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The Effect of Racial Composition on Neighborhood Housing Prices: Evidence from Hurricane Katrina-Induced Migration

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ABSTRACT

Urban housing markets are characterized by racial sorting, but equilibrium prices respond to marginal buyers and thus may mask underlying preferences for segregation. Large migration shocks can make visible these otherwise infra-marginal preferences. We study the effects of Hurricane Katrina-induced displacement on housing markets in receiving neighborhoods in Texas, where 1 in 5 New Orleanians relocated. Using an event study design, we find that the relocation of 100 additional Katrina survivors to a receiving ZIP code is associated with a 2.2% *decline* in relative house prices five years after the storm. This effect is driven by responses to movers from predominantly Black origin blocks. We argue that our findings are best explained by a preference for segregation on the part of incumbent White residents. In this case, racial stratification in the effect of a disaster is followed by racial stratification in economic responses.

1. Introduction

Housing markets are characterized by household sorting along lines of race and ethnicity. Observed sorting patterns are consistent with strong underlying preferences for segregation (Trounstine, 2018), but equilibrium prices—which respond to the marginal buyer's preferences—may mask underlying demand for segregation (Bayer et al., 2007). The arrival of new migrants can disrupt a city's stably-sorted equilibrium, making visible latent segregationist preferences shaping housing market outcomes. In order for a flow of new arrivals to have a measurable effect, it must be (1) large, (2) disproportionately comprised of marginalized movers; and (3) plausibly exogenous to existing intra-city processes. We examine a shock that, we argue, meets all three of these criteria: the migration of large flows of movers from New Orleans to Texas cities in response to Hurricane Katrina.

Hurricane Katrina was the largest disaster-induced mass displacement in the United States since the Dust Bowl, pushing over 1 million people from their homes at least temporarily, and ultimately displacing over a quarter million (Nigg et al., 2006; Hori et al., 2009). An estimated 250,000 of those evacuated after the storm found themselves living in Texas (Nigg et al., 2006), triggering direct changes and local responses in labor markets (McIntosh, 2008), schools (Spencer, 2005; Imberman et al., 2016), and other aspects of social life (Settles and Lindsay, 2011; Asad, 2015; Raker and Elliott, 2018). Evacuees were disproportionately likely to be Black—though residents of all races and ethnicities were displaced—with slower and more limited long-term return by Black versus other survivors (Paxson and Rouse, 2008; Fussell et al., 2010; Sastry and Gregory, 2014). Perhaps self-evidently, the arrival of a quarter-million displaced evacuees into Texas cities did not owe to intra-city processes within those cities. Katrina survivors exercised agency in finding housing and in choosing to stay, but their arrival was catalyzed by the disaster and thus outside of the business-as-usual migration flows that are present even in stably-sorted neighborhoods.

In this paper, we examine housing price responses in neighborhoods of Texas cities that received large disaster-induced migrant flows due to Hurricane Katrina. Given the scale and composition of Katrina displacement, flows of new residents are likely to have measurable effects on neighborhood housing markets. Displaced Katrina survivors—like other internal and international migrants—often sought housing in neighborhoods where they had prior connections through family, friends, or extended networks (Weber and Peek, 2012). Flows were not only large, then, but also concentrated in a few neighborhoods across destination

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cities. The effects of these targeted flows of movers could broadly follow two possibilities. First, the arrival of new movers may increase demand directly by renting or purchasing homes, pushing prices up in the absence of a perfectly elastic supply.[1] We do not see such an effect.

A second possibility is that house prices decline. A house's price reflects not just its physical attributes, but also the characteristics of the neighborhood and surrounding community as well as expectations of changes to these features.[2] In principle, incumbent residents in Texas cities may prefer not to live near displaced migrants from New Orleans in general. More likely, based on prior literature (Bayer et al., 2007; Trounstine, 2018), is that this preference may be racialized, with White (or non-Black) households preferring neighborhoods segregated from Black households. While prior sorting of households may, in the long term, ensure that house prices mask such preferences (Bayer et al., 2007), the arrival of large numbers of Hurricane Katrina survivors from New Orleans—a majority-Black city—could upset these patterns and push down the willingness to pay from existing and potential residents of areas seeing large inflows.

To evaluate these different effects, we use an event-study approach to estimate the housing market effect of the arrival of Hurricane Katrina survivors in Texas neighborhoods based on longitudinal microdata on former New Orleanians. We observe a statistically significant negative association of housing prices with the number of additional survivors a neighborhood received, relative to prices in comparable neighborhoods where fewer people moved. The effect is economically significant. Our estimate implies that a neighborhood receiving 500 migrants had 12% lower house price growth from 2005 to 2010, after controlling for other observable characteristics, relative to comparable non-receiving neighborhoods. The effect is also persistent in the medium term, with relative housing prices only rebounding fully approximately ten years after Katrina.

Two additional sets of analyses offer evidence that the observed estimate represents a causal effect attributable to incumbent preferences for segregation, rather than processes like selection based on (e.g.) declining housing prices before the storm or confounding via (e.g.) effects of the Great Recession. First, we directly evaluate the response of housing prices to the arrival of additional movers from predominantly Black versus predominantly White origin census blocks. This novel contribution is made possible by the complete evacuation of New Orleans, in which nearly all residents were forced to leave in the short-term and substantial fractions of all subgroups made longer-term relocations (Sastry and Gregory, 2014; Bleemer and van der Klaauw, 2019) (in contrast with most migration flows, which are often predominantly comprised of just one subgroup). The overall negative effect is driven by movers from predominantly Black census blocks. Selection does not appear to drive our main result: we see no negative pre-trend in neighborhoods receiving migrants from predominantly Black blocks. In contrast, the negative effect largely disappears for neighborhoods receiving in-movers from predominantly White blocks in New Orleans.[3]

Second, we examine heterogeneity in housing price responses based on the racial makeup of the destination neighborhood prior to Hurricane Katrina to rule out the Great Recession as a potential confounder driving our results. If Katrina migrants moved to neighborhoods with subprime lending booms, we would expect the largest effects in neighborhoods with relatively few White residents (Mian and Sufi, 2009). We do not see evidence of a disproportionate decline in neighborhoods that already had more people of color.

Highly concentrated short-term shocks that disproportionately displace minoritized communities, our work shows, can lead to large housing price effects in destination neighborhoods. Our evidence suggests that the most likely candidate for declining house prices in neighborhoods with large inflows of Katrina survivors is a preference for segregation on the part of incumbent residents. These findings are consistent with an established body of literature showing the role of racial sorting in shaping housing price responses to migration (Schelling, 1971; Boustan, 2010; Saiz and Wachter, 2011), but our work is novel in showing how re-sorting can emerge in response to a large external shock. A single extreme weather event, we show, can lead to economically meaningful housing market effects even in far-flung destination cities. Such events are increasing in frequency and intensity due to climate change (Patricola and Wehner, 2018; Irish et al., 2014)—leading to the predicted displacement of tens of millions, disproportionately from minoritized communities (Lustgarten, 2020). The interplay between disaster displacement and housing market sorting is thus a topic of considerable importance.

1.1. Related Work

Our work contributes to two strands of literature in urban economics and the study of climate migration and disaster-induced displacements.

First, an important set of studies examine housing market responses to in-migration of racialized or economically disadvantaged groups. This literature uses a variety of approaches to causal identification, exploiting historical data on mass migrations (Boustan, 2010; Saiz and Wachter, 2011; Boustan et al., 2020; Akbar et al., 2019) and modern labor market demand shocks (Guerrieri et al., 2013; Howard, 2020). Researchers have observed that in-migration in general constitutes an increase in demand that, in the short run or in supply-constrained markets, translates into increased prices (Saiz, 2003; Howard, 2020; Gonzalez and Ortega, 2013). When in-migrants are minoritized,[4] however, some studies have documented declines in housing demand (i.e., White flight) and prices (Boustan, 2010; Saiz and Wachter, 2011; Akbar et al., 2019) as households re-sort in response to migration.

We contribute to this literature in several ways. We examine contemporary migration flows catalyzed by a single catastrophic weather event using individual-level data about migrants as well as ZIP-level house price indices for destination neighborhoods. Our research design enables us to examine house price effects on an annual basis, including pre-trends before the storm. This context also sidesteps the selection that characterizes migration fuelled by labor market decision-making (Abramitzky et al., 2012). The event we study includes migrants from all racial and socioeconomic backgrounds present in the origin city—in contrast with previous research that has tended to be limited

[1] This is also the expected effect at the metropolitan area as a whole: an increase in housing demand should increase housing prices on average (Saiz, 2003; 2007; Ottaviano and Peri, 2006). Even in places where arriving migrants were economically disadvantaged, post-disaster aid included guaranteed rental payments that would have contributed to increased housing demand in destination neighborhoods, although complicated program requirements meant that many people were deemed ineligible for transitional aid after emergency rental aid payments ended in mid-2006; others never accessed benefits in the first place (Carlisle, 2006).

[2] There is also a possible effect on amenities: local amenities like schools, public transportation, and healthcare services may have been subject to crowding, given the unexpected and highly concentrated in-flow of new residents. Schools in the Houston Independent School District's West Region saw enrollment increase by as much as a third in September of 2005 (Spencer, 2005). Educating students who recently lost their homes presents clear challenges; however, the effects on school outcomes remains unclear. In particular, although researchers have observed no adverse effects on class size or test scores, Imberman et al. (2016) do find a positive association between the number of evacuees a school received and rates of absenteeism and expulsions among the children of existing Houston residents.

[3] For neighborhoods receiving movers from predominantly-White blocks, we do see evidence of a negative pre-trend.

[4] We note that sorting along lines of class can also cause housing price effects to persist in the longer term, as the flight (clustering) of wealthy neighbors leads to spillover effects that have been associated with stably lower (higher) housing prices (Ambrus et al., 2020; Guerrieri et al., 2013; Autor et al., 2014).

to events that induce moves among a subset of the population.[5] Our individual-level data on migrants allows us to estimate differential responses to movers of different backgrounds. A closely linked literature relates observed house prices and sorting patterns to underlying preferences for segregation, showing that equilibrium prices, which respond to the marginal buyer's preferences, may mask underlying demand for segregation (Bayer et al., 2007). By examining an exogenous shock to sorting patterns, we are able to see evidence of a housing price response to the arrival of minoritized migrants.

Second, a growing literature studies the effects of disaster-induced migration on destination economies and social structures (see Arcaya et al. (2020); Belasen and Polachek (2013); Bier (2017) for reviews). Importantly, these studies find that moving flows disproportionately comprise minoritized and otherwise disadvantaged people, suggesting that classic results on segregation are likely to hold regarding their reception. Studies of Hurricane Katrina highlight the effects of the storm on displaced residents Deryugina et al. (2018); Groen et al. (2020); Bleemer and van der Klaauw (2019); Sacerdote (2012) as well as the changes that displaced residents bring to receiving labor markets (De Silva et al., 2010; McIntosh, 2008) and schools (Imberman et al., 2016). Yet surprisingly little is known about the most direct implication of displacement: the acquisition of replacement housing.[6] We contribute to this literature by documenting and analyzing the subsequent housing market responses to the acquisition of replacement housing by displaced survivors of Hurricane Katrina.

2. Methods

2.1. Data

We obtain data on the origins and destinations of New Orleans residents from the Federal Reserve Bank of New York/Equifax Consumer Credit Panel (CCP). The CCP is a panel dataset of quarterly credit information for a 5% sample of U.S. residents with a credit history and a social security number (Lee and Van der Klaauw, 2010). Addresses are geocoded to the census-block level based on the address at which an individual receives mail from creditors, with more weight given to address data from more reliable data providers. We exclude individuals listed as deceased, individuals with fewer than four consecutive quarters in the same location, and individuals over age 74 or under age 25 from the final data set, following standard data cleaning procedures described in previous research (Bleemer and van der Klaauw, 2019; Ding et al., 2016; Mazumder and Miller, 2016).

We identify survivors of Hurricane Katrina as all individuals who were living in the New Orleans MSA in the second quarter (June) of 2005; their destinations are identified based on the five-digit ZIP code in which they were living in the second quarter of 2007. The CCP data are anonymous and do not include individual data on race, so we use the 2000 Census to identify the share non-Hispanic Black, non-Hispanic White, and other race or ethnicity (Hispanic or Asian) in each person's origin census block.

We evaluate housing prices in destination neighborhoods using the Zillow Home Value Index (ZHVI) (Glynn, 2022). The ZHVI represents the value of a "typical" home in a given period and place, through a procedure as follows: First, using data from property sales as well as user-generated and commercial data, Zillow applies an ensemble of hedonic automated valuation models to estimate the likely sale price of a home in a given period based on its attributes and location (called 'Zestimates'). Appreciation in a given period is then measured as a weighted average of the change in the Zestimates over time, with weights proportional to each property's value as a fraction of the total market value in the zip code.[7] This weighted average appreciation A_t is then seasonally adjusted and backward-chained relative to the most recent period, so that the index in a previous period $ZHVI_{t-1} = \frac{ZHVI_t}{1+A_t}$. Finally, the ZHVI smooths the monthly index with a 3-month moving average, so we use data for May 2005, three months before Hurricane Katrina made landfall (August 29, 2005). To assess annual differences in housing prices before and after 2005, we similarly examine housing prices in May of each year. We examine all years for which data are available (1999 to 2021).

There are important limitations to the use of the ZHVI. Zillow predicts its hedonic pricing estimates using black-box machine learning models, limiting interpretability, and may be subject to error. These concerns are mitigated by several studies showing that the ZHVI is highly correlated with other commonly used indices[8] as well as by Zillow's recent publication of a statistical meta-model unpacking the dynamics of the ZHVI (Glynn, 2022). Moreover, two key benefits lead us to choose the ZHVI over other indices. First, Zillow's hedonic modeling approach adjusts for changes in the composition of the housing stock over time, mitigating the risk that effects would be attributable to changes in the housing stock. Second, the use of estimates across nearly all homes rather than just the small share of homes sold enables Zillow to produce estimates at small spatial scales even for areas and periods in which few or no actual market transactions may have occurred. The ZHVI has thus seen increasing academic use due to its public availability, its fine-grained temporal and spatial scales, and its reliability in comparisons with other commonly-used housing price indices (see e.g. Huang and Tang, 2012; Damianov and Escobari, 2016; Weber et al., 2016; Begley, 2017; Begley and Chan, 2018; Lang, 2018; De and Segura-Escano, 2021; Gravatt et al., 2022).

Neighborhood socioeconomic characteristics are from the 2000 Decennial Census, which we obtained via the National Historical Geographic Information System (Manson et al., 2018). For each five-digit ZIP code tabulation area, we calculate the total adult population, the share of residents who reported being non-Hispanic White, the share non-Hispanic Black, the share Hispanic, the share under 25, the share over 65, and household median income in 2000. For the population over age 25, we further calculate the share with a bachelor's degree and the share with no high school degree. We include data on the fraction of occupied units that were owner-occupied and the share of all units that were vacant.

Finally, ZIP code tabulation areas were linked with 2010 Core-Based Statistical Areas (CBSAs) from the U.S. Census. We also calculated the distance from each ZIP code to the central business district (CBD) using geocoded CBD data (Holian and Kahn, 2012) and Haversine distances between ZIP codes from the ZIP Code Distance Database (National Bureau of Economic Research, 2017).

[5] Exceptions include Saiz and Wachter, (2011), who examine immigrants with a variety of backgrounds and who also find housing price effects for minoritized immigrants only.

[6] An extensive literature has examined the effects of climate migration on individual-level outcomes, labor markets, and migration patterns; see Arcaya et al. (2020); Bier (2017); Belasen and Polachek (2013) for overviews. A separate strand investigates housing outcomes in directly affected areas (Boustan et al., 2020; Tierney and Oliver-Smith, 2012; Vigdor, 2008; Ortega and Taşpınar, 2018).

[7] Houses with prices above the 95th percentile or below the 5th percentile for a given region are excluded to make the index robust to outlier values.

[8] For MSAs and time periods in the early 2000s with data in both the ZHVI and the Case-Shiller Index, Guerrieri et al. (2013) document that the two indices are highly correlated. Even after a recent (2019) change to Zillow's approach, state-level annual percent changes in the ZHVI track those in the Federal Housing Finance Agency (FHFA) Index (Kahn, 2021) and zip code-level indices are similar to those produced by applying hedonic modeling to CoreLogic's housing transactions database (Gorback and Keys, 2020). Nationally, the ZHVI produces highly similar temporal changes to those observed in the FHFA or the S&P CoreLogic Case-Shiller Index (Glynn, 2022).

2.2. Empirical Strategy

2.2.1. Conceptual Model and Threats to Identification

We are interested in knowing whether and how the in-migration of Katrina survivors is related to neighborhood-level changes in housing values.[9] Different conceptual models predict different signs for this relationship. A straightforward demand and supply framework predicts that neighborhoods receiving larger inflows of survivors will see prices rise, at least until suppliers can respond. However, migrants bring with them more than their purchasing power. A neighborhood is a bundle of neighbors and nearby amenities, as well as housing units, and a large inflow of new residents may change the composition of all three. The end result of these changes on housing prices depends on the preferences and decisions of the in-migrants and the reactions of existing residents. If newcomers change the bundle in ways that incumbent or other prospective residents find attractive, prices may rise in these neighborhoods. Of course, this effect will be difficult to untangle from a straightforward demand/supply response because both result in an increase in prices.

Alternatively, existing residents may avoid neighborhoods that Katrina survivors move to, by either moving out (flight) or not moving in (avoidance). In this case, house prices may fall, signalling that the decline in demand from existing residents more than offsets the surge in demand from migrants. An extensive literature on residential segregation suggests that this outcome is likely when new residents belong to racialized minority groups (Saiz and Wachter, 2011; Boustan, 2010; Trounstine, 2018), with preferences for racial segregation observed even when researchers are able to condition on income (Bayer et al., 2007). We can investigate this possibility by comparing the responsiveness of house prices to (1) inflows of migrants from different backgrounds and (2) inflows of migrants into different types of neighborhoods—namely, those that are relatively diverse versus those that are nearly all-White. House price decreases (rather than increases) in response to Black migrants in mostly-White neighborhoods thus would suggest that existing residents react strongly to having Black neighbors—what Saiz and Wachter Saiz and Wachter, (2011) term a “demand for segregation”.

There are several threats to the identification of a housing price effect as a preference for segregation. First is the possibility of selection: disadvantaged migrants may move to neighborhoods that are already cheap, or that are getting cheaper. To address this concern, we use a panel event study design that allows us to assess whether an estimated decline in prices is simply the extension of a preexisting trend. The research design is detailed in the next subsection.

A second challenge to identification is the possibility that a confounding process caused prices to decline at the same time and in the same places that Katrina survivors moved to; a particular worry is the role of the bursting housing bubble and subsequent Great Recession. In the aggregate, Texas cities did not experience large run-ups in prices, nor did they see broad declines after 2006; Fig. C1 charts these patterns for the three largest Texas cities, the U.S. as a whole, and for three other large and fast-growing Sunbelt Metropolitan Statistical Areas (MSAs). Nevertheless, these metropolitan aggregates may mask related effects in some neighborhoods. Neighborhoods with significant subprime lending, which may have been most adversely affected by the Great Recession, may also have been likely destinations for survivors. Such neighborhoods began to see house price growth slow in 2006 (Mian and Sufi, 2009). To address this concern, we examine the heterogeneity of house price responses across different types of destination neighborhoods. Our segregation hypothesis predicts the biggest price declines in mostly-White neighborhoods. Conveniently, a subprime lending story predicts the reverse: the biggest price declines should be observed in the more diverse neighborhoods where subprime lending predominated.[10]

Third, the influx of migrants may have changed the characteristics of the typical housing unit sold. An influx of survivors could have shifted some housing units out of for-purchase and into rental markets or otherwise changed the composition of the for-sale market; in the medium or long term, new construction may induce a change in the marginal buyer. Our estimate would be amplified by a selection process that saw more-expensive units shifted differentially into rental housing. This is unlikely. The most common tenure selection process would be for multifamily or attached housing to shift differentially into rental; this process would attenuate our estimate. A change in composition is possible, if the influx of survivors caused more turnover in the lower-end market within a ZIP code. However, this process should be accommodated through Zillow’s hedonic modeling. Nevertheless, some effect may still be present. If so, we might expect this process should reverse quickly after the initial influx, suggesting that a persistent response in the medium run is more likely caused by segregation than by composition effects. Lastly, new construction would likely attenuate our estimated effect; this is especially likely in the medium or long-term after suppliers were able to mount a response (Liu et al., 2016).

A final threat to identification is the preexisting patterns of sorting that characterized Texas long before Hurricane Katrina (Hwang et al., 1985). Neighborhood sorting of the sort described by Bayer et al., (2007) will produce marginal buyers whose indifference to changes in neighborhood composition masks preferences for segregation from inframarginal White households. If the marginal buyer’s indifference is strong enough, there may be no equilibrium housing price differential associated with neighborhood racial makeup despite preferences for segregation from White households. Our context suggests at least some marginal buyers will have their indifference tested, for one of two reasons. First, some neighborhoods feature large, noticeable, and (importantly) *unexpected* inflows following the ‘new news’ of Katrina (Bunten and Kahn, 2014). Second, some migrants end up in nearly all-White neighborhoods where the marginal incumbent resident observably did not choose a diverse neighborhood. In any case, this process would attenuate the observed effect, suggesting that our estimate could be read as a lower bound measure for the presence of preferences for segregation.

Additionally, we estimate the response of house prices over time, which brings up further identification questions. This is especially relevant as a sizeable fraction of evacuees would return. However, most return migrants moved back within the year (Fussell et al., 2010). In contrast, our measure of moving rates is constructed from individuals who lived in Texas two years after Katrina. In the medium term, any estimated price effects would be due to the combination of the initial influx of movers with the responses to their arrival induced among other housing market participants and non-housing institutions.

Altogether, we will conclude that an inverse relationship between survivor inflows and house prices after Katrina constitutes evidence that White households hold a preference for segregation if our estimates show no negative pretrend and are persistent, if the response is larger in response to Black migrants, and if the response to Black migrants is larger in more- versus less-White neighborhoods.

2.2.2. Empirical Model

In this section, we describe our empirical implementation. For Texas neighborhood j in CBSA c, we model the logged housing price index in year t as a function of the number of people in the neighborhood in t who are survivors of Hurricane Katrina, $surv_j$ (observed in 2007),

[9] City-level changes in home values are also of interest in principle. The Katrina context—migrants from a smaller city moving to a large state—makes identification of city-level changes in housing demand more difficult. Disasters affecting larger origin cities with outflows to smaller receiving cities will provide more useful sites to test this level of effect.

[10] As defined in Mian and Sufi (2009), prime ZIP codes were 92.1% White, on average, compared to just 58.5% in subprime ZIP codes.

Table 1
Comparison of demographic, economic, and housing factors in neighborhoods that received Katrina survivors versus in non-receiving neighborhoods.

Variable	Non-receiving	Receiving	Diff	P-Value
Housing Prices, 2005 (Log $)	11.6 (0.45)	11.89 (0.46)	-0.29	< 0.001***
Pre-trends, 2000–2005 (Log $)	0.14 (0.11)	0.15 (0.06)	-0.01	0.528
Population (N)	9640 (11,015)	25,623 (14,082)	-15,983	< 0.001***
White (%)	63.7 (28.8)	56.8 (25.8)	6.9	< 0.001***
Black (%)	7.8 (12.8)	14.6 (17.7)	-6.7	< 0.001***
Hispanic (%)	27.2 (28.0)	24.6 (20.2)	2.6	0.071
Under 25 (%)	36.8 (6.9)	38.0 (5.4)	-1.2	0.002**
Over 65 (%)	12.3 (4.7)	8.6 (4.2)	3.7	< 0.001***
Ownership Rate	74.5 (15.7)	63.1 (19.4)	11.5	< 0.001***
Vacancy Rate	12.9 (10.2)	7.0 (4.3)	5.9	< 0.001***
Bachelor's Degree (%)	16.0 (12.0)	28.5 (17.3)	-13.4	< 0.001***
No HS Degree (%)	27.3 (14.1)	19.7 (14.0)	7.6	< 0.001***
Median Income ($)	37,795 (15,537)	48,880 (19,270)	-11,085	< 0.001***
Katrina Survivors	0 (0)	74 (81)	–	–
ZIP Codes (N)	665	460	1125	

*p<0.05; **p<0.01; ***p<0.001. Baseline prices are logged 2005 housing price indices; pre-trends are change in log price indices from 2000 to 2005. Values are means with standard deviations in parentheses. Data are authors' estimates constructed using the Federal Reserve Bank of New York Consumer Credit Panel/Equifax (for migration flows), the US Census Bureau (for racial composition of origin and destination neighborhoods and SES controls), and Zillow (for housing prices and trends).

interacted with a year dummy T_t:

$$log(P_{j,t}) = \sum_{t=1999}^{2021} \alpha_t T_t surv_j + \delta log(P_{j,2005}) + X_j\beta + \tau_t + \phi_c + \epsilon_{jt} \quad (1)$$

To evaluate the change in prices relative to baseline, we control for prices in the year before Katrina, $\log(P_{j,2005})$. The model additionally includes neighborhood characteristics X_j, CBSA fixed effects ϕ_c, and year fixed effects τ_t; standard errors are clustered by CBSA. We scale the $surv_j$ variable so that the key parameter of interest, α_t, represents the effect of 100 additional Katrina survivors on housing prices in year t,[11] conditional on neighborhood baseline housing prices and characteristics.[12]

We use this approach to model log prices in each year $t \in 1999, 2021$. By evaluating pre-trends, we can provide a placebo test for the role of selection – in the absence of selection, α should not be different from zero in the years prior to 2005. Moreover, our conceptual model suggests that price effects should persist over time at least until supply adjusts — a prediction we can evaluate by examining the evolution of the effect in the years after the event.

In the previous section, we note that, if effects are driven by existing resident responses to the characteristics of movers, we would expect larger effects in association with flows of minoritized movers. To test this hypothesis, we extend our model to compare the effects for flows of movers from predominantly non-Hispanic White ($survw_j$) versus from predominantly non-Hispanic Black origin census blocks in New Orleans ($survb_j$):

$$log(P_{j,t}) = \sum_{t=1999}^{2021} \alpha_{wt} T_t survw_j + \sum_{t=1999}^{2021} \alpha_{bt} T_t survb_j + \delta log(P_{j,2005}) + X_j\beta + \tau_t + \phi_c + \epsilon_{jt} \quad (2)$$

We can thus compare the relative effects of the different flows of movers by comparing the estimated effects α_{wt} and α_{bt} over each year t.

Finally, our conceptual model predicts heterogeneity in effects in association with the characteristics of destination neighborhoods. To test this prediction, we create dummy variables identifying neighborhoods in the middle two quartiles (D_2) and the top quartile (D_3) with respect to share White. We then examine the interaction of these variables with mover flows, again stratified by origin neighborhood characteristics:

$$\begin{aligned} log(P_{j,t}) = &\sum_{t=1999}^{2021} \alpha_{w1t} T_t survw_j + \sum_{t=1999}^{2021} \alpha_{w2t} T_t survw_j D_2 + \sum_{t=1999}^{2021} \alpha_{w3t} T_t survw_j D_3 \\ &+ \sum_{t=1999}^{2021} \alpha_{b1t} T_t survb_j + \sum_{t=1999}^{2021} \alpha_{b2t} T_t survb_j D_2 + \sum_{t=1999}^{2021} \alpha_{b3t} T_t survb_j D_3 \\ &+ \delta log(P_{j,2005}) + X_j\beta + \tau_t + \phi_c + \epsilon_{jt} \end{aligned} \quad (3)$$

Here, the parameters of interest are the effect in neighborhoods in the bottom quartile, (α_{w1t} and α_{w1t}), in the middle quartiles ($\alpha_{w1t} + \alpha_{w2t}$ and $\alpha_{b1t} + \alpha_{b2t}$), and in the top quartile ($\alpha_{w1t} + \alpha_{w3t}$ and $\alpha_{b1t} + \alpha_{b3t}$). If effects are driven by confounding associated with Great Recession effects on prices, we would expect to see the smallest effect magnitudes in the nearly all-White destination neighborhoods; by contrast, our conceptual model would predict the largest effect magnitudes associated with movers from Black origin neighborhoods who arrived in these same destination neighborhoods.

We fit models with all available data, using robust standard errors clustered by CBSA.

2.2.3. Validation

The analytic data set includes 1325 ZIP codes across Texas CBSAs with complete data on all census covariates. Of these, 197 (14.8%) lack housing price data in the ZHVI at baseline (2005). While neighborhoods with missing data have lower shares of Black residents, lower median incomes, and higher vacancy rates than neighborhoods with ZHVI data, they are not significantly different in terms of share White, share Hispanic, or in ownership rates (See Appendix Table A1). The ZIP codes with missing data are also sparsely populated, comprising 14.8% of neighborhoods but less than 4% of the total population, suggesting that their exclusion leads to the omission of relatively few actual housing units. After additionally excluding singleton CBSAs (N=3), the final analytic sample comprises 1125 ZIP codes across 54 CBSAs.[13]

In 2007, we find that the Texas destination neighborhoods were home to 1695 individuals in the CCP data who were residing in New Orleans in 2005—equivalent to an estimated 33,900 total movers. Fig. 1 shows the flow of individuals to Houston, which received an estimated 18,100 total movers from New Orleans and 53.4% of all movers from New Orleans to Texas after June 2005. These flows were large in comparison with the number of movers observed in the CCP from 1999 to 2005 (1,038) as well as racially diverse: a majority (56.5%) of movers originated in predominantly Black census blocks in New Orleans (Appendix Table A2).

Just under half (40.9%) of ZIP codes in Texas CBSAs received at least one mover. Tests of covariate balance (See Table 1) show that the

[11] Because the CCP comprises a 5% sample, each individual represents 20 people; we further divide by 5 to obtain a flow of 100 movers. This magnitude is similar to, albeit slightly larger than, the average number of survivors received in neighborhoods that received movers (Table 1).

[12] As a robustness check, we also fit these models separately for each year. Results can be found in Appendix B.

[13] The ZHVI expands in coverage over time, so the data set is further attenuated for our evaluation of pre-trends. In 1999, for example, the ZHVI includes data for only N = 623 ZIP codes across only 15 CBSAs (covering 72% of the population); after excluding singletons, this comprises 619 ZIP codes across 11 CBSAs.

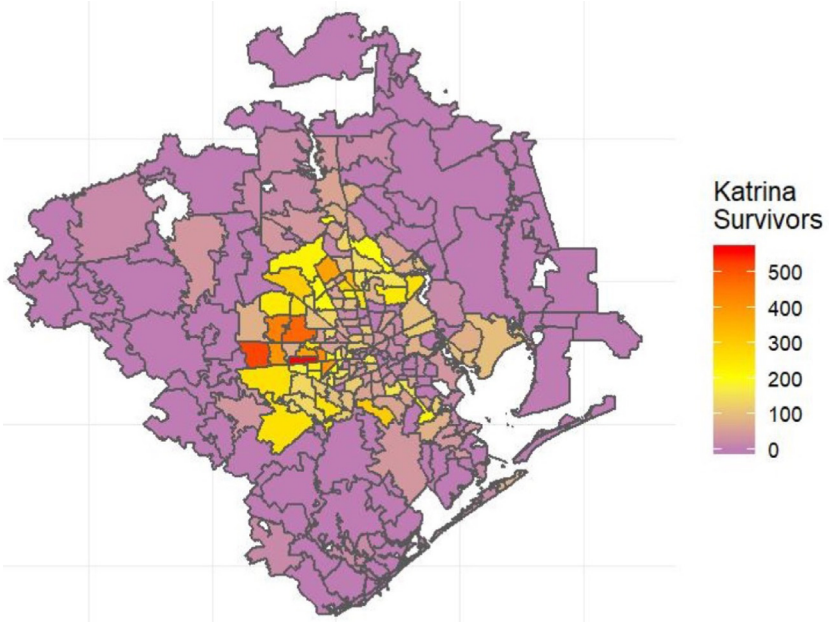

Fig. 1. Estimated number of residents in each Houston neighborhood in 2007 who were residing in New Orleans in the second quarter of 2005. Source: Authors' analyses using the Federal Reserve Bank of New York/Equifax Consumer Credit Panel (for migration flows).

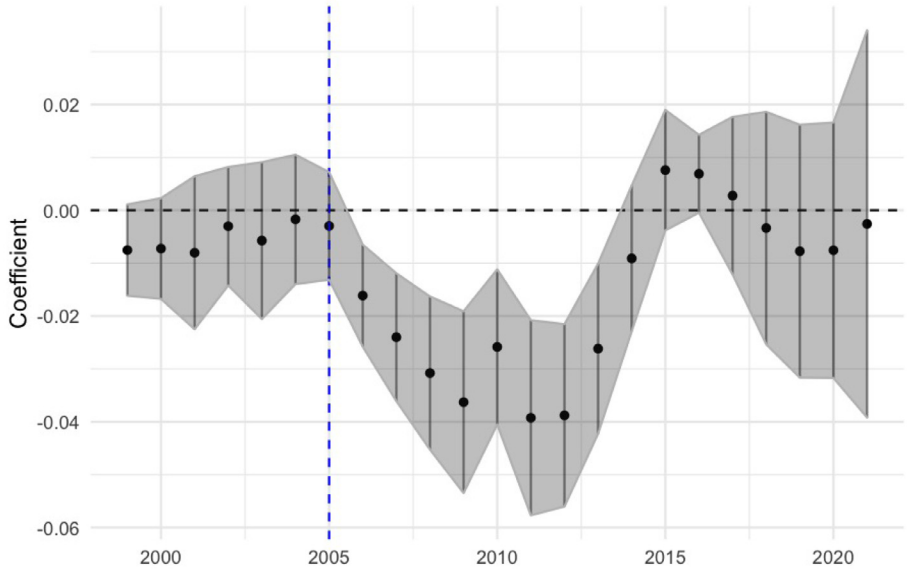

Fig. 2. Effect of 100 additional Hurricane Katrina survivors on neighborhood-level log housing price indices. Points indicate coefficients from the panel event-study specification, with 95% confidence intervals indicated both with bars and shading. Models include SES controls (share White, share under 25, share over 65, ownership rate, vacancy rate, percent bachelors degree, percent with no high school degree, population, and median income in 2000) and controls for baseline prices in 2005, as well as CBSA and year fixed effects. Standard errors are clustered by CBSA (N = 54). Data are authors' estimates constructed using the Federal Reserve Bank of New York Consumer Credit Panel/Equifax (for migration flows), the US Census Bureau (for racial composition of origin and destination neighborhoods and SES controls), and the Zillow Home Value Index.

destination neighborhoods that received Hurricane Katrina survivors differed from other neighborhoods in both socioeconomic and demographic makeup. In particular, neighborhoods that received people displaced by Katrina were almost 7 percentage points less White than were neighborhoods that received no survivors. The housing markets also show some differences: homeownership rates were somewhat lower in receiving neighborhoods, as were vacancy rates. However, pre-trends in housing prices were similar across receiving and non-receiving neighborhoods. While movers may have selected into neighborhoods based on demographic and social factors, which we address by adjusting for a rich set of controls as well as CBSA fixed effects and baseline housing prices, there is no evidence to suggest that they were systematically selecting into neighborhoods based on declining prices.

3. Results & Discussion

Texas neighborhoods with larger inflows of survivors see slower house price growth after Hurricane Katrina (Fig. 2). For every 100 additional Hurricane Katrina survivors in a neighborhood, we observe a two-year change in housing prices that is 2.4% smaller (95% CI -0.036 to -0.012) in comparison with a similar neighborhood that received no Hurricane Katrina survivors. The association is robust to the inclusion of controls for baseline socioeconomic characteristics, baseline housing prices, and prior trends in housing prices. There is no apparent negative pre-trend, and the error bars include zero for all years before Hurricane Katrina.

The effect is also persistent in the medium term. In SES-adjusted models predicting the relative difference in housing prices in 2010, five years after the storm, the negative association remains statistically significant (-0.026, 95% CI -0.041 to -0.011). A neighborhood that received 500 additional people (as observed in some Houston neighborhoods) would have seen approximately 12% lower housing price growth by 2010 in comparison with similar neighborhoods where no survivors relocated. In the longer term, the gap closes. Point estimates are close to zero from 2014 onward, and the error bars widen significantly in the final years. The timing of the effect is consistent with a decline in prices

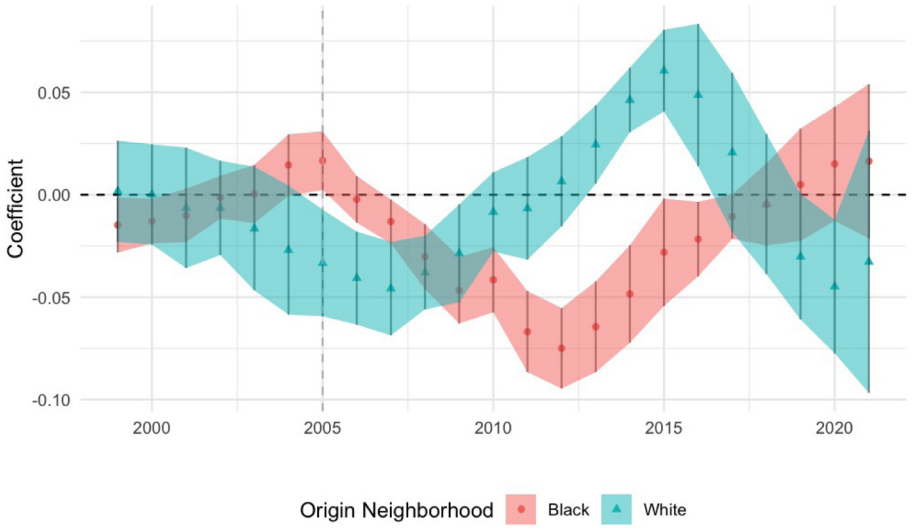

Fig. 3. Changes in neighborhood-level log housing price index in each year in relation to the number of Hurricane Katrina survivors who moved from predominantly Black census blocks (red) or predominantly White census blocks (blue). Points indicate coefficients from the panel event-study specification with 95% confidence intervals indicated both with bars and shading. Data are authors' estimates constructed using the Federal Reserve Bank of New York Consumer Credit Panel/Equifax (for migration flows), the US Census Bureau (for racial composition of origin and destination neighborhoods and SES controls), and the Zillow Home Value Index. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

due to housing market responses to the arrival of Hurricane Katrina survivors in Texas.

Next, we explore heterogeneity in origin neighborhood characteristics to further investigate the potential for selection into declining neighborhoods—rather than segregation—to explain the patterns of price declines. To do so, we examine price responses in association with the predominant racialized group in movers' origin census blocks. Focusing first on movers from predominantly Black census blocks, Fig. 3 shows evidence of a positive pre-trend in housing prices. The positive pre-trend is inconsistent with selection bias driving our negative result: destination neighborhoods were edging up in price prior to the influx of Katrina movers. An in-flow of 100 additional people from a predominantly Black census block is associated with 1.3% lower housing price growth from 2005 to 2007 in fully adjusted models (95% CI -0.024, -0.002); this effect retains the medium-term persistence observed in the main regression. Turning to movers from predominantly White census blocks, the figure suggests that house prices in receiving neighborhoods were already falling in the years prior to Katrina. This negative effect of White migrants could be driven by selection into relatively-affordable neighborhoods. For these movers, the estimated effect is statistically significant only from 2006 to 2009—with a significant *positive* effect emerging from 2013 to 2016. One explanation is that an influx of White migrants may have buoyed demand in neighborhoods that would otherwise have seen declining prices; a medium-term boost from this effect could also account for renewed decline in these neighborhoods in more recent years.

Overall, these results offer support for our conceptual model, in which the observed effects are attributable to the racial preferences of incumbent and prospective residents. However, the coinciding timing of Hurricane Katrina and the housing market drivers of the Great Recession raises concerns about the role of the recession as a potential confounder. We estimate heterogeneous effects stratified by both sending and receiving neighborhood characteristics to distinguish a segregation effect from possible confounding by the Great Recession, which saw substantial variation in the magnitude of house price swings between neighborhoods with different demographics. Neighborhoods with proportionally larger non-White populations were more strongly affected by the housing crisis (Mian and Sufi, 2009; 2011), and Table 1 shows that neighborhoods receiving *any* Katrina survivors had nearly double the share Black residents in comparison with neighborhoods receiving no survivors. The observed results in Figs. 2 and 3 may thus be attributable to ongoing processes in the neighborhoods in which people arrived rather than effects of the movers themselves. In particular, Katrina survivors from predominantly Black neighborhoods may have selected into neighborhoods with substantial subprime lending, neighborhoods that were set for house-price declines in 2006 and beyond (Mian and Sufi, 2009). If the Great Recession is a confounder, we expect the largest effects in neighborhoods with more people of color; by contrast, incumbent preferences would lead to the largest effects in nearly all-White areas receiving movers from predominantly Black areas.

Fig. 4 shows results that are consistent with the hypothesis that house price declines are driven by preferences for segregation, and not by the Great Recession. We see the largest effects in nearly all-White neighborhoods, where 100 in-movers from predominantly Black blocks are associated with 13.5% lower house prices two years later (95% CI -0.201, -0.089). These results should be treated with caution given evidence, in Fig. 4, that these neighborhoods may have experienced price declines prior to 2005 and had lower prices than other neighborhoods with similar shares of White residents. Both findings are consistent with selection into particular neighborhoods by movers from predominantly Black neighborhoods. However, we also see significantly larger magnitudes for effects in mostly-White (i.e., 67–90% White: -0.037, 95% CI -0.053, -0.022) neighborhoods than in neighborhoods that are either more diverse or predominantly home to communities of color (i.e., <67% White: -0.003, 95% CI -0.015, -0.009). Notably, this is the reverse of what might be expected were the results driven by the aftermath of subprime lending expansions. For movers from White origins, there is a short-lived negative effect from 2006 to 2009 observed in the nearly all-White and mostly White neighborhoods but no significant effect in <67% White destinations.

Our results also speak to hypotheses surrounding changes to the identity of the marginal buyer, whether due to shifting volumes at different price points, neighborhood level changes in tenure, or changes in supply. If a price decline is driven by a change in composition towards low-price for-sale housing in the aftermath of the storm, we should expect the effect to disappear quickly as sales patterns revert to normal; the medium-term persistence of our results suggests this is unlikely to be the driving factor. Similarly, an influx of survivors may have caused some property owners to convert owner-occupied housing into rentals, resulting in a change of composition of the purchased housing in a neighborhood. If this is responsible for our result, it is happening through a surprising channel: the decline in prices would mean that more-expensive houses are being converted into rentals, and only in response to migrants from predominantly Black tracts, and particularly in nearly all-White destination neighborhoods. This selection process seems unlikely.

Lastly, there are two reasons why we might not have seen a price effect even with these changes: new supply and preexisting sorting. As we find negative price effects in receiving neighborhoods, the new supply question is less relevant in the neighborhoods under study. That said,

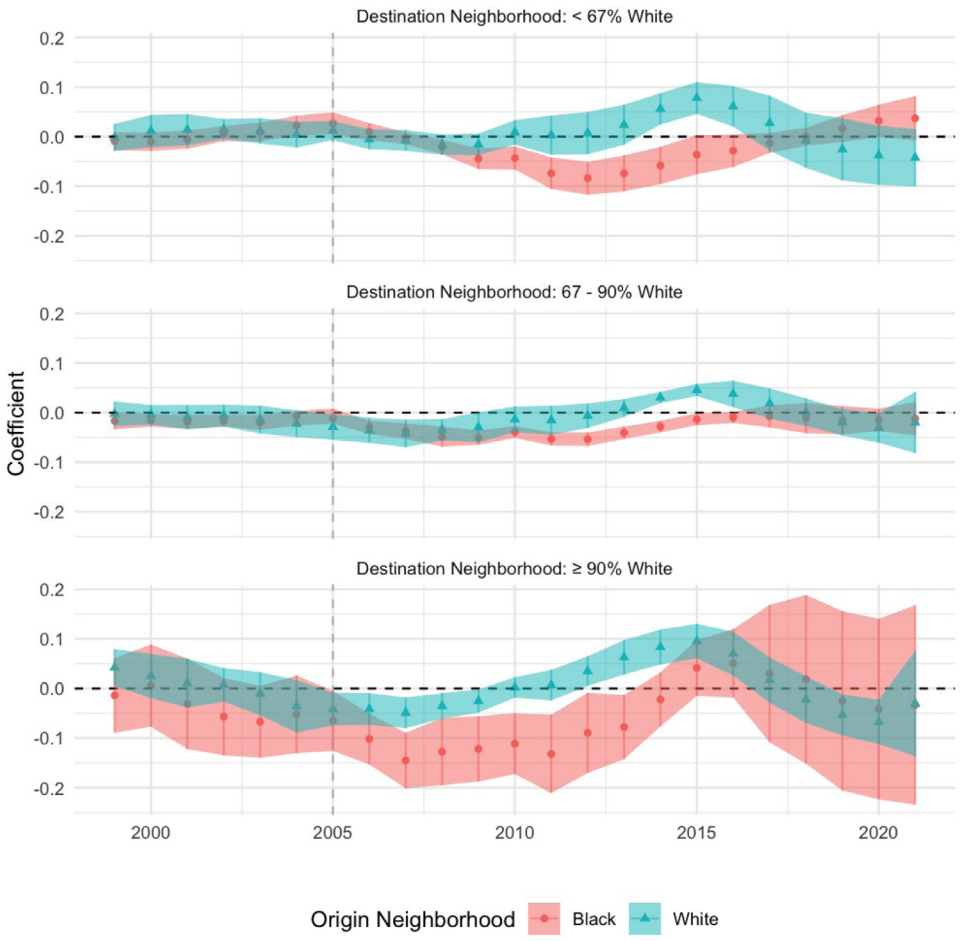

Fig. 4. Effect of 100 additional movers on neighborhood-level log housing prices differs based on both the racial makeup of the origin and of the destination neighborhoods (Share White). Points indicate coefficients from the panel event-study specification with 95% confidence intervals indicated both with bars and shading. Data are authors' estimates constructed using the Federal Reserve Bank of New York Consumer Credit Panel/Equifax (for migration flows), the US Census Bureau (for racial composition of origin and destination neighborhoods and SES controls), and the Zillow Home Value Index.

slowing relative price growth in receiving neighborhoods may, in the long run, be attenuated by increased supply elsewhere in Texas cities. This process may help account for the eventual relative rebound we observe by 2015.

On sorting, Bayer et al. (2007) shows that preferences for segregation might not be capitalized into house prices because the *marginal* (and thus price-setting) resident of integrated neighborhoods is relatively indifferent to marginal changes in neighborhood composition. We nevertheless find a negative price response to in-movers from predominantly Black blocks. The Bayer et al. (2007) approach studies a snapshot in time wherein neighborhoods are observed in equilibrium; the abrupt arrival of Katrina survivors was a form of "new news" (Bunten and Kahn, 2014) about changes to that equilibrium that would not have been capitalized into pre-Katrina house prices. The large scale of in-migration—up to a 7% population shock in some neighborhoods—may simply have been too large a change even for a resident who was indifferent to a marginal change in neighborhood composition. Our finding of a larger effect in nearly all-White neighborhoods is consistent with this hypothesis: as suggested by the findings of Bayer et al. (2007), such neighborhoods are more likely to be home to inframarginal residents with strong preferences about neighborhood composition. In any case, one takeaway from this logic is that our estimates may represent a lower bound measure of the responsiveness of the White population to an influx of Black migrants.

4. Conclusion

This study examined the response of destination housing prices to the arrival of Hurricane Katrina survivors. We document a significant, negative effect of disaster-induced arrivals on housing prices in destination neighborhoods. The effect was large and durable in the medium term: in 2010, five years after Hurricane Katrina, an inflow of 500 Katrina survivors is associated with 12% relative decline in house price growth; within 10 years, however, we observe a rebound. Notably, selection into declining neighborhoods is only evident for movers from predominantly White origin blocks, while negative effects emerge and persist only after the shock for flows of movers from predominantly Black census blocks. We observe the smallest effects for movers to neighborhoods with over 1/3 non-White residents, supporting our argument that the effect is not confounded by the Great Recession—which would have been expected to produce the largest effects in these neighborhoods. Our findings are aligned with a conceptual model in which incumbent residents' responses were driven by a preference for segregation.

These results are consistent with a literature showing that minoritized migration can lead to relative declines in the price of housing due to preferences for segregation on the part of incumbent residents (Saiz and Wachter, 2011). Our paper builds on this literature by evaluating the responses to White and Black migrants who were all survivors of a common storm. This helps us sidestep the questions of selection into migration that would otherwise threaten the identification of a differential response to in-migration of members of different racialized groups. Findings are consistent with at least two mechanisms: White flight responses, as in Boustan (2010), in which existing or would-be in-movers choose alternative neighborhoods; or other non-housing intermediary responses by local residents or institutions to the arrival of Katrina survivors—such as the socioeconomic spillover channels identified by Guerrieri et al. (2013) and Autor et al. (2014). Derenoncourt, (2022), for instance, studies northern cities after the Great Migration and highlights

a set of housing and non-housing channels that work together to shape neighborhoods and their effects on new residents. Further research is needed to disentangle these pathways.

Our estimated effect is larger than estimates from Saiz (2007) or Boustan (Boustan, 2010), who estimate migrant population share/house price elasticities of less than 1; however, our large, sudden, and politicized migration event contrasts with the more gradual (if still large and politicized) migration processes they study. Consistent with the idea that the sudden migration flows may induce relatively large house price swings, Saiz (2003) shows that an approximate 4% migration flow to Miami during the Mariel Boatlft overlapped with 10% lower house price growth relative to national trends and relative to the experience of nearby Fort Lauderdale. We find a similar effect size for smaller flows—500 movers is approximately 2% of the population of the average receiving neighborhood—but unlike the case of the Marielitos, we observe post-Katrina migrant flows to the neighborhood level, allowing us to estimate house price responses at a more granular level where preferences for segregation may be more salient.[14]

The role of incumbent preferences is also supported by qualitative evidence about the experiences of Katrina survivors and the media coverage and survey responses of pre-existing Texas residents. Black migrants from New Orleans describe struggling to adapt to racism in Texas cities, and report experiencing racism from White as well as from Latinx neighbors (Asad, 2015; Raker and Elliott, 2018). On the pre-existing resident side, a majority of Houston residents surveyed between 2006–2010 reported negative attitudes towards people who had been evacuated from New Orleans to Houston, with higher rates of antipathy reported for White and Hispanic versus Black residents (Asad, 2015; Raker and Elliott, 2018). Media coverage responded to the influx of former New Orleanians with a “moral panic”, attributing a perceived (but not observed) rise in crime to the arrival of Katrina survivors (Settles and Lindsay, 2011). These attitudes and media environment are consistent with the processes that accompany the racialization of house prices in other contexts (e.g., Taylor, 2019; Perry (2020)). Consistent with Derenoncourt, (2022), these accounts (and our findings) show cities and neighborhoods responding actively to the arrival of racialized migrants.

We note two key limitations. First, ZIP codes are a relatively poor proxy for neighborhoods: constructed for administrative rather than research purposes, they vary widely in population and occasionally cross other administrative or political boundaries (Osypuk and Galea, 2007); census ZIP code tabulation areas also do not universally align with ZIP codes (Krieger et al., 2002). Nevertheless, our definition of neighborhoods constitutes the smallest areal units for which spatially and temporally fine-grained house price data were available and is consistent with the spatial scales at which perceptions of neighborhood racial changes are theorized to operate (Trounstine, 2018). Second, the CCP data fail to account for “credit invisibles”—individuals who rely on informal rather than formal credit markets and thus who have no established credit history—who are estimated to comprise 11% of U.S. adults in 2010 (Brevoort et al., 2015). We thus may be underestimating the flows of particularly disadvantaged movers, as well as misidentifying the neighborhoods to which some survivors moved. As with the ZIP code data, however, the CCP data amounts to one of the best available datasets linking resident location immediately prior to and after Hurricane Katrina. There was no large-scale federal effort to identify the new homes of displaced New Orleanians in the years following Katrina (Moskowitz, 2017).

Nevertheless, this work shows how theoretical understanding of preferences for segregation should shape our expectations of the effects of large disaster-induced dislocations. To the extent that race and socioeconomic disadvantage are key factors in the housing price effects observed here, future research should examine the effects of disasters like Hurricane Maria, which similarly catalyzed large flows of minoritized movers from Puerto Rico to cities in Florida and elsewhere in the U.S. (Alvarez, 2017; Echenique and Melgar, 2018). By contrast, a disaster striking a city with a predominantly White, wealthier population—wildfires in Malibu, for example—could have vastly different effects on housing markets in nearby destination cities due to both the demographics of migrants and the characteristics of receiving cities.

Hurricane Katrina should be understood as an indicator, rather than an outlier, of the social and economic effects we should expect from more frequent and more damaging disasters as the world warms (Patricola and Wehner, 2018).[15] With tens of millions of people expected to move within the United States in the next half century (Lustgarten, 2020), the magnitude of the challenge ensures that displacement will be experienced by people of all economic and racial backgrounds. Because extreme weather events become disasters when they affect vulnerable communities, however, migration flows are expected to disproportionately consist of minoritized populations (Tierney, 2007). Our research documents an economic response to disadvantaged, displaced survivors after Hurricane Katrina—responses that, as evidence from historical episodes of mass migration suggests, are likely to be reinforced rather than alleviated by policy responses (Boustan, 2016). When disaster-induced displacements are racial, the economic responses can be as well.

CRediT authorship contribution statement

Madeleine I.G. Daepp: Conceptualization, Methodology, Formal analysis, Visualization, Writing – original draft, Writing – review & editing, Funding acquisition. **devin michelle bunten:** Supervision, Writing – review & editing. **Joanne W. Hsu:** Formal analysis, Writing – review & editing.

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[14] Moreover, Lee and Lin (2018) show that Texas cities’ flat geography leaves them susceptible to surprisingly large income transitions from one census to the next.

[15] Size, in this case, matters: the scale of Katrina’s displacement owed to the strength of the storm and the extent of its flooding. These features were exacerbated by climate change; researchers have estimated that flood levels were 15–60% higher than would have occurred given oceanic conditions a century earlier (Irish et al., 2014).

Appendix A. Characteristics of Areas and Movers

Table A1
Comparison of Texas ZIP codes with complete data and ZIP codes missing housing price outcomes at baseline.

Variable	Complete Obs	Missing Obs	Diff	P Value
Population (N)	16,194	3800	12,394	< 0.001***
	(14,649)	(7,256)		
White (%)	60.79	64.1	-3.31	0.124
	(27.82)	(27.73)		
Hispanic (%)	26.2	28.35	-2.15	0.300
	(25.17)	(27.11)		
Black (%)	10.57	6.61	3.96	< 0.001***
	(15.34)	(14.4)		
Under 25 (%)	37.32	37	0.33	0.670
	(6.33)	(10.44)		
Over 65 (%)	10.8	14.11	-3.32	< 0.001***
	(4.85)	(5.83)		
No High School Degree (%)	24.21	29.36	-5.15	< 0.001***
	(14.57)	(15.57)		
Ownership Rate	69.84	71.65	-1.81	0.245
	(18.17)	(20.47)		
Vacancy Rate	10.49	19.36	-8.87	< 0.001***
	(8.79)	(12.26)		
Median Income ($)	42292.12	31910.95	10381.16	< 0.001***
	(17988.82)	(9096.08)		
ZIP Codes (N)	1128	197	1325	

Means with standard deviations in parentheses. Data are authors' estimates constructed using data from the US Census Bureau (for racial composition of origin and destination neighborhoods and SES controls) for the year 2000. *** = $p < .001$

Table A2
Descriptive characteristics for movers.

	Pre-2005 Movers	Survivors	P-Value
Age in 2005	43.08 (10.98)	42.55 (12.17)	0.248
Predominant Race of Origin Census Block			< 0.001***
Non-Hispanic White	735 (74.3%)	684 (42.4%)	
Non-Hispanic Black	243 (24.6%)	910 (56.5%)	
Other	11 (1.1%)	18 (1.1%)	
Equifax Risk Score in 2005	670.77 (109.03)	622.09 (106.44)	< 0.001***
Has Mortgage in 2005	655 (63.1%)	724 (42.7%)	< 0.001***
N	1038	1695	

Pre-2005 movers are individuals who lived in New Orleans in at least one year between 1999 and 2005 and who were living in a CBSA in Texas in 2005. Survivors are individuals who were living in New Orleans in the second quarter of 2005 and who resided in a Core-Based Statistical Area in Texas in 2007. For continuous variables, values are means with standard deviations in parentheses. For factor variables, values are counts with percentages in parentheses. Data are authors' estimates constructed using the Federal Reserve Bank of New York Consumer Credit Panel/Equifax (for migration flows) and the US Census Bureau (for racial composition of origin and destination neighborhoods and SES controls). *** = $p < .001$

Appendix B. Robustness to Alternate Specifications

To evaluate the robustness of our result over time, we run separate specifications for each year. That is, for Texas neighborhood j in CBSA c, we model the change in logged housing prices from 2005 to year t, $\Delta\log(P_{jc,t-2005}) = \log(P_{jc,t}) - \log(P_{jc,2005})$, as a function of the number of people in the neighborhood in t who are survivors of Hurricane Katrina, $surv_{jc}$:

$$\Delta log(P_{jc,t-2005}) = \alpha surv_{jc} + \delta_0 log(P_{jc,2005}) + X_{jc}\beta + \phi_c + \epsilon_{jc} \quad \text{(B.1)}$$

The model includes controls for baseline prices $log(P_{jc,2005})$, neighborhood characteristics X_{jc} and CBSA fixed effects ϕ_c. As in the primary specifications, we scale the $surv_{jc}$ variable so that the key parameter of interest, α, represents the effect of 100 additional Katrina survivors on housing prices in year t, conditional on neighborhood baseline housing prices and characteristics.

This approach can be simplified, approximating a single-differences design:

$$log(P_{jc,t}) = \alpha_t surv_{jc} + \delta^*_{0t} log(P_{jc,2005}) + X_{jc}\beta_t + \phi_{ct} + \epsilon_{jct} \quad \text{(B.2)}$$

We use this approach to model log prices in each year $t \in 1999, 2021$, again evaluating both pre-trends and the evolution of the effect over time. Results are presented in Fig. B.1.

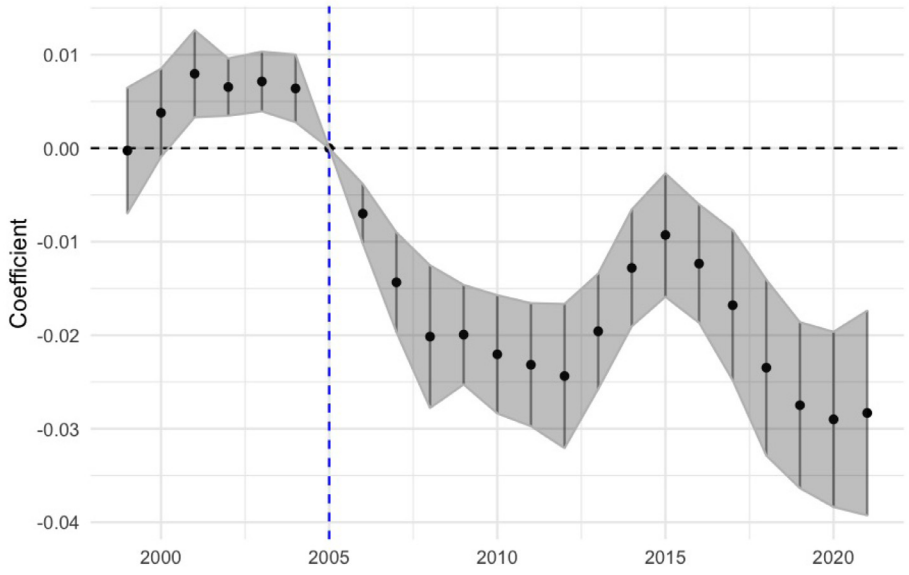

Fig. B1. Changes in neighborhood-level log housing price index in each year in relation to the number of Hurricane Katrina survivors in each neighborhood. Points indicate coefficients with 95% confidence intervals indicated both with bars and shading. Models include SES controls (share White, share under 25, share over 65, ownership rate, vacancy rate, percent bachelors degree, percent with no high school degree, population, and median income in 2000), controls for baseline prices in 2005, and CBSA fixed effects. Data are authors' estimates constructed using the Federal Reserve Bank of New York Consumer Credit Panel/Equifax (for migration flows), the US Census Bureau (for racial composition of origin and destination neighborhoods and SES controls), and the Zillow Home Value Index.

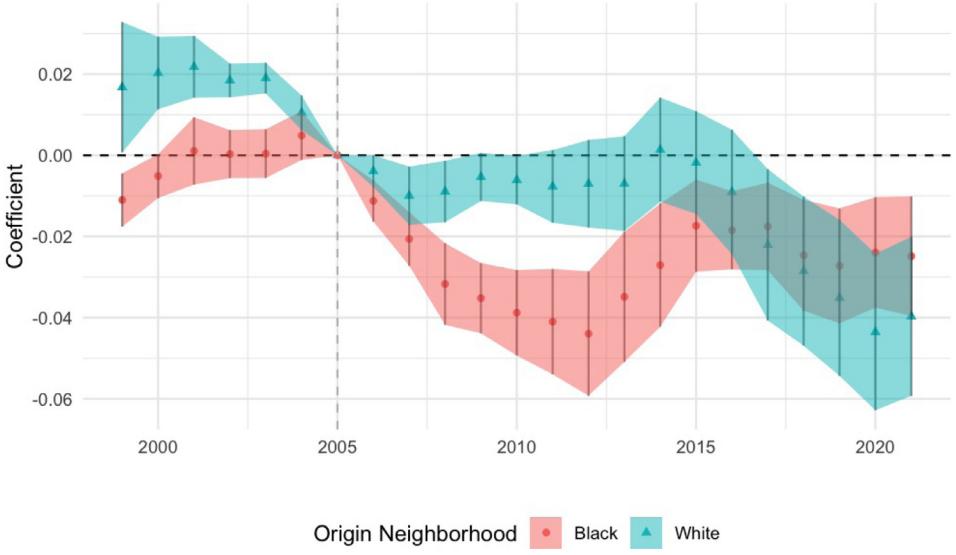

Fig. B2. Changes in neighborhood-level log housing price index in each year in relation to the number of Hurricane Katrina survivors who moved from predominantly Black census blocks (red) or predominantly White census blocks (blue). Points indicate coefficients with 95% confidence intervals indicated both with bars and shading. Data are authors' estimates constructed using the Federal Reserve Bank of New York Consumer Credit Panel/Equifax (for migration flows), the US Census Bureau (for racial composition of origin and destination neighborhoods and SES controls), and the Zillow Home Value Index. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

This model can easily be extended, as in Eqs. 2 and 3, to evaluate heterogeneity in effects with respect to origin racial makeup (Fig. B.2) or interactions of origin and destination makeup (Fig. B.3). Across models, we use robust standard errors clustered by CBSA.

Results are similar to the findings presented in the main figure in that the timing of the effect is consistent with the timing of the storm and the effect heterogeneity is consistent with the predictions of our conceptual model. However, several important differences emerge. Most notably, the effect is persistent for 15+ years; however, given the difference in the specifications, this likely does not reflect a true long-term effect of Katrina arrivals but instead is an artifact of allowing the effects of controls to vary over time.

Fig. B3. Effect of 100 additional movers on neighborhood-level log housing prices differs based on both the racial makeup of the origin and of the destination neighborhoods (Share White). Points indicate coefficients with 95% confidence intervals indicated both with bars and shading. Models include SES controls (share White, share under 25, share over 65, ownership rate, vacancy rate, percent bachelors, percent high school drop-outs, population, and log median income at baseline (2000)), controls for baseline prices in 2005, and CBSA fixed effects. Data are authors' estimates constructed using the Federal Reserve Bank of New York Consumer Credit Panel/Equifax (for migration flows), the US Census Bureau (for racial composition of origin and destination neighborhoods and SES controls), and the Zillow Home Value Index.

Appendix C. Housing Price Boom & Bust in Texas

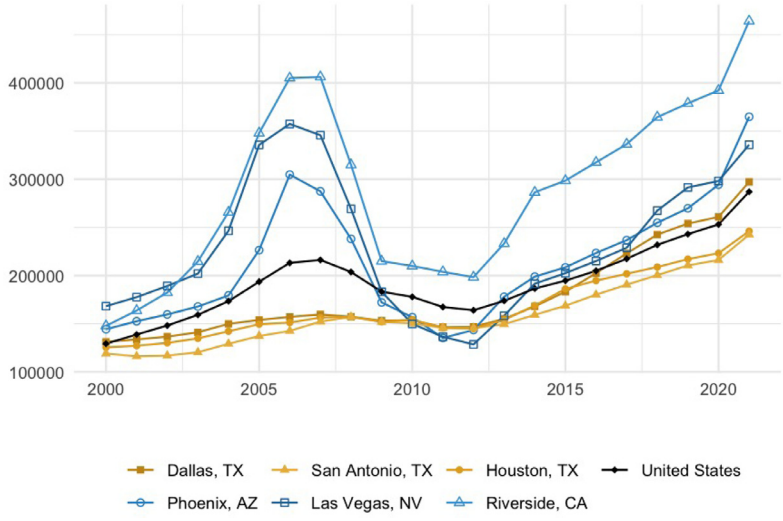

Fig. C1. House Prices in Texas and Select Non-Texas MSAs, 2000–2021. The Texas MSAs are the three largest in the state; the non-Texas MSAs were selected because they are also relatively large and fast-growing Sun Belt cities. Data are the Zillow Home Value Indexes (ZHVI) for all homes, middle tier, smoothed and seasonally adjusted for the respective MSAs and for the US as a whole. The index is published monthly; we show just the May values for each year.

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