 1940 Census. Counties affected by the Dust Bowl are defined as in Hornbeck (2012).

3 Data

Linked Housing Units. Our analysis is based on individual-level data from the Los Angeles population in the 1930 and 1940 U.S. censuses, sourced from the IPUMS Restricted Complete Count Data (Ruggles et al., 2020) and the Urban Transition Historical GIS Project by Logan et al. (2023). This detailed micro-level data allows us to observe individual and household characteristics such as age, race, ethnicity, and other demographic factors. Most importantly, the census data enables us to precisely determine each person's address in 1930s and 1940s Los Angeles, allowing us to observe the same housing unit before and after the arrival of migrants.

Nonetheless, tracking houses across the two decennial censuses is challenging, as it requires matching long strings of characters that are prone to style variations and errors. To address this, we use the automated matching algorithm from Cortes and Sant'Anna (2023), which links addresses across the 1930 and 1940 Censuses based on exact matches, following recent advances in the economic history literature that connect *individuals* across censuses using their names (Abramitzky et al., 2014, 2021). Adapting this strategy to addresses, Cortes and Sant'Anna (2023) employ a similar approach to Akbar et al. (2022), matching addresses based on state, city, street name, and house number, as shown in census records. This method allows us to track changes in each housing unit's price and the head of household's characteristics at the same address over the decade. We assume that the head of household's characteristics are representative of the entire household.[7]

As expected, we are able to link only a fraction of addresses between 1930 and 1940. After excluding heads of households living in group quarters, the 1940 Census contains 508,491 households in the city of Los Angeles, of which 112,575 remain after we link addresses. However, there is no reason to believe that our procedure resulted in a biased sample. In fact, we do not observe any consistent bias, as the average characteristics of households in the full sample and the linked sample are similar, as shown in the appendix Table A.2.

Georeferenced Addresses. We take an additional step by determining the latitude and longitude of addresses in 1930s and 1940s Los Angeles. This novel spatial data allows us to conduct spatial analysis and, more importantly, establish consistent measures of neighborhoods across the two censuses, enabling us to control for unobservable neighborhood characteristics and amenities. By combining these approaches, we obtain a sample of over 89,000 households and 77,394 addresses that we can successfully link across the two censuses, along with their georeferenced locations, house prices, and household characteristics.

To obtain the latitude and longitude of addresses in 1930 and 1940 Los Angeles, we use address information from the Urban Transition Historical GIS Project by Logan et al. (2023). We complement this data by geocoding the addresses with the *tidygeocoder* R package and searching for the 1930 and 1940 addresses using ArcGIS and OpenStreetMap services. After collecting the coordinates for each address, we exclude those where the distance between coordinates from different methods exceeds 100 meters. Using this approach, we retrieve coordinates for a substantial number of addresses. For the baseline period of 1930, we geocoded 65.37% of identifiable addresses, which housed 63.96% of individuals living in identifiable homes.

Multi-Family Housing. There is a substantial number of multifamily units in our sample. Specifically, in 1930, 46.7% of the linked and geocoded addresses had two or more families living in them. Of these, 43.4% housed fewer than seven families. While it is not uncommon to exclude such units from housing studies, we choose to keep them in our sample because mi-

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[7] The head of household is usually identified in the Census data. When the head was not identified, we assigned this position to the oldest individual in the household. For households with more than one head, we assigned the role to the first listed. Finally, we dropped households where the head was younger than 16.

grants from the Dust Bowl were likely to be in the lower income distribution and, thus, more likely to live in multifamily units. Indeed, while 2.4% of single-family units in 1930 received Dust Bowl migrants, 3.6% of multifamily units did. However, defining the housing characteristics of a multifamily unit is less straightforward than for a single-family unit. In most cases, the variables represent the median or share of a given characteristic among the families in the unit. We clarify these choices as we present our variables.

House Prices. Our main dependent variable is *house price*, which we construct from census data on house values[8] and monthly rents paid by households at each address.[9] For multifamily units, we use the median house value or the median rent. Both house values and rents are adjusted to 1930 prices. However, rented units only provide information about rent, which limits comparisons between owner-occupied and renter-occupied properties. To address this, we establish a common price metric across ownership statuses.

To achieve this goal, we calculate the equivalent monthly rental value for both owned homes and rented units. This approach allows us to evaluate housing costs on a uniform scale, regardless of occupancy type. Let $P_{i,n}$ represent the house price (monthly rent or house value) of unit i in neighborhood n, $r_{i,n}$ be an indicator for whether the address contains at least one rented unit, and $X_{i,n}$ be a vector of household characteristics, including the racial and ethnic composition of residents.[10] We then compute the within-groups estimator of δ, denoted by $\widehat{\delta}$, in the following equation:

$$\log P_{i,n} = \alpha_n + \delta \cdot r_{i,n} + \gamma' X_{i,n} + \epsilon_{i,n}, \tag{1}$$

which represents the log of the user cost of owner-occupied housing or the capitalization rate (Poterba, 1992). In this regression equation, α_n represents a neighborhood fixed effect (detailed later in Section 3.1), and $\epsilon_{i,n}$ denotes a random error. We run this specification separately for 1930

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[8] The U.S. Census collected information on house values through owner self-reporting. While some might question the reliability of self-reported home values, there are several reasons to alleviate concerns about this information. First, the census enumerators received specific instructions to record house values as nearly as it could be ascertained to their current market value, offering clear guidelines to help owners estimate how much the property "would sell for under normal conditions" (Bureau of the Census, 1930). Second, recent research by Lyons et al. (2024) provides compelling validation of the census information by showing that the cross-sectional distribution of census house prices closely matches contemporary market prices from newspaper listings in many cities.

[9] The U.S. censuses report the household's monthly contract rent payment in dollars, reflecting the amount the landlord expected to receive for the unit. This amount includes utilities, fuel, and other expenses only if they were part of the rental contract.

[10] The complete set of controls is the same as the one used in the main estimations described below.

and 1940 and use the respective $\widehat{\delta}$ to convert house values to an equivalent monthly rent for each year. This approach is commonly used in the real estate literature to estimate the rental value of owner-occupied houses (Bayer et al., 2007; Gilbukh et al., 2017; Akbar et al., 2022).

There are 3,905 addresses for which we lack the necessary information to compute house prices in both periods, reducing our sample to 73,489 observations. In this final sample, the average house price in 1930 is US$50.83, which can be interpreted as the imputed rent. For comparison, the average rent among renter-occupied units is US$55.08. On average, house prices declined by 2.4% between 1930 and 1940, which is expected given the overall reduction in asset prices during the Great Depression.

Migrants. Our main explanatory variable indicates whether a given address was occupied by a migrant from the Dust Bowl area between 1935 and 1940. Following Hornbeck (2023), we define a Dust Bowl migrant as any household head who reported living in 1935 in counties affected by the Dust Bowl. Consistent with Hornbeck (2012), we define Dust Bowl-affected areas as the Great Plains counties that experienced cumulative erosion damage during the 1930s. An address is classified as having received Dust Bowl migrants if at least 5% of the household heads reported living in a Dust Bowl area in 1935. This means that for units with up to 20 families, at least one household must have moved from a Dust Bowl-affected area. Using this definition, 3% of LA addresses in 1940 received Dust Bowl migrants.

Using Hornbeck's (2012) definition of high, medium, and low erosion counties, we divide Dust Bowl migrants into two groups: *High Erosion* migrants, consisting of household heads who lived in high or medium erosion counties in 1935, and *Low Erosion* migrants, consisting of heads who lived in low erosion counties in 1935. An address is classified as having received *High Erosion* migrants if at least 5% of the household heads were *High Erosion* migrants. Addresses are classified as *Low Erosion* if they received Dust Bowl migrants but do not meet the criteria for *High Erosion* classification.

We also define *other internal migrants* as any household head who reported living in 1935 in a county other than Los Angeles County or counties in the Dust Bowl-affected area. This definition excludes foreign-born migrants. An address is classified as having received other migrants if at least 10% of the household heads are considered other internal migrants, excluding addresses already classified as receiving Dust Bowl migrants. In our sample, 8.1% of addresses in 1940 received other internal migrants between 1935 and 1940.

Other Census Data. To strengthen our identification assumption (discussed further in Section 4), we control for a set of household characteristics from 1930 in our estimations. These include individual characteristics such as gender, marital status, race, age, education, and country of origin. For multi-family units, these demographic characteristics represent the shares of household heads at a given address. In later analyses, these variables will also be used to observe changes in the composition of residents triggered by Dust Bowl migration. Table A.1 presents a full set of descriptive statistics for these variables, along with those discussed earlier.

Redlining Controls. Another important set of variables we control for relates to mortgage access and local default risks. We use shapefiles containing information on Home Owners' Loan Corporation (HOLC)-graded neighborhood boundaries for Los Angeles, sourced from the University of Richmond's Mapping Inequality dataset (Nelson and Winling, 2023). Between 1935 and 1940, the HOLC assigned grades to residential neighborhoods based on their assessment of "mortgage security" and lending risk. Extensive literature has linked the HOLC program to redlining and discrimination against Black Americans, foreign-born residents, and other minority groups in mortgage markets. We combine this information with the geolocation of addresses to determine whether a house was located in neighborhoods graded as "Hazardous" or "Definitely Declining," thus controlling for potential exposure to redlining.

3.1 Defining Granular Neighborhoods

A classic challenge in studying the impacts of immigration on housing is accurately measuring neighborhood characteristics and amenities. To address this, we adopt a strategy of using neighborhood-level fixed effects to account for unobserved characteristics that could be associated with housing variables and the location choices of Dust Bowl migrants. This approach allows us to better capture the influence of neighborhood factors on housing outcomes.

A commonly used approach to delineate neighborhoods in historical census data is to rely on enumeration districts, which are areas an enumerator (census taker) could fully cover within two weeks in urban areas and four weeks in rural areas. We use geocoded information on enumeration districts from the Urban Transition Historical GIS Project (Logan et al., 2023).

However, there are at least two limitations to using enumeration districts as neighborhood measures in our context. First, they represent areas that are not consistent across censuses, limiting our ability to directly assess the effects of Dust Bowl migrants' arrival in the same neighborhood over time. Second, because these areas were based on what one enumerator could cover, the size of enumeration districts varies greatly. In densely populated areas, a district might cover just one or a few blocks, while in less densely populated areas, it could span a much larger region. This size inconsistency hinders our ability to control for unobserved neighborhood amenities or geographic characteristics using fixed effects, likely leading to more pronounced measurement errors in larger districts.

To address these issues, we leverage our georeferenced information on addresses to define neighborhoods by dividing the city of Los Angeles into grid cells of the same size, except along the borders where a cell may be divided. We work with two grid cell sizes. *Grid-level neighborhoods* are defined as square grid cells with a side length of 30 arc seconds, approximately one kilometer near the equator.[11] This grid size was chosen to align with commonly used rasters that provide granular geographical information (e.g., PRISM Climate Group, 2014). Alternatively, we define *sub-divisions* as grid-level neighborhoods with a side length of 10 arc seconds, or approximately 300 meters near the equator. Figure 3 overlays a grid-level neighborhood and a sub-division on a set of georeferenced addresses in our sample. While grid-level neighborhoods encompass several blocks, sub-divisions contain 2 to 3 blocks. Naturally, the number of blocks and addresses within each granular neighborhood depends on the density of each location.

Spatial Distribution of Dust Bowl Migrants in Los Angeles. With the geographical coordinates of addresses at hand, we associate each address with a grid-level neighborhood and a sub-division. Figure 4 uses this information to depict the geography of Dust Bowl migration within Los Angeles. In both panels, we divide Los Angeles into grid-level neighborhoods. Panel A shows the areas of the city that were more populated in 1930, before the arrival of Dust Bowl migrants. Panel B illustrates the presence of Dust Bowl addresses in 1940 as a share of total addresses in each grid-level neighborhood, excluding those with fewer than 5 addresses. Dust Bowl migrants found homes in virtually every part of Los Angeles. Most neighborhoods had at least one head of household who came from Dust Bowl-affected areas, with a moderate concentration in neighborhoods close to the city center, where between 5 and 10% of the heads of household originated from Dust Bowl-affected areas. Some neighborhoods had concentrations exceeding 10% of Dust Bowl households, as indicated by the yellow grids in Panel B. Interestingly, these high-share grid neighborhoods were located in low-density areas, dis-

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[11] In Los Angeles, 30 arc seconds is approximately 770 meters or 0.48 miles.

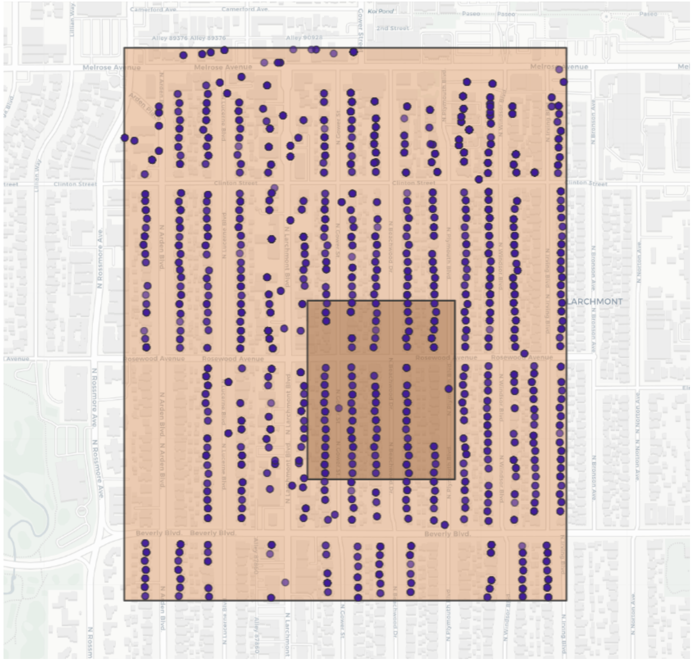

Figure 3. Georeferenced Grid-Level Neighborhood and Sub-Division Areas. This figure shows an example of the area encompassing a grid-level neighborhood as the larger rectangle and one sub-division (in the smaller dark-shaded area). Grid-level neighborhoods are 30 arc seconds, while the sub-divisions are 10 arc seconds, corresponding to roughly 1 kilometer and 300 meters near the Equator, respectively. The points represent the addresses in today's Los Angeles that we can successfully geocode from 1930.

tant from the city center, primarily in the northern part of Los Angeles. This is likely due to the small number of addresses in these regions.

4 Empirical Strategy

The typical regression model we estimate to infer the effects of Dust Bowl migration on the urban landscape of Los Angeles is of the following form:

$$\Delta y_{i,n} = \eta_0 + \beta \cdot z_{i,n} + u_{i,n}, \tag{2}$$

where y is an outcome variable such as house price or tenure status, z is a measure of the influence of Dust Bowl migrants, η_0 is a constant, and u is the error term. The subscripts i and n denote address and neighborhood, respectively, while Δ denotes variation between 1930 and 1940. Note that when $z_{i,n}$ is an indicator variable, this equation is the canonical regression representation of the Difference-in-Difference (DID) estimator. Under the assumptions of par-

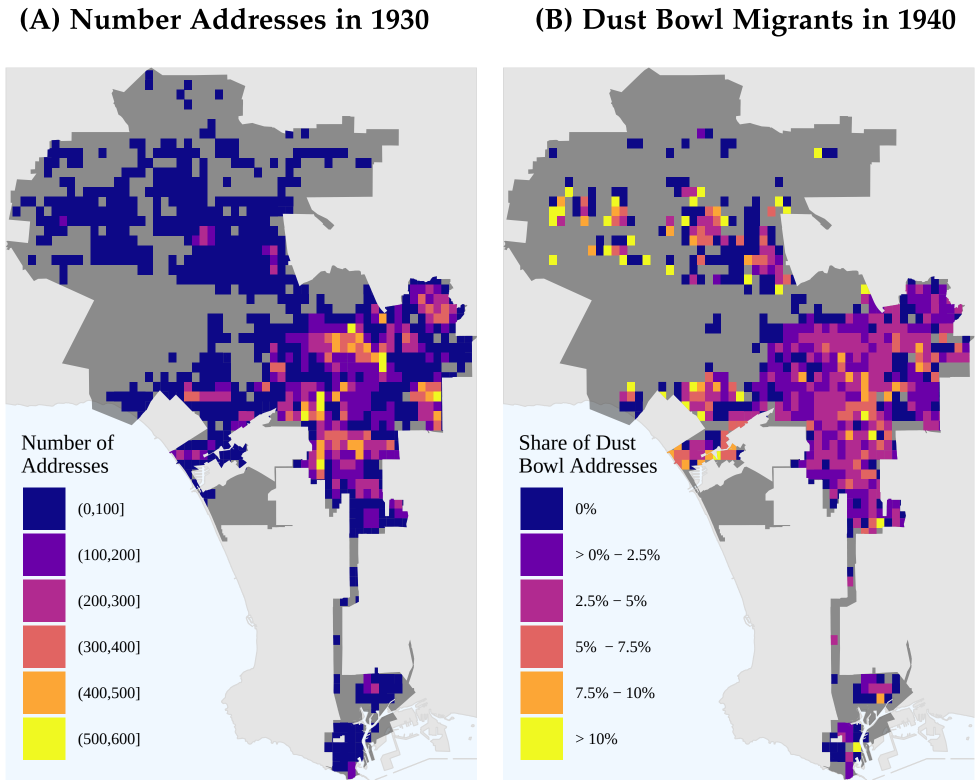

Figure 4. The Geography of Dust Bowl Migration to Los Angeles: Grid-Level Evidence. This figure provides maps of the geographic concentration of Dust Bowl migrants in Los Angeles. In both panels, grids have $(800)^2$ meters, which is approximately $(0.5)^2$ miles. Lighter colors represent higher numbers. Panel A shows the number of addresses in 1930 for each grid-level neighborhood. Panel B depicts the location of Dust Bowl migrants as a share of the grid-level addresses.

allel trends and no anticipatory effects, the DID estimator of β, denoted by $\widehat{\beta}$, is equivalent to the average treatment effect on the treated (ATT).[12]

To interpret $\widehat{\beta}$ as ATT, we must address potential selection bias. Specifically, we need to rule out the possibility that Dust Bowl migrants systematically settled in addresses where outcome variables were expected to change differently compared to addresses occupied by other residents. While this exclusion restriction is unlikely to hold unconditionally, we can make it more plausible through several strategies. To address these concerns, we identify potential sources of bias, select

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[12] The two-way fixed effects model incorporating both time-varying address ($X_{i,n,t}$) and neighborhood ($X_{n,t}$) characteristics, is specified as follows:

$$y_{i,n,t} = \lambda_i + \eta_t + \beta \cdot z_{i,n,t} + \gamma_i \cdot X_{i,n,t} + \gamma_n \cdot X_{n,t} + \varepsilon_{i,n,t},$$

where $\varepsilon_{i,n,t}$ represents the random error term. We assume that Dust Bowl migrants had no influence in 1930, implying $z_{i,n,1930} = 0$ and $\Delta z_{i,n,t} = z_{i,n,1940} := z_{i,n}$ for all i and n. Consequently, in Equation (2), we express $\eta_0 = \Delta\eta_{i,n,t}$ and $u_{i,n} = \Delta X_{i,n,t} + \Delta X_{n,t} + \Delta\varepsilon_{i,n,t}$. In the following formulations, $\Delta X_{n,t}$ will be captured by neighborhood fixed effects in the first-difference model, while $\Delta X_{i,n,t}$ will be captured by pre-existing address characteristics.

an appropriate comparison group, and implement a standard set of controls. Next, we elaborate on these strategies and demonstrate how they collectively strengthen the validity of our ATT interpretation. While the ideal empirical evidence would include an assessment of parallel pre-trends, this approach is infeasible in our context. The U.S. Census started collecting respondents' house values and rents in the 1930 Census. This limitation makes it impossible to formally test for parallel trends in the decades before using the Census data. In addition, Los Angeles experienced substantial growth during the 1920s. This rapid expansion severely limits our ability to link addresses to earlier periods, further preventing traditional pre-trend analyses.

Granular Neighborhood Fixed Effects. One common source of selection bias arises from individuals' housing choices being associated with neighborhood characteristics and amenities that are not observable. Put another way, our error term $u_{i,n}$ may include variables at the level of the neighborhood that are correlated with the presence of Dust Bowl migrants. To overcome this issue, we compare addresses within the same granular neighborhood by conditioning our estimates of β on neighborhood fixed effects, denoted by α_n.

We present our estimates at three different levels of fixed effects: grid-level neighborhoods, sub-divisions, and enumeration districts. The benefits of using the first two over the latter were discussed above. However, we still present results with enumeration district fixed effects as it is common practice in the literature. Between grid-level neighborhoods and sub-divisions, there is a clear trade-off. Smaller grid cells, such as sub-divisions, allow us to compare groups of addresses with very similar local amenities, but, at the same time, reduce the power of our hypothesis tests given the reduced number of observations within the same grid cell.

Figure 5 stresses the importance of neighborhood fixed effects. It tests the correlation between address characteristics in 1930, including demographic information about the previous residents, and the presence of Dust Bowl migrants. Specifically, we plot the point estimates and 95% confidence intervals of linear regressions where one of the variables listed on the vertical axis is the response variable, and an indicator variable of whether the address was inhabited by Dust Bowl migrants serves as the explanatory variable.[13] Panel A shows the estimates without the inclusion of fixed effects, while Panels B and C include the grid-level neighborhood and sub-division fixed effects, respectively. Since the explanatory variables are binary, we can interpret these values as tests of mean differences.

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[13] For this figure only, the coefficients are standardized.

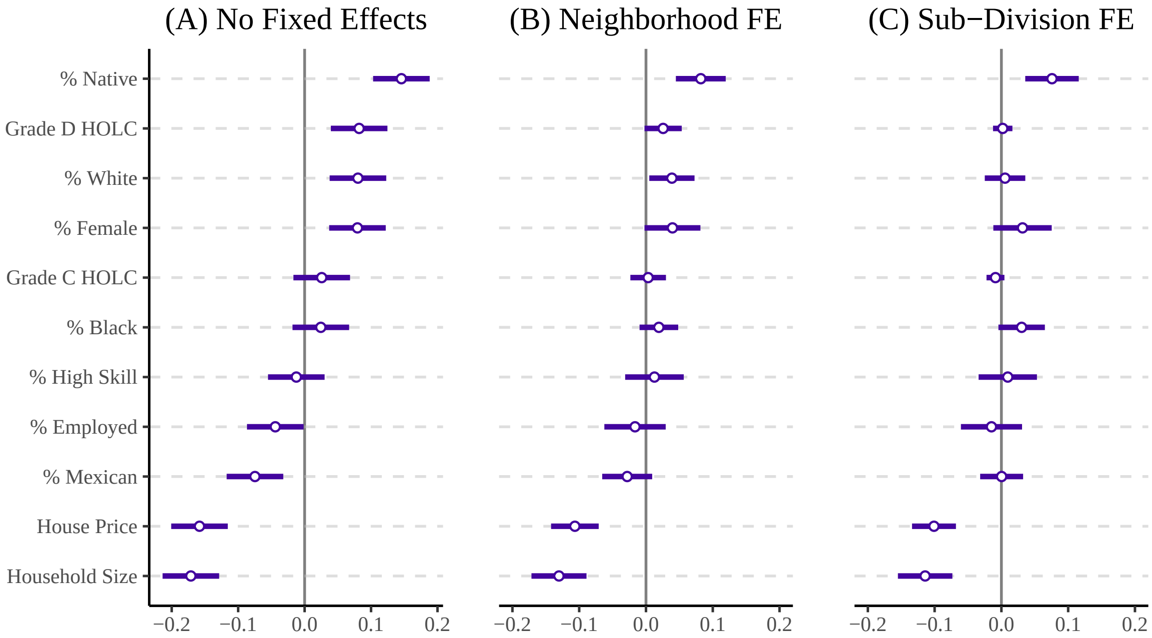

Figure 5. Correlations Between 1930 Addresses Characteristics and Dust Bowl Migrant Presence. Panel A shows point estimates and 95% confidence intervals of characteristics correlated with the addresses of Dust Bowl migrants. Panel B shows the conditional correlations on the grid-level neighborhood, and panel C presents the correlations conditional on the sub-division fixed effects.

The results in Figure 5 suggest that many pre-existing characteristics of an address are associated with the presence of Dust Bowl migrants in 1940. The presence of Dust Bowl migrants was positively correlated with addresses that were distinctively more likely to be inhabited by White, Female, Unemployed, and U.S.-born heads, with smaller families and lower prices in 1930. Moreover, these addresses were more likely to be located in areas graded as "Hazardous" by HOLC. These results clearly indicate the existence of selection. The question is: is this neighborhood selection or address selection?

In Panels B and C, many conditional correlations are zero. Specifically, the bias towards addresses occupied by White, Unemployed, and Female heads in "Hazardous" areas is no longer statistically significant, suggesting that Dust Bowl migrants opted for neighborhoods with these characteristics but not necessarily addresses with these characteristics. Thus, controlling for neighborhood fixed effects is crucial to eliminate these and other sources of bias at the neighborhood level.

Some correlations remain statistically significant even after controlling for fixed effects, suggesting address selection. Dust Bowl migrants were more likely to inhabit addresses with more native residents, smaller family sizes, and lower prices in 1930. These are interesting patterns, suggesting that Dust Bowl migrants don't seem to be "replacing" minorities, such as Black or foreign-born families. It seems that Dust Bowl migrants had a clear preference to live near other U.S.-born residents. Crucially, the Dust Bowl migrants also were more likely to live in lower-priced homes within a neighborhood, which is expected given that they are likely more financially constrained relative to local incumbent residents.

Selection on Observables. The previous analysis suggests that the neighborhood fixed effects are not enough to eliminate all omitted variables potentially causing bias in our analysis. Given their income levels, Dust Bowl migrants are more likely to move into cheaper units, and these units may have different trends relative to more expensive units. Thus, the straightforward solution is to add initial prices as control variables. In this way, we are studying the effects of Dust Bowl migrants within neighborhoods conditional on the addresses' initial prices.

Beyond the obvious benefit of eliminating an observed source of bias, we believe that controlling for house prices is also fundamental to eliminating biases from unobserved sources. For example, the vast literature on hedonic prices reveals that house prices are largely determined by the physical characteristics of the unit. Therefore, by controlling for initial prices, we are indirectly controlling for the initial structure of the unit. Moreover, house prices also contain information about the expected evolution of its value and, hence, control for unobserved expectations about a given property.

In a similar vein to the argument above, we believe that observables related to household characteristics in 1930 may also be informative about other unobservables. Thus, we add all variables listed in Figure 5 as controls in our estimates below. Importantly, all variables, except the HOLC grading, were measured in 1930 to avoid introducing "bad controls" to our model. The HOLC grading is added as it is common practice in the literature, although we recognize that it is less of a concern within our granular neighborhood and it may introduce potential bias as a bad control. Reassuringly, none of our results depend on the introduction of HOLC gradings as control variables.

Sample Selection. Another concern is that addresses might have unobserved characteristics that make them more likely to be inhabited by newcomers by 1940. To address this, we compare the price evolution of homes inhabited by Dust Bowl migrants with addresses inhabited by internal migrants from other parts of the U.S., not directly affected by the natural disaster.[14]

In summary, our identification strategy focuses on analyzing the locations of Dust Bowl migrants within narrowly defined neighborhoods relative to other migrants, while controlling for the observable characteristics of homes in 1930. This approach aims to mitigate potential selection bias regarding the impact of Dust Bowl migration on the appreciation of home prices over the decade. Specifically, we assume that changes in house prices within these small neighborhoods are not influenced by additional factors affecting the housing choices of Dust Bowl migrants, beyond the pre-existing conditions at the time of their arrival.

It is important to note that several studies treat the selection of houses within a sufficiently small neighborhood as plausibly random since it depends on the availability of vacant units (Bayer et al., 2022). In our setting, we find that relying solely on the fixed effect is not enough, as financially constrained groups tend to self-select into cheaper units, even within small neighborhoods. By adopting our multi-faceted approach, we aim to eliminate this bias, thereby approximating a quasi-experimental design.

5 Direct Effects

5.1 Dust Bowl Migrants and Effects on House Price Growth

We begin by investigating whether the presence of Dust Bowl migrants in an address influenced its price evolution over the 1930s decade. Thus, we rewrite Equation (2) specifying the variables and explicitly removing the granular neighborhood fixed effects and observed controls variables from the error term. With that, we estimate the local effect of Dust Bowl migrants on housing prices by estimating β in the following regression equation:

$$\Delta \log(\mathit{House\ Price})_{i,n,1930:40} = \alpha_n + \beta \cdot D_{i,n} + \gamma' X_{i,n,1930} + \varepsilon_{i,n}. \tag{3}$$

$\Delta \log(\mathit{House\ Price})_{i,n,1930:40}$ is the house price log difference between 1930 and 1940 of an address i in neighborhood n. House prices are defined as the monthly rent (actual or inputed from house values) in 1930 dollar terms. The variable $D_{i,n}$ denotes an indicator variable that equals one if the

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[14] Figure B.1 in the Appendix presents the corresponding correlation coefficients to the ones in Figure 5, but when restricting the sample to only internal migrants. The results show smaller correlation coefficients, suggesting that the sample restriction helps alleviate the selection concerns. However, it still shows that the inclusion of the fixed effects and control variables are still crucial for the validity of our strategy.

Table 1. Effects of Dust Bowl Migration on House Prices

	$\Delta \log(\textit{House Price})_{1930:40}$							
	No Fixed Effects		Grid–neighborhood Fixed Effects		Sub–division Fixed Effects		Enum. District Fixed Effects	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dust Bowl Migrant	–0.091***	–0.076***	–0.055***	–0.051***	–0.041**	–0.039**	–0.053***	–0.047***
	(0.016)	(0.016)	(0.017)	(0.017)	(0.018)	(0.018)	(0.016)	(0.017)
Observations	8,148	8,148	8,148	8,148	8,148	8,148	8,148	8,148
R–squared	0.383	0.402	0.501	0.506	0.637	0.640	0.508	0.512
Clusters			665	665	2,625	2,625	700	700
Log Prices (1930)	✓	✓	✓	✓	✓	✓	✓	✓
Controls		✓		✓		✓		✓

Notes: This table presents our baseline results for the direct effects of the presence of Dust Bowl migrants on the house price evolution during the 1930s. We estimate Equation (3), where $\Delta \log(\textit{House Price})_{1930:40}$ is the log difference in house prices between 1930 and 1940. *Dust Bowl Migrant* is a dummy variable that equals one if the address was inhabited by Dust Bowl migrants. The specifications include neighborhood fixed effects, which can be at the grid-neighborhood (Columns 3 and 4), the sub-division (Columns 5 and 6), or the enumeration district levels (Columns 7 and 8). Control variables for the 1930s household head and address characteristics include high-skill, married, single, log of age, employed, female, White, Black, foreign-born, Mexican-born, the log of the number of families, the average household size, whether the house was located in areas graded as "Hazardous" or "Definitely Declining" by the Home Owners' Loan Corporation, and the log of prices in 1930. The sample is restricted to only addresses inhabited by other internal U.S.-born migrants. Robust standard errors clustered at the level of fixed effects in parentheses. Statistical significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

address was inhabited by Dust Bowl migrants in 1940. Neighborhood fixed effects are denoted by α_n, which can be at the grid-neighborhood, the sub-division, or the enumeration district levels. The vector $X_{i,n,1930}$ contains control variables for the 1930s household head and address characteristics. Controls include the variables for high-skill, married, single, log of age, employed, female, White, Black, foreign-born, Mexican-born, the log of the number of families, the average household size, whether the house was located in areas graded as "Hazardous" or "Definitely Declining" by the Home Owners' Loan Corporation, and the log of the house price in 1930. We limit the sample to only addresses occupied by U.S.-born migrants. Results are presented in Table 1.

Table 1 shows that, on average, an address inhabited by Dust Bowl migrants had a lower house price appreciation relative to similar addresses inhabited by other migrant residents. Columns 1 and 2 show that, without the inclusion of neighborhood fixed effects, homes inhabited by Dust Bowl migrants had a house price growth rate 7.6–9 percentage points smaller over the decade relative to addresses inhabited by other internal migrants. One possible explanation for these results is that Dust Bowl migrants self-selected into neighborhoods where amenities worsened throughout the decade. Previous studies have shown that displaced migrants tend to move to poorer neighborhoods (Desmond and Shollenberger, 2015).

To address this concern, we include different levels of neighborhood fixed effects (columns 3 to 8), and we find a negative and statistically significant effect of Dust Bowl presence on the house price growth rate. As expected, the inclusion of neighborhood fixed effects indeed decreases the magnitude of the estimate coefficients, suggesting that neighborhood characteristics and local amenities played a crucial role in the house price evolution. In our preferred specification, we use the grid-neighborhood fixed effects (columns 3 and 4), and we find that Dust Bowl-inhabited homes had a 5 percentage points lower price growth rate over the decade relative to other migrants. In our most demanding specifications (columns 5 and 6), we find that homes inhabited by Dust Bowl migrants had a price growth rate 4 percentage points smaller relative to similar homes inhabited by other U.S.-born migrants within a sub-division area. Our results are also robust to an alternative measure of the neighborhood, the enumeration district fixed effects (columns 7 and 8), which are commonly used in other studies using the historical census data.

5.2 Direct Effects and the Role of Tenure Status

After establishing the overall negative effect of Dust Bowl migrant presence on house price growth, it is crucial to investigate how this effect may vary based on the properties' initial tenure status. The initial tenure status—whether a property was owner-occupied or rented—could play a significant role in the overall impact on price evolution. Examining the heterogeneity by tenure status can provide insights into whether the observed effects are driven primarily by changes in the rental market or in home values of owner-occupied properties. To measure these heterogeneous effects, we estimate the following specification:

$$\Delta y_{i,n,1930:40} = \alpha_n + \beta^{Renter} \cdot \left[D_{i,n} \times \mathbb{1}^{Renter}_{i,1930} \right] + \beta^{Owner} \cdot \left[D_{i,n} \times \mathbb{1}^{Owner}_{i,1930} \right] + \eta \cdot \mathbb{1}^{Renter}_{i,1930} + \gamma' X_{i,n,1930} + \varepsilon_{i,n}, \quad (4)$$

where $\Delta y_{i,n,1930:40}$ is either the log difference in house prices between 1930 and 1940 (Panel A in Table 2) or the dummy variable that assumes value 1 if the address changed tenure status between 1930 and 1940 (Panel B in Table 2). The dummy variable $D_{i,n}$ equals one if the address was inhabited by Dust Bowl migrants. The dummy variable $\mathbb{1}^{Owner}_{i,1930}$ equals one if the unit was fully owner-occupied in 1930, while $\mathbb{1}^{Renter}_{i,1930}$ is the analogous dummy variable for when the address had at least one unit rented in 1930. The neighborhood fixed effects α_n and the vector of control variables $X_{i,n,1930}$ were discussed before. The sample includes only addresses inhabited by internal U.S.-born migrants. Standard errors are clustered at the level of fixed effects. Table 2

Table 2. Dust Bowl Migration and the Role of Tenure Status in 1930

Panel A. Effects on Prices by Tenure Status

	$\Delta \log(House\ Price)_{1930:40}$							
	No Fixed Effects		Grid–neighborhood Fixed Effects		Sub–division Fixed Effects		Enum. District Fixed Effects	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DB Migrant × *Renter*	–0.069***	–0.060***	–0.043**	–0.040**	–0.040*	–0.038*	–0.037**	–0.033*
	(0.019)	(0.019)	(0.019)	(0.019)	(0.022)	(0.022)	(0.018)	(0.018)
DB Migrant × *Owner*	–0.127***	–0.109***	–0.079**	–0.077**	–0.042	–0.039	–0.084***	–0.079**
	(0.030)	(0.030)	(0.032)	(0.032)	(0.034)	(0.035)	(0.031)	(0.031)
Renter	–0.174***	–0.147***	–0.125***	–0.117***	–0.092***	–0.084***	–0.129***	–0.121***
	(0.018)	(0.019)	(0.018)	(0.020)	(0.022)	(0.023)	(0.019)	(0.020)
Observations	8,148	8,148	8,148	8,148	8,148	8,148	8,148	8,148
R–squared	0.391	0.406	0.504	0.509	0.639	0.641	0.512	0.515
Clusters			665	665	2,625	2,625	700	700
Log Prices (1930)	✓	✓	✓	✓	✓	✓	✓	✓
Controls		✓		✓		✓		✓

Panel B. Tenure Status Change

	$\Delta Tenure\ Status_{1930:40}$							
	No Fixed Effects		Grid–neighborhood Fixed Effects		Sub–division Fixed Effects		Enum. District Fixed Effects	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DB Migrant × *Renter*	–0.012	–0.011	–0.011	–0.010	–0.011	–0.010	–0.014*	–0.012
	(0.010)	(0.010)	(0.008)	(0.008)	(0.009)	(0.009)	(0.008)	(0.008)
DB Migrant × *Owner*	0.045***	0.044***	0.042**	0.041**	0.036	0.035	0.042**	0.041**
	(0.015)	(0.015)	(0.019)	(0.019)	(0.024)	(0.024)	(0.020)	(0.020)
Renter	–0.660***	–0.642***	–0.663***	–0.651***	–0.677***	–0.662***	–0.651***	–0.638***
	(0.009)	(0.010)	(0.014)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
Observations	8,197	8,197	8,197	8,197	8,197	8,197	8,197	8,197
R–squared	0.471	0.475	0.536	0.539	0.688	0.690	0.521	0.523
Clusters			667	667	2,636	2,636	700	700
Log Prices (1930)	✓	✓	✓	✓	✓	✓	✓	✓
Controls		✓		✓		✓		✓

Notes: This table presents the results when analyzing the role of the tenure statuses of addresses in 1930 in the effects of the presence of Dust Bowl migrants on the house price evolution during the 1930s. We estimate Equation (4). The dependent variable is either the log difference in house prices between 1930 and 1940 (Panel A) or the dummy variable that assumes value 1 if the address changed tenure status between 1930 and 1940 (Panel B). *Dust Bowl Migrant* is a dummy variable that equals one if the address was inhabited by Dust Bowl migrants. $\mathbb{1}^{Homeowner}_{i,1930}$ is a dummy that equals one if the unit was fully owner-occupied in 1930, while $\mathbb{1}^{Renter}_{i,1930}$ is the analogous dummy variable for when the address had at least one unit rented in 1930. Neighborhood fixed effects can be at the grid-neighborhood (columns 3 and 4), the sub-division (columns 5 and 6), or the enumeration district levels (columns 7 and 8). Control variables for the 1930s household head and address characteristics include the variables for high-skill, married, single, log of age, employed, female, White, Black, foreign-born, Mexican-born, the log of the number of families, the average household size, whether the house was located in areas graded as "Hazardous" or "Definitely Declining" by the Home Owners' Loan Corporation, and the log of prices in 1930. The sample includes only addresses inhabited by internal U.S.-born migrants. Robust standard errors clustered at the level of fixed effects in parentheses. Statistical significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

presents the results of this analysis, shedding light on how the tenure status in 1930 interacts with the presence of Dust Bowl migrants to shape house price dynamics over the decade.

From Table 2.A, we find that both renter-occupied and owner-occupied properties experienced negative relative price effects due to the presence of Dust Bowl migrants, but the magnitude of the impact differs. For properties renter-occupied in 1930, we observe a statistically significant decrease in price growth of approximately 4 percentage points over the decade across all specifications, including our preferred grid-neighborhood fixed effects model. In contrast, owner-occupied properties show a larger negative effect, with price growth declining by about 7 to 8 percentage points over the decade in the specifications with grid-neighborhood and enumeration district fixed effects. Interestingly, when using sub-division fixed effects, the coefficients for owners and renters become much closer to each other, at around 4 percentage points. However, the effect loses statistical significance when using sub-division fixed effects, possibly due to the smaller variation at this very granular level. Overall, our findings show that both types of homes experienced lower price growth rates relative to other similar migrant-inhabited homes, with some evidence for larger effects among owner-occupied properties.

Panel B of Table 2 provides further insights into the dynamics of housing tenure by examining the probability of tenure status changes in response to Dust Bowl migration. The dependent variable in Panel B is 1 when the tenure status of a house changed from 1930 to 1940. The results reveal a stark contrast between renter-occupied and owner-occupied properties. We find no statistically significant effect on the tenure status change of properties previously rented. This suggests that the probability that a home inhabited by Dust Bowl migrants to have changed from rental to owner-occupied by 1940 is not statistically different from the probability of a home inhabited by other internal migrants. In contrast, for properties that were owner-occupied in 1930, we observe a significant positive effect on the probability of changing tenure status. Specifically, owner-occupied properties that received Dust Bowl migrants were about 4 percentage points more likely to become rental units relative to other migrant-occupied homes. These findings suggest that Dust Bowl migrant presence is associated with changes in the optimal tenure choices of previously owner-occupied properties.

In summary, our analysis of the heterogeneous effects of Dust Bowl migration on housing prices and tenure status reveals important nuances in the housing market's response to this influx of migrants. The more pronounced negative price effects for owner-occupied properties, coupled with the increased likelihood of these properties transitioning to rentals, suggest a significant reshaping of the local housing market.

Table 3. Effects on Household Size and Number of Residents

	Δ*Household Size*$_{1930:40}$				Δ*Residents*$_{1930:40}$			
	Grid FE (1)	Sub-Div. FE (2)	Grid FE (3)	Sub-Div. FE (4)	Grid FE (5)	Sub-Div. FE (6)	Grid FE (7)	Sub-Div. FE (8)
DB Migrant	0.047***	0.046***			0.100***	0.090***		
	(0.012)	(0.013)			(0.018)	(0.019)		
DB Migrant × Renter			0.030**	0.031**			0.088***	0.071***
			(0.013)	(0.015)			(0.021)	(0.023)
DB Migrant × Owner			0.091***	0.088***			0.134***	0.146***
			(0.023)	(0.026)			(0.026)	(0.031)
Renter			–0.043***	–0.041**			–0.088***	–0.079***
			(0.014)	(0.017)			(0.018)	(0.020)
Observations	8,197	8,197	8,197	8,197	8,197	8,197	8,197	8,197
R–squared	0.513	0.657	0.515	0.658	0.410	0.585	0.413	0.587
Clusters	667	2,636	667	2,636	667	2,636	667	2,636
Log Prices (1930)	✓	✓	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓	✓	✓

Notes: This table presents the effects of the presence of Dust Bowl migrants on the changes in household size and number of residents of an address over the decade. The dependent variable is either the change in the household size (columns 1 to 4) or the change in the total number of residents (Columns 5 to 8) in an address i. DB Migrant is a dummy variable that equals one if the address was inhabited by Dust Bowl migrants. Homeowner$_{1930}$ *is a dummy that equals one if the unit was fully owner-occupied in 1930, while Renter*$_{1930}$ *is the analogous dummy variable for when the address had at least one unit rented in 1930. Specification include the neighborhood fixed effects, which can be at the grid-neighborhood (Columns 1, 3, 5, and 7) and the sub-division (Columns 2, 4, 6, and 8). Control variables for the 1930s household head and address characteristics are included as described before. The sample includes only addresses inhabited by internal U.S.-born migrants. Robust standard errors clustered at the level of fixed effects in parentheses. Statistical significance:* *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

5.3 Effects on Family Sizes and Number of Residents

Having examined the effects of Dust Bowl migration on housing prices and the role of tenure status, it is crucial to investigate how Dust Bowl migration influenced occupational patterns. Analyzing changes in household size and the total number of residents provides valuable insights into the potential mechanisms driving the observed price effects, as they reflect shifts in housing demand and utilization. Variations in the family sizes and total number of residents per address may reveal whether properties were used more intensively to house the incoming migrants. Understanding these patterns can also be informative about the potential strain on local infrastructure and services resulting from the Dust Bowl migrant arrival. We estimate the models in Equations (3) and (4) replacing the outcome variables with either the log difference in the household size or the total number of residents in an address between 1930 and 1940. Household size measures the average number of residents per household as defined by the Census records, while the number of residents measures the total number of individuals living in the same address. In unreported results, we also test this specification for the number of adults in an address and the results are the same. Table 3 presents our findings on how the presence of Dust Bowl migrants affected household size and the total number of residents

The first four columns of Table 3 present the relationship between Dust Bowl migration and household size, revealing a consistent positive association across all specifications. Columns 1 and 2, which use grid-neighborhood and sub-division fixed effects, respectively, show that addresses inhabited by Dust Bowl migrants experienced higher growth rates in household size by 4.7 percentage points over the decade relative to other migrant-inhabited homes. Interestingly, when we examine the heterogeneity by tenure status, we find that the effects were more pronounced in properties that were owner-occupied in the previous decade. Specifically, owner-occupied addresses that received Dust Bowl migrants saw a higher growth rate in their household sizes of about 9 percentage points over the decade relative to other migrant homes. For units that were rental-occupied in 1930, the presence of Dust Bowl migrants is associated with a 3 percentage point greater relative growth rate.

Columns 5 to 6 of Table 3 focus on the log difference in the total number of residents per address between 1930 and 1940. Similar to the patterns found in the first four columns, addresses inhabited by Dust Bowl migrants are also associated with a substantially higher growth rate in the total number of residents, of about 9-10 percentage points over the decade higher than other migrant-inhabited addresses. The heterogeneity analysis in columns 7 and 8 demonstrates that this effect is more pronounced for previously owner-occupied properties. These results indicate that properties receiving Dust Bowl migrants saw a significant intensification of use, accommodating larger families and a considerably larger number of individuals. This trend was particularly strong in previously owner-occupied homes, suggesting a marked shift towards denser occupancy or potential informal subletting arrangements in response to the Dust Bowl migrant influx.

6 Spillover Effects

6.1 Proximity to Dust Bowl Migrants and House Price Growth

Having established the direct effects of Dust Bowl migration on housing prices and occupancy patterns for properties inhabited by climate migrants, we now turn our attention to broader neighborhood dynamics. It is crucial to investigate whether the presence of Dust Bowl migrants had spillover effects on nearby properties, potentially influencing the housing market beyond the direct effects discussed so far.

To test this broader impact, we leverage the geocoded address sample and compute a geographical proximity measure to the closest Dust Bowl families for each address with only non-migrant households. The idea is to test whether the evolution of incumbent residents' house prices was affected depending on how close they were to Dust Bowl migrants. This sample contains 68,809 addresses, in which the average minimum distance to a Dust Bowl address is 209 meters (685 feet). The strategy is to estimate the parameters in a linear regression similar to Equation (3) where the explanatory variable is the log of the inverse distance to the closest Dust Bowl migrant home in a sample with only non-migrant households.[15]

We estimate the following specifications:

$$\Delta \log(\mathit{House\ Price})_{i,n,1930:40} = \alpha_n + \beta \cdot \log(\mathit{Proximity})_{i,n} + \gamma' X_{i,n,1930} + \varepsilon_{i,n} \tag{5}$$

$$\begin{aligned} \Delta \log(\mathit{House\ Price})_{i,n,1930:40} = \alpha_n &+ \beta^{Renter} \cdot \left[\log(\mathit{Proximity})_{i,n} \times \mathbb{1}^{Renter}_{i,n,1930}\right] \\ &+ \beta^{Owner} \cdot \left[\log(\mathit{Proximity})_{i,n} \times \mathbb{1}^{Owner}_{i,n1930}\right] \\ &+ \eta \cdot \mathbb{1}^{Renter}_{i,n1930} + \gamma' X_{i,n,1930} + \varepsilon_{i,n}, \end{aligned} \tag{6}$$

where $\Delta \log(\mathit{House\ Price})_{i,1930:40}$ is the log difference in house prices between 1930 and 1940. The term $\log(\mathit{Proximity})_{i,n}$ denotes the log of the inverse distance to the closest Dust Bowl migrant address. The term α_n represents the neighborhood fixed effects, which can be at the grid-neighborhood, the sub-division, or the enumeration district levels. The vector $X_{i,n,1930}$ denotes the control variables for the 1930s household head and address characteristics and are the same variables included in the previous regressions. The sample is restricted to addresses exclusively inhabited by non-migrants. In this set of regressions, β captures the average effect of proximity to Dust Bowl families on price growth of non-migrant homes, while β^{Renter} and β^{Owner} capture the heterogeneous effects from properties rented or owner-occupied in 1930. Robust standard errors clustered at the level of the fixed effects. Table 4 presents our findings on how this proximity to Dust Bowl migrants influenced house price growth for incumbent residents.

Panel A of Table 4 presents the average effect of proximity to Dust Bowl migrants on house price growth for non-migrant households. The results consistently show a negative relationship between proximity to Dust Bowl migrants and house price appreciation across all specifications. In our preferred grid-neighborhood fixed effects specification (columns 3 and 4), we find that a

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[15] Specifically, the explanatory variable is defined as $-\log(1 + \min(\text{Dust Bowl Distance}))$ as there are 874 addresses where the Dust Bowl Distance is zero. This occurs due to minor imprecisions in the georeferencing process, where, in some cases, different addresses are mapped to the center of the street where they are located.

Table 4. Proximity to Dust Bowl families and Housing Prices.

Panel A. Average Effect of Distance

	$\Delta \log(\mathit{House\ Price})_{1930:40}$							
	No Fixed Effects		Grid–neighborhood Fixed Effects		Sub–division Fixed Effects		Enum. District Fixed Effects	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\log(\mathit{Proximity})$	–0.038***	–0.027***	–0.020***	–0.016***	–0.018***	–0.014***	–0.021***	–0.017***
	(0.002)	(0.002)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Observations	65,341	65,341	65,341	65,341	65,341	65,341	65,341	65,341
R–squared	0.334	0.363	0.426	0.433	0.491	0.495	0.433	0.440
Clusters			857	857	4,352	4,352	750	750
Log Prices (1930)	✓	✓	✓	✓	✓	✓	✓	✓
Controls		✓		✓		✓		✓

Panel B. Heterogeneity by Tenure in 1930

	$\Delta \log(\mathit{House\ Price})_{1930:40}$							
	No Fixed Effects		Grid–neighborhood Fixed Effects		Sub–division Fixed Effects		Enum. District Fixed Effects	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\log(\mathit{Prox.}) \times \mathit{Renter}$	–0.013***	–0.012***	–0.011**	–0.010**	–0.012***	–0.010**	–0.013***	–0.011**
	(0.003)	(0.003)	(0.005)	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)
$\log(\mathit{Prox.}) \times \mathit{Owner}$	–0.055***	–0.038***	–0.024***	–0.020***	–0.018***	–0.014***	–0.024***	–0.019***
	(0.003)	(0.003)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Renter	0.052**	0.009	–0.062**	–0.069**	–0.080***	–0.085***	–0.062**	–0.073***
	(0.022)	(0.022)	(0.028)	(0.028)	(0.025)	(0.025)	(0.027)	(0.027)
Observations	65,341	65,341	65,341	65,341	65,341	65,341	65,341	65,341
R–squared	0.344	0.368	0.432	0.438	0.495	0.498	0.438	0.444
Clusters			857	857	4,352	4,352	750	750
Log Prices (1930)	✓	✓	✓	✓	✓	✓	✓	✓
Controls		✓		✓		✓		✓

Notes: This table presents our results for the indirect effects of the presence of Dust Bowl migrants on the house price evolution during the 1930s. We estimate Equations (5) and (6). $\Delta \log(\mathit{House\ Price})_{1930:40}$ *is the log difference in house prices between 1930 and 1940.* $\log(\mathit{Proximity})$ *is the log of the inverse distance to the closest Dust Bowl migrant address.* $\mathit{Homeowner}_{1930}$ *is a dummy that equals one if the unit was fully owner-occupied in 1930, while* Renter_{1930} *is the analogous dummy variable for when the address had at least one unit rented in 1930. Neighborhood fixed effects can be at the grid-neighborhood (Columns 3 and 4), the sub-division (Columns 5 and 6), or the enumeration district levels (Columns 7 and 8). Control variables for the 1930s household head and address characteristics are as discussed before. Panel A estimates the average effect of proximity to Dust Bowl migrants, while Panel B estimates the heterogeneous effects by tenure status in 1930. The sample is restricted to addresses exclusively inhabited by non-migrants. Robust standard errors clustered at the level of fixed effects in parentheses. Statistical significance: **** $p < 0.01$, **** $p < 0.05$, *** $p < 0.10$.

1% increase in proximity to Dust Bowl migrants is associated with a 1.6 to 2 percentage point decrease in house price growth over the decade. This effect remains robust and statistically significant when using alternative levels of fixed effects. Using the sub-division fixed effects specifications (columns 5 and 6), we find an average effect of proximity to Dust Bowl families on house price growth to be between 1.4 and 1.8. This finding suggests that, even within a very small area, houses located 1% closer to Dust Bowl migrants saw an average house price growth rate smaller by 1.4 percentage points over the decade.

In Panel B of Table 4, we explore the heterogeneity in these spillover effects by the initial tenure status of the properties. Similar to the patterns found in Table 2, we observe a slightly larger coefficient for houses that were previously owner-occupied in 1930. For renter-occupied properties in 1930, we observe a smaller but still statistically significant negative effect, with a 1% increase in proximity to Dust Bowl migrants associated with a 1 percentage point decrease in price growth. In contrast, owner-occupied properties show a larger negative effect, with price growth declining by 1.4 to 2 percentage points for every 1% increase in proximity to Dust Bowl migrants. This heterogeneity is consistent across all fixed effects specifications and suggests that owner-occupied properties were slightly more sensitive to the presence of nearby Dust Bowl migrants.

6.2 Dust Bowl Migrants and Probability of Move

The results from the previous sections show consistent and robust evidence of negative spillovers on house price growth on properties located closer to homes inhabited by Dust Bowl migrants. In this section, we examine how the presence of these migrants influenced the mobility decisions of incumbent residents. Understanding the relationship between migrant proximity and the probability of local residents moving can be helpful in explaining the observed price effects, as changes in the propensity to move may influence housing supply and demand dynamics within a certain neighborhood. Moreover, these mobility patterns can shed light on the social and economic integration of the Dust Bowl migrants.

The main challenge in studying the mobility decisions of families during the 1930s in tracking their place of residence across time. The U.S. census did not have a unique individual identifier that could be used to track individuals across different censuses. Therefore, it is crucial to obtain a reliable measure of whether families changed addresses during the decade.

To address this challenge, we employ two complementary approaches. First, we utilize the Census Linking Project 1930–1940 crosswalk (Abramitzky et al., 2022), which adopts the Abramitzky, Boustan and Eriksson (2012, 2014, 2019) ABE linking approach to link individual records across censuses based on individual characteristics, such as name, age, and place of birth. This method, allows us to track a subset of individuals with high confidence across 1930 and 1940 and determine whether or not they changed addresses between the two censuses.[16]

Second, we develop a demographic-based measure of household moves by comparing the demographic characteristics of residents at the same address in 1930 and 1940. Specifically, we classify the head of a given address as having moved away if there is a change in any demographic characteristic between 1930 and 1940, such as race, gender, or ethnicity, or if their age in 1940 does not align with their age in 1930 plus 10 years. We exclude multifamily addresses from this analysis, as it is difficult to track these variables precisely when multiple heads of household are present. This approach, while less precise at the individual level, does not rely on linked individual algorithms, which have their own limitations (Bailey et al., 2020), and also provides a broader picture of residential turnover.

These combined approaches allow us to overcome the limitations of historical data and offer more robust insights into the mobility decisions of Los Angeles residents during the decade. To this end, we estimate the following specifications:

$$\begin{aligned}\mathbb{P}(Move)_{i,n,1930:40} = \alpha_n + \beta^{Renter} \cdot \left[\log(Proximity)_{i,n} \times \mathbb{1}^{Renter}_{i,n,1930}\right] \\ + \beta^{Owner} \cdot \left[\log(Proximity)_{i,n} \times \mathbb{1}^{Owner}_{i,n,1930}\right] + \eta \cdot \mathbb{1}^{Renter}_{i,n1930} + \gamma' X_{i,n,1930} + \varepsilon_{i,n},\end{aligned} \tag{7}$$

where $\mathbb{P}(Move)_{i,n,1930:40}$ denotes a dummy variable that equals one if the family moved to a different address between 1930 and 1940, and can be either the individual linked-based measure or the demographic-based measure. The term $\log(Proximity)_{i,n}$ denotes the log of the inverse distance to the closest Dust Bowl migrant home. The term α_n represents the neighborhood fixed effects, which can be at the grid-neighborhood or the sub-division levels. The vector $X_{i,n,1930}$ contains the control variables for the 1930s household head and address characteristics, which include the same set of variables as in the previous specifications. The sample

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[16] More specifically, we use their NYSIIS–based standard approach, which converts names into phonetic codes using the New York State Identification and Intelligence System algorithm. We combine this information with our sample of linked and geocoded addresses to know whether the head of household from an address in 1930 was no longer living in the same address by 1940.

is restricted to addresses exclusively inhabited by non-Dust Bowl migrants. Robust standard errors are clustered at the level of fixed effects.

Table 5 presents our findings on how proximity to Dust Bowl migrants affected the probability of incumbent residents moving. Panel A, which uses our individual-linked measure of moves, shows a clear and robust positive relationship between proximity to Dust Bowl migrants and the probability of moving for renters. We find that, on average, a 1% increase in the proximity to Dust Bowl migrants is associated with a 1-1.7 percentage point increase in the probability of moving (Columns 2 and 6). When assessing the heterogeneity between homeowners and renters, we find that the effects are mostly concentrated among properties that were rented in 1930. For those properties, on average, a 1% increase in the proximity to Dust Bowl migrants is associated with a 0.5-1.3 percentage point increase in the probability of moving (Columns 4 and 8). The effect for homeowners is not statistically significant in the specifications that include fixed effects, suggesting that homeowners' mobility decisions were less sensitive to the presence of Dust Bowl migrants. Panel B, which uses the more noisy demographic-based measure of moves, shows similar patterns, although less statistically significant. For renters, we again see a positive and significant effect, with a 1% increase in proximity to Dust Bowl migrants associated with a 0.5 to 0.8 percentage point increase in the probability of moving.[17]

The stronger and more consistent results for renters across both measures of move suggest that this group was particularly responsive to the arrival of Dust Bowl migrants. This heightened mobility among renters could be due to several factors, including greater flexibility in their housing choices, as renters typically can have lower moving costs than homeowners. Overall, these findings provide evidence that the presence of Dust Bowl migrants significantly influenced local residential mobility patterns, particularly for renters. The increased propensity for renters to move in response to migrant proximity suggests a complex process of neighborhood change and potential residential sorting that accompanied the Dust Bowl migration to Los Angeles.

We also examine the relationship between proximity to Dust Bowl migrants and changes in household composition, with the results presented in Table B.4. Our findings indicate that households closer to Dust Bowl migrants were more likely to become distinctively younger and smaller between 1930 and 1940. Additionally, the proximity to Dust Bowl migration is associated with these locations becoming disproportionately inhabited by U.S.-born and low-skill heads

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[17] We also demonstrate that the residential sorting is not solely a function of proximity. Similar results are observed when we use Dust Bowl migrant density to measure spillover effects. These findings are presented in Table B.3.

Table 5. Probability of Move and Dust Bowl migrant presence.

Panel A. Individual-Linked Move Measure

	Grid–neighborhood Fixed Effects				Sub–division Fixed Effects			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(*Proximity*)	0.018***	0.010***			0.027***	0.017***		
	(0.004)	(0.003)			(0.005)	(0.005)		
log(*Prox.*) × *Renter*			0.008***	0.005**			0.016***	0.013***
			(0.003)	(0.002)			(0.004)	(0.004)
log(*Prox.*) × *Owner*			–0.005	–0.005			0.002	0.002
			(0.006)	(0.006)			(0.007)	(0.007)
Renter			0.498***	0.445***			0.499***	0.449***
			(0.029)	(0.028)			(0.032)	(0.032)
Observations	19,745	19,745	19,745	19,745	19,745	19,745	19,745	19,745
R–squared	0.065	0.134	0.274	0.284	0.212	0.267	0.384	0.393
Clusters	764	764	764	764	3,487	3,487	3,487	3,487
Log Prices (1930)	✓	✓	✓	✓	✓	✓	✓	✓
Controls		✓		✓		✓		✓

Panel B. Demographic-Based Move Measure

	Grid–neighborhood Fixed Effects				Sub–division Fixed Effects			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(*Proximity*)	0.003	0.004			0.006	0.007*		
	(0.003)	(0.002)			(0.004)	(0.004)		
log(*Prox.*) × *Renter*			0.005**	0.007***			0.006	0.008**
			(0.002)	(0.002)			(0.004)	(0.004)
log(*Prox.*) × *Owner*			–0.006	–0.005			0.0002	0.0006
			(0.004)	(0.004)			(0.005)	(0.005)
Renter			0.239***	0.247***			0.218***	0.228***
			(0.020)	(0.020)			(0.021)	(0.021)
Observations	34,491	34,491	34,491	34,491	34,491	34,491	34,491	34,491
R–squared	0.034	0.045	0.095	0.101	0.130	0.139	0.184	0.189
Clusters	834	834	834	834	4,123	4,123	4,123	4,123
Log Prices (1930)	✓	✓	✓	✓	✓	✓	✓	✓
Controls		✓		✓		✓		✓

Notes: This table presents our results for the effects of the presence of Dust Bowl migrants on the probability of families moving to a different address. We estimate Equation (7). $\mathbb{P}(Move)_{i,1930:40}$ *is a dummy variable that equals one if the family moved to a different address between 1930 and 1940.* $\log(Proximity)$ *is the log of the inverse distance to the closest Dust Bowl migrant address.* $Homeowner_{1930}$ *is a dummy that equals one if the unit was fully owner-occupied in 1930, while* $Renter_{1930}$ *is the analogous dummy variable for when the address had at least one unit rented in 1930. Neighborhood fixed effects can be at the grid-neighborhood (columns 1 to 4), or the sub-division (columns 5 to 8). Control variables for the 1930s household head and address characteristics are as discussed before. Panel A uses the move measure based on the individual-link approach, while Panel B uses the demographic-based measure as the dependent variable. The sample is restricted to addresses exclusively inhabited by non-migrants. Robust standard errors clustered at the level of fixed effects in parentheses. Statistical significance:* *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

of household. These shifts suggest that the arrival of Dust Bowl migrants led to significant residential sorting changing the surrounding population's characteristics, favoring younger, U.S.-born, and less-educated individuals. Interestingly, proximity to Dust Bowl migrants had no significant effect on racial changes; if anything, addresses previously occupied by non-white heads were less likely to change to white household heads.

7 Discussion of Mechanisms

Our analysis thus far has revealed several key findings regarding the impact of Dust Bowl migration on the Los Angeles housing market during the 1930s. We have established that properties inhabited by Dust Bowl migrants experienced lower price growth compared to similar addresses inhabited by other internal migrants within the same neighborhoods. Moreover, we uncovered consistent spillover effects, with non-migrant properties closer to or in areas with high concentrations of Dust Bowl migrants also experiencing relatively lower price growth. These price effects were accompanied by changes in occupancy patterns, with Dust Bowl migrant addresses showing increases in household size and total number of residents. Additionally, we observed suggestive evidence of residential sorting, with some incumbent residents, particularly renters, more likely to move when in closer proximity to Dust Bowl migrants.

In this section, we assess the underlying mechanisms driving these outcomes. We begin by examining the heterogeneity in the effects based on the severity of environmental degradation in migrants' origin areas. Hornbeck (2012, 2023) shows evidence that areas in the Great Plain that were more eroded faced more substantial declines in agricultural land values, access to credit, population, and employment. These studies show that Dust Bowl migrants leaving more eroded counties were more economically vulnerable than the ones leaving areas with low erosion. Therefore, migrants from more severely affected regions may have been more economically vulnerable upon arrival, potentially having differential impacts on local housing markets.

Comparing Dust Bowl migrants from high-medium erosion areas with those of low-erosion regions is valuable for examining potential mechanisms. This comparison is particularly insightful because these two groups of Dust Bowl migrants likely shared many characteristics, such as cultural background, general labor skills, and the experience of westward migration.[18]

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[18] Figure B.2 in the Appendix compares the characteristics of properties selected by Dust Bowl migrants from high-medium erosion areas compared to those from low-erosion areas. The results show no statistically significant difference between the two groups across observed address characteristics in 1930. This presents further evidence that

Table 6. Direct Effects of Dust Bowl Migration on House Prices by Erosion Level at the Origin

	$\Delta \log(\textit{House Price})_{1930:40}$							
	No Fixed Effects		Grid–neighborhood Fixed Effects		Sub–division Fixed Effects		Enum. District Fixed Effects	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
High and Medium Erosion Origin	–0.104***	–0.089***	–0.062***	–0.057***	–0.050***	–0.049**	–0.058***	–0.051***
	(0.018)	(0.018)	(0.018)	(0.018)	(0.019)	(0.019)	(0.018)	(0.018)
Low Erosion Origin	–0.047	–0.035	–0.033	–0.032	–0.010	–0.004	–0.035	–0.032
	(0.030)	(0.030)	(0.030)	(0.030)	(0.037)	(0.037)	(0.028)	(0.028)
Observations	8,148	8,148	8,148	8,148	8,148	8,148	8,148	8,148
R–squared	0.383	0.400	0.456	0.461	0.465	0.468	0.462	0.465
Clusters			665	665	2,625	2,625	700	700
Log Prices (1930)	✓	✓	✓	✓	✓	✓	✓	✓
Controls		✓		✓		✓		✓

Notes: This table presents our baseline results for the direct effects of the presence of Dust Bowl migrants on the house price evolution during the 1930s. We estimate a similar specification to Equation (3), but decomposing Dust Bowl migrants into those that came from areas with high-medium erosion or from areas with low erosion. The specifications include neighborhood fixed effects, which can be at the grid-neighborhood (Columns 3 and 4), the sub-division (Columns 5 and 6), or the enumeration district levels (Columns 7 and 8). Control variables for the 1930s household head and address characteristics are the same as discussed in the main results. The sample is restricted to only addresses inhabited by other internal U.S.-born migrants. Robust standard errors clustered at the level of fixed effects in parentheses. Statistical significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

However, these groups critically differed in the severity of environmental and economic shock they experienced at the origin. For instance, if the housing market effects were primarily driven by cultural differences or group discrimination against Dust Bowl migrants, we would expect similar impacts from both high- and low-erosion migrants.

We begin by testing whether the direct effects on house prices were different by the two groups of Dust Bowl migrants. Table 6 presents these results, distinguishing between migrants from high and medium erosion areas versus those from low erosion areas, as classified by Hornbeck (2012). We find that the negative effect on house price growth is primarily driven by migrants from high and medium-erosion origins. Specifically, addresses inhabited by these more vulnerable migrants experienced a 4.9 to 5.7 percentage point lower price growth over the decade compared to other migrant-inhabited homes, depending on the fixed effects specification. In contrast, the effect for migrants from low-erosion areas is smaller and statistically insignificant across all specifications, suggesting that their average house price growth rate was similar to those of other internal migrants. This result suggests that the economic circumstances of migrants upon arrival, shaped by the severity of environmental disasters in their origin areas, play a crucial role in determining their impact on local housing markets.

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the selection concerns discussed in section 4 about potential systematic differences in the type of properties chosen by Dust Bowl migrants when arriving in LA are not driving our results.

The stronger negative price effects associated with migrants from more severely affected areas provide compelling evidence for a disinvestment mechanism in the housing market. This pattern suggests that properties inhabited by the most economically vulnerable Dust Bowl migrants–those from areas with high and medium erosion–experienced more pronounced negative price effects, likely due to reduced investment in property maintenance and improvements. Such disinvestment could occur through two primary channels. First, landlords renting to these more vulnerable migrants might have been less inclined to invest in property upkeep, anticipating lower returns or higher risk of default. Second, Dust Bowl migrant homeowners from more severely affected areas may have lacked the financial resources to adequately maintain or improve their properties. In both scenarios, the economic strain experienced by migrants from high-erosion areas could translate into higher rates of property degradation over time, explaining the larger negative price effects for these homes.

Another competing mechanism that could explain our results is crowding. Our finding in Table 3 revealed significant increases in household size and total number of residents in addresses inhabited by Dust Bowl migrants. This could suggest that the observed negative price effects could be partially attributed to more intensive use and faster depreciation of properties due to higher occupancy rates. The influx of economically vulnerable migrants may have led to denser living arrangements, either through larger family units or informal subletting. Such crowding could accelerate wear and tear on properties, leading to faster physical depreciation and, consequently, lower property values. Moreover, crowding might affect the perceived desirability of these properties and their immediate surroundings, potentially explaining both the direct negative price effects on Dust Bowl migrant-occupied homes and the spillover effects on neighboring properties.

Table 7 shows the results when estimating similar specifications to Table 3, but distinguishing between migrants from high-medium erosion areas and those from low erosion areas. Interestingly, we find statistically significant positive effects for both groups across all specifications. The fact that both groups show significant positive effects, with magnitudes that are comparable and, in some specifications, larger for low erosion migrants, suggests that overcrowding alone is not a plausible driver for the differential changes in house prices observed earlier. If overcrowding was the primary mechanism, we would expect to find a more pronounced difference between the two groups of migrants, mirroring the pattern found in the price effects. Instead, these results indicate that while Dust Bowl migration did lead to increased occupancy and intensity of

Table 7. Effects on Household Size and Number of Residents by Erosion

	Δ*Household Size*$_{1930:40}$				Δ*Residents*$_{1930:40}$			
	Grid FE (1)	Sub-Div. FE (2)	Grid FE (3)	Sub-Div. FE (4)	Grid FE (5)	Sub-Div. FE (6)	Grid FE (7)	Sub-Div. FE (8)
DB Migrant	0.047***	0.046***			0.100***	0.090***		
	(0.012)	(0.013)			(0.018)	(0.019)		
High and Medium Erosion Origin			0.042***	0.041***			0.095***	0.093***
			(0.013)	(0.014)			(0.019)	(0.020)
Low Erosion Origin			0.061***	0.062**			0.117***	0.082**
			(0.021)	(0.024)			(0.030)	(0.033)
Observations	8,197	8,197	8,197	8,197	8,197	8,197	8,197	8,197
R–squared	0.513	0.657	0.513	0.657	0.410	0.585	0.410	0.585
Clusters	667	2,636	667	2,636	667	2,636	667	2,636
Log Prices (1930)	✓	✓	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓	✓	✓

Notes: This table presents the effects of the presence of Dust Bowl migrants on the changes in household size and number of residents of an address by erosion at the origin. The dependent variable is either the change in the household size (columns 1 to 4) or the change in the total number of residents (Columns 5 to 8) in an address i. DB Migrant is a dummy variable that equals one if the address was inhabited by Dust Bowl migrants. Homeowner$_{1930}$ *is a dummy that equals one if the unit was fully owner-occupied in 1930, while Renter*$_{1930}$ *is the analogous dummy variable for when the address had at least one unit rented in 1930. Specification include the neighborhood fixed effects, which can be at the grid-neighborhood (Columns 1, 3, 5, and 7) and the sub-division (Columns 2, 4, 6, and 8). Control variables for the 1930s household head and address characteristics are included as described before. The sample includes only addresses inhabited by internal U.S.-born migrants. Robust standard errors clustered at the level of fixed effects in parentheses. Statistical significance: **** $p < 0.01$, **** $p < 0.05$, *** $p < 0.10$.

property use, this increase was not unique to the more economically vulnerable high-erosion migrants and thus cannot fully explain the observed price differentials from Table 6.

Finally, one important channel to be tested is discrimination. Given the historical context of the Dust Bowl migration, examining potential discrimination as a mechanism is crucial. Contemporary accounts and subsequent historical research have documented widespread stigmatization and discrimination against Dust Bowl migrants at their destinations. Given this historical backdrop, it's important to investigate whether the observed negative effects on housing prices were driven primarily by economic factors or if they also reflected discriminatory attitudes towards Dust Bowl migrants as a group.

Table 8 provides the results of the spillover specifications (Table 4) by comparing the effects of migrants from high-medium erosion areas versus those from low erosion areas. The results show that the negative impact on house prices is predominantly driven by migrants from high and medium erosion origins, with their presence associated with a 4.9 to 5.7 percentage point lower price growth over the decade. In contrast, the effect for migrants from low erosion areas is smaller and statistically insignificant across all specifications. This stark difference suggests that the negative price effects were not primarily due to generalized discrimination against Dust Bowl migrants as a group. If discrimination were the main driver, we would expect to see similar negative effects for both high and low-erosion migrants, as they likely shared similar cultural backgrounds and would have been equally subject to stigmatization. Instead, the results point to economic vulnerability, as proxied by the severity of environmental degradation in the migrants' origin areas, as the key factor influencing the observe housing market effects.

Given the lack of evidence for generalized discrimination as the primary driver of the observed spillover effects, it's important to consider alternative explanations for the negative impact on surrounding property values. One potential driver could be the change in long-term expectations about the future trajectory of local communities. Incumbent residents may have anticipated potential challenges in maintaining the quality of very local amenities and public services in the face of the increased arrival of vulnerable migrants. Additionally, the results could indicate a preference among more affluent residents to distance themselves from areas with higher concentrations of economically vulnerable migrants. This preference might not stem from overt discrimination but rather from concerns about potential negative externalities associated with poverty. Such preferences could lead to a sorting pattern, where those with resources gradually move away from areas with higher migrant concentrations, potentially contributing to lower demand and decreased property values. This interpretation would align with the findings of stronger negative effects in areas with migrants from more severely eroded regions, suggesting that the economic vulnerability of migrants, rather than their identity as Dust Bowl migrants per se, was the key factor influencing local housing markets. Finally, an alternative explanation could be the disruption of existing social capital in neighborhoods receiving large numbers of Dust Bowl migrants. The rapid influx of newcomers, particularly those from more severely affected areas, may have weakened established community networks and social cohesion, leading to a perceived decline in local housing quality. This erosion of social capital could manifest in reduced trust, less community engagement, and a weakening of informal support systems that Angelino residents previously relied upon.

8 Concluding Remarks

Our study provides a comprehensive analysis of how the influx of Dust Bowl migrants shaped the Los Angeles housing market during the 1930s. By leveraging detailed, address-level historical data and employing a rigorous identification strategy, we uncover several key findings that contribute to our understanding of how climate-induced migration impacts urban housing markets.

Table 8. Housing Prices and Proximity to Dust Bowl Families by Erosion

	Grid–neighborhood Fixed Effects			Sub–division Fixed Effects		
	(1)	(2)	(3)	(4)	(5)	(6)
log(Prox. High-Medium Erosion)	–0.019***		–0.019***	–0.015***		–0.012***
	(0.004)		(0.004)	(0.004)		(0.004)
log(Prox. Low Erosion)		–0.005	0.007		–0.013*	–0.004
		(0.006)	(0.006)		(0.006)	(0.007)
Observations	65,341	65,341	65,341	65,341	65,341	65,341
R–squared	0.433	0.433	0.433	0.495	0.495	0.495
Clusters	857	857	857	4,352	4,352	4,352
Log Prices (1930)	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓

Notes: This table presents the results for the indirect effects of the presence of Dust Bowl migrants by erosion level at the origin on the house price evolution of non-migrants. The dependent variable is the log difference in house prices between 1930 and 1940. log(Prox. High-Medium Erosion) is the log of the inverse distance to the closest Dust Bowl migrant from High-Medium erosion areas address. log(Prox. Low Erosion) is the analogous measure for migrants from low erosion areas. Specification include the neighborhood fixed effects, which can be at the grid-neighborhood (Columns 1-3) and the sub-division (Columns 4-6). Control variables for the 1930s household head and address characteristics are included as described before. The sample includes only addresses inhabited by non-migrants. Robust standard errors clustered at the level of fixed effects in parentheses. Statistical significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

First, we find that properties inhabited by Dust Bowl migrants experienced significantly lower price growth compared to similar addresses occupied by other internal migrants within the same neighborhoods. This effect was particularly pronounced for properties inhabited by migrants from high-erosion areas, suggesting that the severity of environmental degradation at the origin plays a crucial role in determining housing market outcomes at the destination.

Second, we document substantial spillover effects, with non-migrant properties in close proximity to or in areas with high concentrations of Dust Bowl migrants also experiencing relatively lower price growth. These spillover effects underscore the broader impact of climate-induced migration on neighborhood dynamics and property values beyond just the directly affected properties.

Third, our analysis of potential mechanisms reveals that the observed price effects are primarily driven by migrants' vulnerability rather than overcrowding or generalized discrimination. The economic vulnerability of migrants, especially those from high-erosion areas, appears to translate into lower property values over time, a result consistent with the disinvestment hypothesis.

From a policy perspective, our results suggest that strategies aimed at supporting the vulnerable migrant population and mitigating the housing disinvestment effects could be particularly effective in maintaining neighborhood stability and property values in areas receiving climate migrants. One potential policy approach could be the implementation of targeted home improvement grants or low-interest loans for climate migrants. Such programs could help address the maintenance and improvement issues stemming from economic vulnerability, potentially mitigating the negative spillover effects on surrounding properties.

In conclusion, our study of the Dust Bowl migration to Los Angeles provides valuable insights into the complex interactions between climate change, migration, and housing markets. As climate change continues to displace populations worldwide, understanding these dynamics is crucial for developing effective policies to manage the impacts of climate-induced migration on both migrants and receiving communities.

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Internet Appendix to
“Finding Home When Disaster Strikes: Dust Bowl Migration and Housing in Los Angeles”

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Appendix A Summary Statistics

Table A.1. Descriptive Statistics

Variables	N (1)	Mean (2)	SD (3)	Min (4)	Max (5)
Migration and Population Movement					
Dust Bowl Migrants	73,489	0.030	0.170	0	1
Other Internal U.S.-Born Migrants	73,489	0.083	0.276	0	1
Housing Outcomes					
House Price 1930	73,489	50.864	219.693	0.11	8,500
Avg. House Price Gr.	73,489	–0.024	0.783	–9.32	6.96
Employment and Skill Level Shares					
High Skill 1930	73,489	0.537	0.489	0	1
Employed 1930	73,489	0.756	0.421	0	1
Resident Characteristics (1930)					
White	73,489	0.934	0.247	0	1
Black	73,489	0.019	0.137	0	1
U.S.-Born	73,489	0.738	0.433	0	1
Foreign	73,489	0.229	0.414	0	1
Mexican	73,489	0.033	0.177	0	1
Number of Families	73,489	2.234	3.366	1	101

Notes: This table displays summary statistics for our final sample of addresses. *Dust Bowl Migrants* is the share of heads of households living in the address which we determine was living in areas affected by the American Dust Bowl in 1935. *Other Internal U.S.-Born Migrants* is the share of heads of households living in an address that migrated to Los Angeles between 1935 and 1940. Both these variables are defined based on the 1940s Census information on which county the person was living in 1935. *House Price* is our main outcome variable and is the combination of actual and inputed monthly rents in 1930 dollar terms (See Appendix A for the details on the imputation approach). *House Price Growth* is the house price log difference between 1930 and 1940. *High Skill* is the worker skill level based on the occupation, and *Employed* is one if the individual declared to be employed in 1930. *White*, *Black*, *U.S.-born*, *Foreign*, and *Mexican* are the shares of residents in the address with the respective race or national origin. These measures are constructed using the information of race and place of birth of each head of household from the 1930 Census. *Number of Families* is the total number of households living in the same address.

Table A.2. Sample Comparison: Full Count *vs.* Linked Address Sample *vs.* Final Sample.

	Full Sample		Linked Sample		Final Sample	
	N (1)	Mean (2)	N (3)	Mean (4)	N (5)	Mean (6)
Dust Bowl Migrants	508,491	0.037	112,575	0.029	73,489	0.03
Other Internal U.S.-Born Migrants	508,491	0.11	112,575	0.084	73,489	0.083
House Value (1930 US$)	165,884	5,766	44,540	4,898	32,918	4,879
Rent (1930 US$)	324,210	59.16	66,984	58.35	41,794	61.67
High Skill	508,491	0.626	112,575	0.629	73,489	0.648
Employed	508,491	0.637	112,575	0.648	73,489	0.663
White	508,491	0.946	112,575	0.954	73,489	0.959
Native	508,491	0.782	112,575	0.752	73,489	0.762
Age	508,491	46.549	112,575	48.277	73,489	48.485
Single	508,491	0.112	112,575	0.069	73,489	0.055

Notes: This table displays means and observation counts for the 1940 Full-Count Census (Columns 1 and 2), the Address-Linked sample (Columns 3 and 4) using the house-linking algorithm developed in Cortes and Sant'Anna (2023), and the final sample (Columns 5 and 6) containing addresses linked and geocoded.

Appendix B Additional Results

B.1 Main Results with Complete Sample

Table B.1 presents our baseline results for the direct effects of the presence of Dust Bowl migrants on the house price evolution during the 1930s, but using the complete sample of addresses. We estimate the following specification:

$$\Delta \log(\mathit{House\ Price})_{i,n,1930:40} = \alpha_n + \beta \cdot D_{i,n} + \gamma' X_{i,n,1930} + \varepsilon_{i,n}.$$

$\Delta \log(\mathit{House\ Price})_{i,n,1930:40}$ is the log difference in house prices between 1930 and 1940. The term $D_{i,n}$ denotes a dummy variable that equals one if the address was inhabited by Dust Bowl migrants, while α_n represents the neighborhood fixed effects, which can be at the grid-neighborhood (Columns 3 and 4), the sub-division (Columns 5 and 6), or the enumeration district levels (Columns 7 and 8). $X_{i,n,1930}$ are the control variables for the 1930s household head and address characteristics. Controls include the variables for high-skill, married, single, log of age, employed, female, White, Black, foreign-born, Mexican-born, the log of the number of families, the average household size, whether the house was located in areas graded as "Hazardous" or "Definitely Declining" by the Home Owners' Loan Corporation, and the log of prices in 1930. Robust standard errors clustered at the level of fixed effects in parentheses.

Table B.1. Effects of Dust Bowl Migration on House Prices, Complete Sample.

	$\Delta \log(\mathit{House\ Price})_{1930:40}$							
	No Fixed Effects		Grid–neighborhood Fixed Effects		Sub–division Fixed Effects		Enum. District Fixed Effects	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dust Bowl Migrant	–0.060***	–0.045***	–0.041***	–0.028**	–0.031**	–0.020	–0.037***	–0.025*
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Observations	73,489	73,489	73,489	73,489	73,489	73,489	73,489	73,489
R–squared	0.337	0.366	0.429	0.436	0.489	0.493	0.434	0.441
Mean Y	–0.024	–0.024	–0.024	–0.024	–0.024	–0.024	–0.024	–0.024
Clusters			868	868	4,450	4,450	754	754
Log Prices (1930)	✓	✓	✓	✓	✓	✓	✓	✓
Controls		✓		✓		✓		✓

Statistical significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table B.2 presents our results for the indirect effects of the presence of Dust Bowl migrants on the probability of tenure status changes during the 1930s. We estimate the following specifications:

$$\Delta \log(\mathit{Tenure\ Status})_{i,n,1930:40} = \alpha_n + \beta \cdot \log(\mathit{Proximity})_{i,n} + \gamma' X_{i,n,1930} + \varepsilon_{i,n}$$

$$\begin{aligned}\Delta \log(\mathit{Tenure\ Status})_{i,n,1930:40} = \alpha_n &+ \beta^{Renter} \cdot \left[\log(\mathit{Proximity})_{i,n} \times \mathbb{1}^{Renter}_{i,n,1930}\right] \\ &+ \beta^{Owner} \cdot \left[\log(\mathit{Proximity})_{i,n} \times \mathbb{1}^{Owner}_{i,n,1930}\right] + \eta \cdot \mathbb{1}^{Renter}_{i,n,1930} + \gamma' X_{i,n,1930} + \varepsilon_{i,n}.\end{aligned}$$

Table B.2. Proximity to Dust Bowl families and Changes in Tenure Status.

Panel A. Average Effect of Distance

	$\Delta \log(\mathit{Tenure\ Status})_{1930:40}$							
	No Fixed Effects		Grid–neighborhood Fixed Effects		Sub–division Fixed Effects		Enum. District Fixed Effects	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\log(\mathit{Proximity})$	–0.012***	–0.010***	–0.011***	–0.009***	–0.009***	–0.007***	–0.008***	–0.006***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)
Observations	65,804	65,804	65,804	65,804	65,804	65,804	65,804	65,804
R–squared	0.001	0.009	0.030	0.035	0.088	0.092	0.028	0.033
Mean Y	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270
Clusters			859	859	4,366	4,366	751	751
Log Prices (1930)	✓	✓	✓	✓	✓	✓	✓	✓
Controls		✓		✓		✓		✓

Panel B. Heterogeneity by Tenure in 1930

	$\Delta \log(\mathit{Tenure\ Status})_{1930:40}$							
	No Fixed Effects		Grid–neighborhood Fixed Effects		Sub–division Fixed Effects		Enum. District Fixed Effects	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\log(\mathit{Proximity}) \times \mathit{Renter}_{1930}$	–0.028***	–0.027***	–0.026***	–0.024***	–0.022***	–0.020***	–0.025***	–0.024***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
$\log(\mathit{Proximity}) \times \mathit{Owner}_{1930}$	0.015***	0.017***	0.017***	0.017***	0.020***	0.021***	0.020***	0.021***
	(0.002)	(0.002)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Renter_{1930}	–0.261***	–0.243***	–0.239***	–0.217***	–0.232***	–0.213***	–0.248***	–0.227***
	(0.016)	(0.016)	(0.024)	(0.023)	(0.021)	(0.021)	(0.024)	(0.024)
Observations	65,804	65,804	65,804	65,804	65,804	65,804	65,804	65,804
R–squared	0.007	0.013	0.033	0.037	0.091	0.094	0.032	0.035
Mean Y	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270
Clusters			859	859	4,366	4,366	751	751
Log Prices (1930)	✓	✓	✓	✓	✓	✓	✓	✓
Controls		✓		✓		✓		✓

Statistical significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

$\Delta \log(\mathit{Tenure\ Status})_{1930:40}$ is the variable that assumes value 1 if the address changed tenure status between 1930 and 1940. $\log(\mathit{Proximity})$ is the log of the inverse distance to the closest Dust Bowl migrant address. α_n represents the neighborhood fixed effects, which can be at the grid-neighborhood (Columns 3 and 4), the sub-division (Columns 5 and 6), or the enumeration district levels (Columns 7 and 8). $X_{i,n,1930}$ are the control variables for the 1930s household head and address characteristics. Controls include the variables for high-skill, married, single, log of age, employed, female, White, Black, foreign-born, Mexican-born, the log of the number of families, the average household size, whether the house was located in areas graded as "Hazardous" or "Definitely Declining" by the Home Owners' Loan Corporation, and the log of prices in 1930. Panel A estimates the average effect of proximity to Dust Bowl migrants, β, while Panel B estimates the heterogeneous effects by tenure status in 1930, β^{Renter} and β^{Owner}. The sample is restricted to addresses exclusively inhabited by non-Dust Bowl migrants. Robust standard errors clustered at the level of fixed effects in parentheses.

B.2 Concentration of Dust Bowl Migrants and House Price Effects

Previously, we focused on the impact of proximity to the nearest Dust Bowl migrants on the house prices of non-migrant residents. Another equally important aspect to be investigated is the potential effect of migrant concentration. The density of climate-displaced individuals in an area may have distinct implications for local housing markets, potentially amplifying or mitigating the effects observed in our proximity analysis. Dust Bowl Migrant Density is measured as the number of Dust Bowl addresses per square mile within a 0.25-mile radius of each address. In our sample, 8,363 addresses have no Dust Bowl addresses within this perimeter. On average, there are 26.85 Dust Bowl addresses within a 0.25-mile radius of non-migrant addresses.

We estimate the following specifications:

$$\begin{aligned}
\Delta \log(\mathit{House\ Price})_{i,n,1930:40} &= \alpha_n + \beta \cdot \mathit{DB\ Density}_{i,n} + \gamma' X_{i,n,1930} + \varepsilon_{i,n}. \\
\Delta \log(\mathit{House\ Price})_{i,n,1930:40} &= \alpha_n + \beta^{Renter} \cdot \left[\mathit{DB\ Density}_{i,n} \times \mathbb{1}^{Renter}_{i,n,1930}\right] + \\
&\qquad \beta^{Owner} \cdot \left[\mathit{DB\ Density}_{i,n} \times \mathbb{1}^{Owner}_{i,n,1930}\right] + \eta \cdot \mathbb{1}^{Renter}_{i,n,1930} + \gamma' X_{i,n,1930} + \varepsilon_{i,n},
\end{aligned}$$

where $\mathit{DB\ Density}_{i,n}$ denotes the local concentration of Dust Bowl migrants. The rest of the variables are defined as before. Here, we do not use sub-division fixed effects since there is almost no variation left for density within such a small area. Table B.3 present the results. Similarly to the results in Table 4, we find evidence of negative spillover effects from Dust Bowl migrant concentration on non-migrant house prices in Los Angeles during the 1930s. In our preferred specifications with grid-neighborhood fixed effects (columns 3–4), a one-unit increase in Dust Bowl migrant density is associated with a 7.4–9 percentage point decrease in house price growth over the decade. This effect remains robust and statistically significant across various fixed effects specifications. Interestingly, the heterogeneous effects analysis in Panel B reveals that owner-occupied properties experienced slightly larger negative impacts compared to renter-occupied ones. This suggests that homeowners may have been more sensitive to the presence of Dust Bowl migration. Overall, these findings provide strong support for the existence of significant negative externalities associated with the influx of Dust Bowl migrants, extending beyond just the properties they directly occupied.

Table B.3. Density of Dust Bowl families and Housing Prices.

Panel A. Average Effect of Density

	$\Delta \log(\textit{House Price})_{1930:40}$					
	No Fixed Effects		Grid–neighborhood Fixed Effects		Enum. District Fixed Effects	
	(1)	(2)	(3)	(4)	(5)	(6)
DB Density	–0.205***	–0.143***	–0.091***	–0.074**	–0.163***	–0.140***
	(0.011)	(0.011)	(0.034)	(0.032)	(0.038)	(0.035)
Observations	65,341	65,341	65,341	65,341	65,341	65,341
R–squared	0.335	0.363	0.426	0.433	0.433	0.440
Clusters			857	857	750	750
Log Prices (1930)	✓	✓	✓	✓	✓	✓
Controls		✓		✓		✓

Panel B. Heterogeneity by Tenure in 1930

	$\Delta \log(\textit{House Price})_{1930:40}$					
	No Fixed Effects		Grid–neighborhood Fixed Effects		Enum. District Fixed Effects	
	(1)	(2)	(3)	(4)	(5)	(6)
DB Dens. × *Renter*	–0.097***	–0.083***	–0.063*	–0.056*	–0.133***	–0.123***
	(0.014)	(0.015)	(0.036)	(0.034)	(0.041)	(0.038)
DB Dens. × *Owner*	–0.260***	–0.168***	–0.096***	–0.074**	–0.159***	–0.129***
	(0.016)	(0.016)	(0.036)	(0.034)	(0.037)	(0.035)
Renter	–0.195***	–0.140***	–0.135***	–0.122***	–0.127***	–0.114***
	(0.008)	(0.008)	(0.010)	(0.010)	(0.011)	(0.010)
Observations	65,341	65,341	65,341	65,341	65,341	65,341
R–squared	0.345	0.368	0.432	0.438	0.438	0.444
Clusters			857	857	750	750
Log Prices (1930)	✓	✓	✓	✓	✓	✓
Controls		✓		✓		✓

Notes: This table presents our results for the effects of the density of Dust Bowl migrants on the house price evolution during the 1930s. $\Delta \log(\textit{House Price})_{1930:40}$ *is the log difference in house prices between 1930 and 1940. DB Density is the density of Dust Bowl migrants.* $\textit{Homeowner}_{1930}$ *is a dummy that equals one if the unit was fully owner-occupied in 1930, while* $\textit{Renter}_{1930}$ *is the analogous dummy variable for when the address had at least one unit rented in 1930. Neighborhood fixed effects can be at the grid-neighborhood (Columns 3 and 4), or the enumeration district levels (Columns 5 and 6). Control variables for the 1930s household head and address characteristics are as discussed before. Panel A estimates the average effect of proximity to Dust Bowl migrants, while Panel B estimates the heterogeneous effects by tenure status in 1930. Robust standard errors clustered at the level of fixed effects in parentheses. Statistical significance: **** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

B.3 Residential Sorting and Proximity to Dust Bowl Migrants

Table B.4 presents the effects of the presence of Dust Bowl migrants on the changes in resident characteristics. We estimate the following specifications:

$$\begin{aligned}
Y_{i,1930:40} &= \alpha_n + \beta \cdot \log(Proximity) + \gamma' X_{i,n,1930} + \varepsilon_{i,n}. \\
\Delta Y_{i,1930:40} &= \alpha_n + \beta^{Renter} \cdot \left[\log(Proximity)_{i,n} \times \mathbb{1}^{Renter}_{i,n,1930}\right] \\
&\quad + \beta^{Owner} \cdot \left[\log(Proximity)_{i,n} \times \mathbb{1}^{Owner}_{i,n,1930}\right] + \eta \cdot \mathbb{1}^{Renter}_{i,n,1930} + \gamma' X_{i,n,1930} + \varepsilon_{i,n}.
\end{aligned}$$

$\Delta Y_{i,1930:40}$ is either the change in one of the resident characteristic: age (columns 1 and 2), household size (columns 3 and 4), U.S.-born (columns 5 and 6), White (columns 7 and 8), or high-skill (columns 9 and 10). $\log(Proximity)$ is the measure of proximity to the closest address inhabited by Dust Bowl migrants. When the dependent variable measures the change in a binary variable, we estimate the interaction of $\log(Proximity)$ with each dummy variable representing each state of Y in 1930. α_n represents the neighborhood fixed effects, which can be at the grid-neighborhood (Columns 1, 3, 5, 7, and 9) and the sub-division (Columns 2, 4, 6, 8, and 10). $X_{i,n,1930}$ are the control variables for the 1930s household head and address characteristics as described before. The sample includes only addresses inhabited by non-Dust Bowl migrants.

Table B.4. Dust Bowl Migration and Local Residential Sorting.

	Age		Household Size		U.S.–Born		White		High–Skill	
	Grid FE (1)	Sub-Div. FE (2)	Grid FE (3)	Sub-Div. FE (4)	Grid FE (5)	Sub-Div. FE (6)	Grid FE (7)	Sub-Div. FE (8)	Grid FE (9)	Sub-Div. FE (10)
log(*Prox.*)	–0.006***	–0.010***	–0.008***	–0.004						
	(0.002)	(0.002)	(0.003)	(0.003)						
log(*Prox.*) × $U.S.\text{–}Born_{1930}$					–0.014***	–0.012***				
					(0.003)	(0.003)				
log(*Prox.*) × $Foreign\text{–}Born_{1930}$					0.026***	0.029***				
					(0.006)	(0.005)				
log(*Prox.*) × $White_{1930}$							–0.0005	0.001		
							(0.001)	(0.001)		
log(*Prox.*) × $non\text{–}White_{1930}$							–0.026*	–0.025*		
							(0.015)	(0.014)		
log(*Prox.*) × $High\text{–}Skill_{1930}$									0.011***	0.006*
									(0.003)	(0.003)
log(*Prox.*) × $Low\text{–}Skill_{1930}$									–0.004	–0.008**
									(0.004)	(0.004)
Observations	65,804	65,804	65,804	65,804	65,804	65,804	65,804	65,804	65,804	65,804
R–squared	0.390	0.427	0.355	0.399	0.145	0.195	0.624	0.670	0.100	0.149
Mean Y	0.084	0.084	–0.063	–0.063	0.244	0.244	0.057	0.057	0.417	0.417
Clusters	859	4,366	859	4,366	859	4,366	859	4,366	859	4,366
Log Prices (1930)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Robust standard errors clustered at the level of fixed effects in parentheses. Statistical significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

B.4 Additional Balance Tests

In this section, we present additional balance tests to complement the analysis from the main text. In Figure 5, we examined correlations between various address characteristics in 1930 and the presence of Dust Bowl migrants relative to all other residents. Since our primary analysis compares Dust Bowl migrants specifically to other internal migrants (rather than to all residents), we now assess whether these characteristic correlations differ when using this more targeted comparison group.

Figure B.1 reproduces the correlations from Figure 5 but restricting the sample to internal migrants. The results show that limiting the sample to migrants reduces selection concerns, as evidenced by the smaller magnitudes of the correlation coefficients. Nevertheless, the use of neighborhood fixed effects remains essential for eliminating selection bias between observable 1930s address characteristics and Dust Bowl migrant presence.

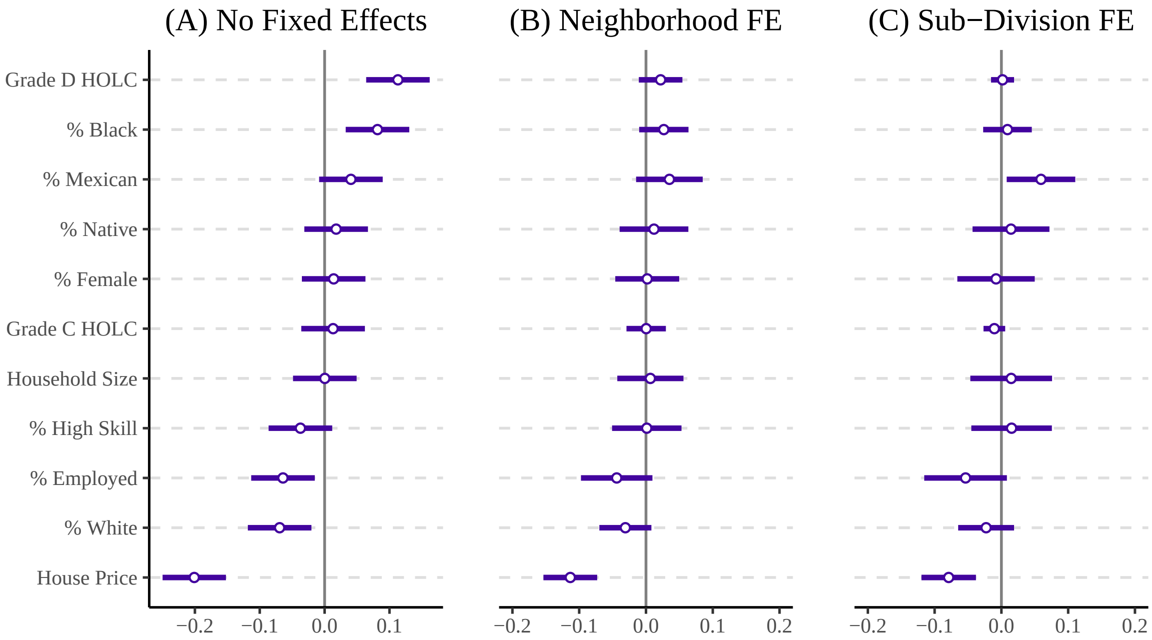

Figure B.1. Correlations Between 1930 Addresses Characteristics and Dust Bowl Migrant Presence relative to Other Migrants. Panel A shows point estimates and 95% confidence intervals of characteristics correlated with the addresses of Dust Bowl migrants. Panel B shows the conditional correlations on the grid-level neighborhood, and panel C presents the correlations conditional on the sub-division fixed effects. The sample is restricted to internal migrants.

Our analysis in Section 7 explores the comparisons between Dust Bowl migrants who came from counties with different levels of exposure to the natural disaster. A natural concern is whether these two subgroups of migrants (from high-medium erosion versus low erosion areas) selected into systematically different types of properties. To address this concern, To address this concern, Figure B.2 presents correlations between address characteristics in 1930 and the presence of Dust Bowl migrants from high-medium erosion areas relative to those from low-erosion areas.

Figure B.2 shows that the correlation coefficients are not statistically significant across all observed characteristics in 1930, indicating that the two groups of Dust Bowl migrants selected into similar types of properties. This similarity supports our identification assumptions by suggesting that differential price effects between high-erosion and low-erosion migrants are unlikely to be driven by systematic differences in their initial housing selections.

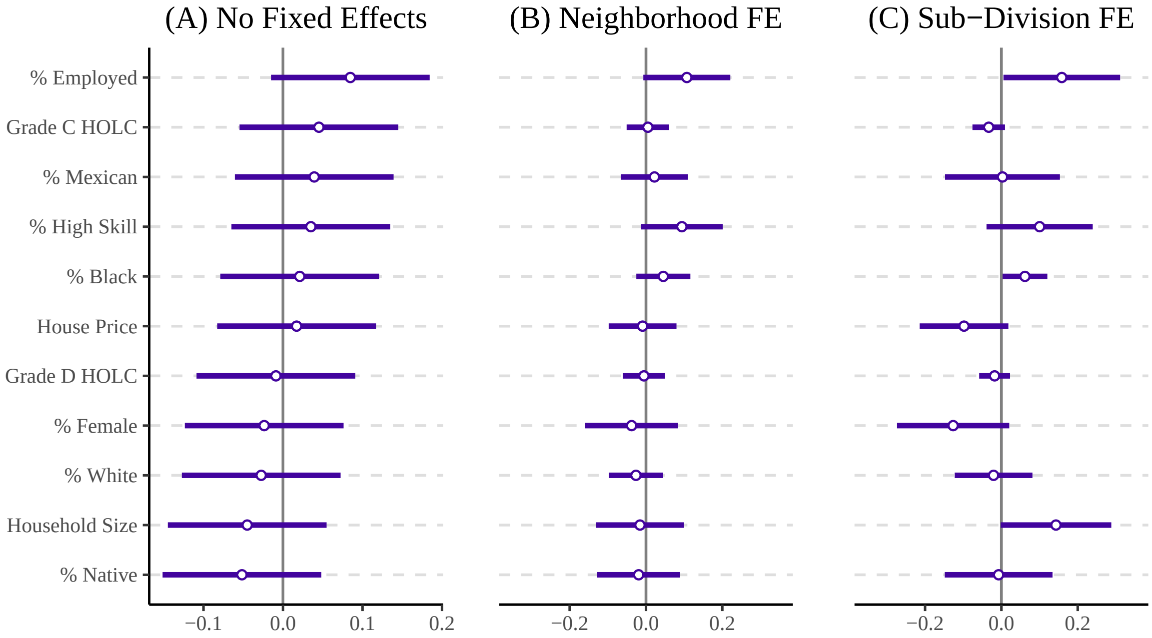

Figure B.2. Correlations Between 1930 Addresses Characteristics and Dust Bowl Migrant Presence: High-Medium Erosion Relative to Low-Erosion. Panel A shows point estimates and 95% confidence intervals of characteristics correlated with the addresses of Dust Bowl migrants from High-Medium erosion origins relative to migrants from low-erosion origins. Panel B conditions the correlations on the grid-level neighborhood, and panel C presents the correlations conditional on the sub-division fixed effects.