Neighborhood Revitalization and Residential Sorting

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Abstract

The HOPE VI Revitalization program sought to transform high-poverty neighborhoods into mixed-income communities through the demolition of public housing projects and the construction of new housing. We use longitudinal administrative data to investigate how the program affected both neighborhoods and individual-level residential outcomes. In line with the stated objectives, we find that the program reduced poverty rates in targeted neighborhoods and enabled subsidized renters to live in lower-poverty neighborhoods, on average. The primary beneficiaries were not the original residents, since most moved away; but rather, were the new subsidized renters who moved in after the award. The program reduced the stock of public housing in targeted neighborhoods but expanded access to housing vouchers in other, lower-poverty neighborhoods. Spillover effects on the poverty rates of other neighborhoods were small and dispersed throughout the city. Our estimates imply that cities that revitalized half of their public housing stock reduced the average neighborhood poverty rate among all subsidized renters by 4.8 percentage points.

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1 Introduction

Families in subsidized housing often live in high-poverty neighborhoods, which existing research shows can adversely affect health, behavior, and labor market outcomes (Chyn and Katz, 2021). In response, the Department of Housing and Urban Development (HUD) has pursued two strategies to improve neighborhood conditions for subsidized renters. The first approach targets people, and seeks to help disadvantaged families relocate to better neighborhoods. Evidence from the Moving to Opportunity (MTO) experiment (Katz et al., 2001) and subsequent work (Collinson and Ganong, 2018; Bergman et al., 2019) illustrates the promise of this approach. However, the scalability of MTO-type interventions is limited by the willingness of subsidized households to move and the availability of affordable housing in low-poverty neighborhoods. The second approach targets places, and seeks to improve the neighborhoods where disadvantaged households reside. A common concern with place-based policies is that the original residents of targeted neighborhoods might be forced to move and therefore may not benefit from any improvements in neighborhood conditions. Despite being an important policy tool, there is limited empirical evidence assessing whether place-based policies that invest in disadvantaged neighborhoods benefit disadvantaged populations.

In this paper we investigate how the HOPE VI Revitalization program, a large place-based policy, affected both neighborhoods and individual-level residential outcomes. The program was administered by HUD and allocated $6.3 billion from 1993 to 2010 across 261 grants. The aim was to transform high-poverty neighborhoods into mixed-income communities by demolishing distressed public housing projects and constructing new housing units. The neighborhood-level changes were intended to benefit subsidized renters, allowing them to live in less segregated neighborhoods. But because the program could have affected residential sorting, a reduction in poverty rates in targeted neighborhoods need not benefit the original, subsidized renters in those neighborhoods. For example, the program could have lowered poverty rates in targeted neighborhoods but displaced subsidized renters to other, higher-poverty neighborhoods, thereby increasing their exposure to poverty. Our analysis seeks to answer two key questions: i) Did the program reduce poverty rates in targeted neighborhoods, and ii) Did it enable subsidized renters to live in lower poverty neighborhoods? In this way, our findings shed light on the incidence of an important place-based policy.
We estimate the effect of the Revitalization program by comparing neighborhoods that received an award to those that applied for but never received funding. The program targeted some of the most distressed public housing projects in the country. However, due to funding constraints, there were many similar projects that applied for but never received an award. We estimate a stacked event-study regression, reweighting by the inverse propensity score to adjust for any differences in observable pre-award characteristics and track people and places over time using individual-level administrative data on income, place of residence, and participation in subsidized housing. The data allow us to follow the original residents as they moved across neighborhoods and to observe everyone who moved into Revitalization neighborhoods after an award. The ability to decompose neighborhood change into parts attributable to out-migration and in-migration as well as to measure whether neighborhood changes were experienced by individual residents are major improvements over existing work and critical for answering our main research questions.

We begin by showing that the Revitalization program led to a large, persistent reduction in poverty rates in targeted neighborhoods. The program reduced poverty rates through two equally important channels. First, a permanent reduction in public housing units led to a mechanical decrease in the number of poor households in the targeted neighborhoods. Second, the program induced higher-income households to move into the newly constructed market-rate units. Together, these two channels led to an 8 percentage point reduction in neighborhood poverty rates 15 years after an award. The program reduced poverty rates by attracting residents who would have had higher incomes regardless of where they lived, as opposed to increasing the income of the new residents. While the program reduced the share of Black non-Hispanic residents in the short-run, it did not have a significant effect on the racial composition of the neighborhood in the long-run.

Next, we investigate whether the reduction in poverty rates in the Revitalization neighborhoods led subsidized renters to live in lower poverty neighborhoods. There are four groups of subsidized renters who could have been affected by the program: those who i) were original Revitalization neighborhood residents, ii) moved into Revitalization neighborhoods after an award, iii) would have moved into a Revitalization neighborhood absent an award, and iv) lived in other neighborhoods affected by program spillovers. We estimate the effect of the program on exposure to neighborhood poverty for each group. Inference for three of the
four groups is based primarily on the stacked event-study specification.

Most of the original Revitalization neighborhood residents (group i) moved away and had limited exposure to the reduction in poverty rates in targeted neighborhoods. Within 5 years of the award, 74 percent of the original public housing project residents in Revitalization neighborhoods had moved to a new neighborhood. Because of these high rates of residential mobility, the reduction in poverty rates for Revitalization neighborhoods is five times as large as the reduction in exposure to neighborhood poverty experienced by the original residents. Both the demolitions and subsequent rising housing prices contribute to the original residents of the public housing projects and nearby market rate units moving away at higher rates. However, we find no impacts on the migration rates of residents with access to Housing Choice Vouchers (hereafter, housing vouchers). This is consistent with housing vouchers diminishing displacement by limiting exposure to price increases. While some of the original residents were displaced, three-fourths of the original public housing residents who moved away would have done so even absent the intervention. This is because low-income renters in high-poverty neighborhoods move often.

The program enabled the subsidized renters who moved into Revitalization neighborhoods after an award (group ii) to live in lower poverty neighborhoods. This is not a mechanical result despite the observed reduction in poverty rates in Revitalization neighborhoods; the program could have attracted residents who, absent the intervention, would have lived in different neighborhoods with similar poverty rates to post-Revitalization neighborhoods. We find that subsidized renters who move into Revitalization neighborhoods and failed applicant neighborhoods after an award move from neighborhoods with similar poverty rates. This suggests that new subsidized renters in Revitalization and failed applicant neighborhoods had similar outside housing options. Using data on the characteristics of prior neighborhoods and individual income, we estimate that the program enabled the subsidized renters who moved into Revitalization neighborhoods after an award to live in neighborhoods with poverty rates that were 7.6 percentage points lower than the neighborhoods they would have lived in absent the award. In other words, the reduction in poverty in targeted neighborhoods translated into a reduction in exposure to neighborhood poverty for the subsidized renters who moved in after an award.

Some subsidized renters would have moved into the Revitalization neighborhoods absent
an award, but ended up in different neighborhoods (group iii). This is because the program reduced the size of the subsidized housing population in targeted neighborhoods by 20 percent in the long run but—by expanding access to housing vouchers—did not reduce the city-wide supply of subsidized housing. We cannot identify who these individuals are. However, the Revitalization and failed applicant neighborhoods were among the highest-poverty neighborhoods in their cities; the median Revitalization neighborhood was in the 98th percentile for neighborhood poverty in their surrounding county. Furthermore, households who moved into the failed applicant sites in the post-award period moved from neighborhoods where the poverty rate was 14 percentage points lower than the failed applicant neighborhood, on average. Thus, if individuals who would have moved into the Revitalization sites absent an award remained in their original neighborhoods, they would end up in lower-poverty areas; if, instead, they moved to different, non-Revitalization neighborhood, there were a limited number of higher-poverty neighborhoods for them to move. Together, this suggests that the program led these households to live in lower-poverty neighborhoods.

The spillover effects of the Revitalization program on the poverty rates of subsidized renters in other neighborhoods (group iv) are small and spread across many neighborhoods. If, as our evidence suggests, the program shaped the spatial distribution of poverty by affecting where poor adults lived (as opposed to increasing the income of poor individuals), then the reduction in poverty rates in Revitalization sites must be offset by an increase in poverty rates in other neighborhoods. However, the low-income households displaced by the program were dispersed across many different neighborhoods throughout their cities instead of being concentrated in a small number of neighborhoods. As a result, these displaced households increased the poverty rates of their new neighborhoods by only 0.7 percentage points. When we consider spillovers for adjacent neighborhoods, we find that the effects of the program are smaller in magnitude and quite local: the program reduced poverty rates by only 1.6 percentage points in neighborhoods adjacent to Revitalization neighborhoods.

Did the Revitalization program reduce exposure to neighborhood poverty for subsidized households, on average? We take a weighted-average of our group-specific estimates of the effect on exposure to poverty and find that cities that revitalized half of their public housing stock reduced the average neighborhood poverty rate among all subsidized renters in the city by 4.8 percentage points. Reductions in exposure to neighborhood poverty for the new
residents explain two-thirds of this aggregate effect. While the program did not change the
city-wide poverty rate, the reductions in poverty were concentrated in neighborhoods with
many subsidized renters while the increases in poverty from spillover effects were dispersed
across many neighborhoods with fewer subsidized renters. In this way, the program achieved
its goal of enabling subsidized renters to live in lower poverty neighborhoods.

The Revitalization approach to neighborhood integration faces a trade-off between at-
tracting higher-income residents and displacing lower-income residents. This is partly me-
chanical: a greater share of market-rate units necessitates a smaller share of subsidized units.
However, by looking across Revitalization sites, we also find that it is more difficult to attract
higher-income residents in neighborhoods that currently or historically have more households
in public housing. Our findings point to two lessons for how to mitigate this trade-off. First,
low-income households in distressed neighborhoods move frequently so the primary benefici-
aries of neighborhood-level interventions are likely to be new residents. Unless there are
effective ways to encourage the original residents to stay, efforts to maximize a program’s
impact should focus on these newcomers. Second, the provision of subsidized housing can
help mitigate the displacement effects generated by rising housing prices. Furthermore, be-
cause of the high rates of residential mobility, efforts to minimize displacement effects will
not generally conflict with the goal of changing the composition of neighborhoods. In terms
of cost, the program required a large upfront investment but it produced a durable change
in neighborhood conditions. When considered over a time horizon of twenty years, the per
household cost of reducing exposure to neighborhood poverty is comparable to the annual
cost of the housing voucher program.

The main contribution of this paper is to estimate the effect of a large, place-based
housing intervention, the HOPE VI Revitalization program, on both neighborhoods and
individual residential outcomes. Previous research on HOPE VI has focused on either the
effect of the program on neighborhoods (Zielenbach and Voith, 2010; Tach and Emory, 2017;
Sandler, 2017; Bruhn, 2018; Blanco, 2023) or on the impact of the program on the original
residents of the targeted places (Jacob, 2004; Chyn, 2018; Haltiwanger et al., 2020). Our
individual-level data allow us quantify the drivers of neighborhood change and shed light
on who benefited from neighborhood change. Almagro et al. (2023) interpret neighborhood-
level changes in Chicago through the lens of a structural model and find that the HOPE VI
program reduced the welfare of low-income, minority renters. While Almagro et al. (2023) model neighborhood-level changes for all low-income households, we provide reduced-form estimates of the impact on exposure to neighborhood poverty for subsidized renters, which is a key input to determining the welfare impacts of the program.

More generally, we contribute to research on urban renewal policies (Baum-Snow and Marion, 2009; Collins and Shester, 2013; Busso et al., 2013; Harari et al., 2018; Rojas Ampuero, 2022; Blanco and Neri, 2023; Gechter and Tsivanidis, 2023), as well as the literature on the drivers, dynamics, and distributional impacts of neighborhood-level change (Rossi-Hansberg et al., 2010; McKinnish et al., 2010; Guerrieri et al., 2013; Boustan et al., 2019; Diamond and McQuade, 2019; Couture et al., 2019; Couture and Handbury, 2020; Qiang et al., 2020; Brummet and Reed, 2021; Pennington, 2021; Su, 2022; Lee, 2022; Asquith et al., 2023; Kennedy and Wheeler, 2023). Our paper makes progress on a central challenge in this literature: identifying who gains and loses from neighborhood change. Chyn and Katz (2021) note that “a final frontier research area involves the estimation of the impact of place-based policies to improve low-income neighborhoods on the intended beneficiaries—the incumbent (preexisting) adult residents and their children.” Our findings confirm the importance of separately estimating impacts on the incumbent residents and on the targeted places and additionally highlight the value of considering program impacts on other groups of beneficiaries; in the case of the Revitalization program, the new residents of targeted neighborhoods.

The rest of the paper is structured as follows. Section 2 provides background on the HOPE VI Revitalization program. Section 3 presents a conceptual framework. Section 4 describes the data. Section 5 describes our empirical strategy. Section 6 presents our empirical results. Section 7 provides a brief discussion of the results and Section 8 concludes.

2 The HOPE VI Revitalization Program

The HOPE VI program was created in response to a report by the National Commission on Severely Distressed Public Housing that raised concerns about living conditions in public housing projects (Green and Lane, 1992). While there were several distinct programs included under the broader HOPE VI umbrella, 94 percent of HOPE VI funding was allocated
to the Revitalization program.\(^1\) The FY1999 HUD appropriations bill (Public Law 105-276) that authorized HOPE VI identifies four main goals of the program:

1. improving the living environment for public housing residents of severely distressed public housing projects through the demolition, rehabilitation, reconfiguration, or replacement of obsolete public housing projects (or portions thereof);
2. revitalizing sites (including remaining public housing dwelling units) on which such public housing projects are located and contributing to the improvement of the surrounding neighborhood;
3. providing housing that will avoid or decrease the concentration of very low-income families; and
4. building sustainable communities. (42 United States Code §1437v(a))

In short, the program sought to transform distressed public housing projects into economically integrated neighborhoods in which families receiving subsidized housing assistance would live alongside higher-income neighbors who paid market prices for housing.

Revitalization grants were awarded through a competitive process in which Public Housing Agencies (PHAs)—the city-level agencies authorized to administer HUD programs—could submit one application per year. Each year HUD evaluated applications based a number of factors including “capacity to undertake development, need, the amount of outside resources brought in (leveraging), resident and community involvement, community and supportive services, commitment to early education, and the relocation plan,” and grants were allocated subject to funding constraints (Congressional Research Service, 2012).

The Revitalization program represented a large investment in neighborhoods. In total, the program awarded 261 grants totaling $6.3 billion between 1993 and 2010 with a mean award size of $24 million. On average, each grant leveraged an additional $42 million from non-HOPE VI funding sources and thus the full size of the neighborhood-level intervention often exceeded the listed grant amount (Gress et al., 2016). To put these numbers in perspective, the mean Revitalization project had 360 occupied units in 1993.

Previous research on the HOPE VI programs either explores the impact on neighborhoods or the original residents. Research focused on neighborhoods finds that the program reduced neighborhood poverty rates (Tach and Emory, 2017) and crime (Aliprantis and Hartley, 1997). The Demolition program was the other major arm of the HOPE VI program, which had the less ambitious goal of demolishing distressed public housing projects. HUD awarded 285 Demolition and 261 Revitalization grants but the average Revitalization award was 20 times as large. One challenge with interpreting the existing research on the HOPE VI program is that papers often combine the Demolition and Revitalization programs into one category and study the composite effect of these two distinct interventions.

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2015; Sandler, 2017), and increased housing prices (Zielenbach and Voith, 2010). Research focused on the original public housing residents finds that the program led families to move to lower poverty neighborhoods and improved the long-run labor market outcomes of children (Kingsley et al., 2003; Jacob, 2004; Chyn, 2018; Haltiwanger et al., 2020).

3 Conceptual Framework

This section interprets the Revitalization program through the lens of a model of residential sorting. Our goal is to i) define the Revitalization program’s objective of reducing the exposure to neighborhood poverty for subsidized renters, ii) illustrate why the effect of the program is theoretically ambiguous, and iii) decompose the average effect on subsidized renters into group-specific effects for the four populations that we focus on in our empirical analysis. We adopt the framework of Schelling (1971, 2006) as summarized by Glaeser (2008), extending these models to include public housing and heterogeneous agents.

Consider a city that consists of two neighborhoods, the central city (C) and the suburbs (B), which both have a fixed, homogeneous housing stock of equal size. There are two periods (t and t + 1). The population is fixed and equal to the size of the housing stock. There are two types of households: low-income (l) and high-income (h). All low-income and no high-income households have subsidized housing. The poverty rate of neighborhood j is \( P_{jt} \) (i.e., the share of households that are low-income) and is defined in equilibrium, while the poverty rate of the city is fixed at \( P_c \).

The Revitalization program sought to reduce the average neighborhood poverty rate for subsidized renters (\( \bar{P}_{lt} \)), where \( \bar{P}_{lt} \equiv P_{Ct} \times \omega_{Ct} + P_{Bt} \times \omega_{Bt} \) and \( \omega_{jt} = \frac{P_{jt}}{P_{Ct} + P_{Bt}} \), taking the city-level poverty rate as given. Figure 1 depicts the relationship between segregation and exposure to poverty by plotting \( \bar{P}_{lt} \) against \( P_{Ct} - P_{Bt} \). Distributing poor households evenly throughout the city minimizes exposure to neighborhood poverty. Next, we specify a model of neighborhood choice to shed light on whether the Revitalization program will reduce \( \bar{P}_{lt} \) and how different groups of subsidized renters will be affected.

Low-income households either live in public housing or receive housing vouchers and

\[ \text{We drop the time subscript for variables that are time invariant.} \]
join high-income households in their search for housing in the private market.\textsuperscript{3} In each neighborhood a share of units, $H_{jt}$, are reserved for public housing. Each household $i$ in the private market chooses a neighborhood $j$ to maximize their utility, which is given as:

\begin{align*}
    u_{ijt}^h &= y^h - r_{jt} + A_{jt} - P_{jt} + \epsilon_{ijt} \\
    u_{ijt}^l &= y^l - \phi r_{jt} + \delta A_{jt} - \alpha P_{jt} + \epsilon_{ijt},
\end{align*}

(1)

where $y$ is income; $r_{jt}$ is the cost of housing; $A_{jt}$ is the amenity value of the neighborhood; $P_{jt}$ is the neighborhood poverty rate; and $\epsilon_{ijt}$ represents heterogeneity in the valuation of the neighborhoods, which is independently, identically distributed extreme value. $0 < \phi < 1$ captures the fact that low-income households who are not in public housing have housing vouchers. $\delta > 0$ and $\alpha > 0$ allow low-income households to value neighborhoods differently.

\textsuperscript{3}We assume that public housing is rationed and sufficiently appealing such that low-income households would always chose to accept public housing over searching for housing in the private market.
A spatial equilibrium is a vector of prices, \( \{r_{Ct}, r_{Bt}\} \), and allocations, \( \{P_{Ct}, P_{Bt}\} \), such that no household in the private market could be made better off by moving neighborhoods.

To model the city before the program we consider a unique, stable equilibrium where there is no public housing in the suburbs and the city center is poorer \((0 = H_B < P_{Bt} < H_{Ct} < P_{Ct})\). There are two cases in which such an equilibrium exists, Case 1: \( A_{Ct} > A_{Bt}, \phi < \delta, \) and \( \phi < \alpha; \) and Case 2: \( A_{Ct} < A_{Bt} \) and \( \delta < \phi < \alpha. \)\(^4\) We model the Revitalization program as increasing neighborhood amenities \((A_{Ct} < A_{Ct+1})\) and reducing the stock of public housing \((H_{Ct} > H_{Ct+1})\), keeping fixed the the city-wide poverty rate and population. In spatial equilibrium the poverty rate in the city center is pinned down by the following condition: \( (\phi - \delta)(A_B - A_{Ct}) = 2(\phi - \frac{\alpha}{3})(P - P_{Ct}) + (\phi - \frac{1}{3})(\frac{P}{P_{Ct}P_{Bt}}) \). Taking the derivative of \( P_{Ct} \) with respect to \( A_{Ct} \) yields, \( \frac{dP_{Ct}}{dA_{Ct}} = 2(\phi - \delta)\left[ (\phi - \frac{2}{3}) + (\phi - \frac{1}{3})\left(\frac{P}{P_{Ct}P_{Bt}}\right)\right]^{-1}. \) The conditions of case 1 imply that \( \frac{dP_{Ct}}{dA_{Ct}} > 0 \) and the conditions of case 2 imply that \( \frac{dP_{Ct}}{dA_{Ct}} < 0. \)

The Revitalization program produces three possible equilibria. First, case 1 implies that \( P_t^l < P_{t+1}^l. \) The program attracts low-income households to the city center because they value the amenities and housing vouchers prevent them from paying the full cost. We refer to this case as the Segregation equilibrium, which is depicted by the green circles in Figure 1. Second, case 2 in addition to \( A_B \geq A_{Ct+1} \) or \( H_{Ct+1} \geq P_{Ct} \) implies that \( P_t^l > P_{t+1}^l. \) An increase in amenities attracts high-income households to the city center because they value the amenities more. We refer to this case as the Integration equilibrium, which is depicted by the red squares in Figure 1. Third, case 2 in addition to \( A_B < A_{Ct+1} \) and \( H_{Ct+1} < P_{Ct} \) implies that \( P_t^l < P_{t+1}^l. \) In this case the poverty rate in the suburbs after the award is higher than the poverty rate in city center before the award \((P_{Bt+1} > P_{Ct})\) because the improvement in amenities attracts high-income households and the reduction in public housing allows the low-income households to be priced out. We refer to this scenario as the

\(^4\)The logit choice probability that household of type \( k \) selects neighborhood \( j \) is \( \frac{\exp(\mathbf{u}^{t,k}_{j})}{\exp(\mathbf{u}^{t,k}_{iA} + \mathbf{u}^{t,k}_{iC})} \). Using the identity \( (P_{Ct} + P_{Bt})/2 = P \) and taking the log difference between the choice probabilities of neighborhoods \( B \) and \( C \) for high- and low-income households, we can define the price difference between neighborhoods \((f^k(P_{Ct}) = r_{Bt} - r_{Ct})\) as a function of the poverty rate in the City: \( f^h(P_{Ct}) = (A_B - A_{Ct}) - 2(P - P_{Ct}) - \log(\frac{2P - P_{Ct}}{P_{Ct}}) \) and \( f^l(P_{Ct}) = \frac{h}{2}(A_B - A_{Ct}) - 2\frac{h}{2}(P - P_{Ct}) - \frac{1}{h}\log(\frac{2P - P_{Ct}}{P_{Ct}}) \). The equilibrium poverty rate in the City is defined by this system of two equations and two unknowns. Let \( g(P_{Ct}) = f^l(P_{Ct}) - f^h(P_{Ct}) \), then a unique, stable equilibrium that satisfies \( 0 = H_B < P_{Bt} < H_{Ct} < P_{Ct} \) occurs when \( g(P_{Ct}) = 0, \frac{dg(P_{Ct})}{dP_{Ct}} < 0, \) and \( g(P_{Ct}) > 0. \) These conditions are satisfied if and only if the conditions of case 1 or case 2 hold.

\(^5\)Because we do not model housing supply, we can only pin down relative prices in equilibrium.
Gentrification equilibrium, which is depicted by the blue triangles in Figure 1. The program reduces poverty rates in the city center, but increases poverty rates in the suburbs enough to increase the average, city-wide neighborhood poverty rate for low-income households.

This simple model illustrates why the effect of the Revitalization program is theoretically ambiguous. The program could increase exposure to neighborhood poverty by attracting poor households to the revitalized sites (segregation equilibrium) or relocating too many poor households to the suburbs (gentrification equilibrium). Whether these unintended consequences occur depends on how low-income households value neighborhood amenities ($\delta$ and $\alpha$) and the extent to which they pay for them ($\phi$). The program will be successful only if it attracts high-income households into the revitalized neighborhoods while maintaining a sufficient amount of affordable units for low-income households (integration equilibrium).

The change in exposure to poverty for subsidized renters, $\Delta = \bar{P}_{lt+1} - \bar{P}_{lt}$, can be decomposed into the weighted-average of the effects on subgroups,

$$\Delta = \sum_g \Delta_g \omega_g,$$

where $\Delta_g$ is the change in the average neighborhood poverty rate between time $t$ and $t+1$ for subsidized renters in group $g$ and $\omega_g$ is the share of subsidized renters who belong to group $g$. Subsidized renters belong to one of four mutually exclusive and exhaustive groups of households that.\(^6\)

i) lived in a Revitalization neighborhood before an award (residents for whom $u^i_{tBt}(H_{Ct},A_{Ct}) < u^i_{tCt}(H_{Ct},A_{Ct})$ or residents of the public housing project in $t$),

ii) moved into a Revitalization neighborhood after an award (residents for whom $u^i_{tBt}(H_{Ct},A_{Ct}) > u^i_{tCt}(H_{Ct},A_{Ct})$ and $u^i_{tBt+1}(H_{Ct+1},A_{Ct+1}) < u^i_{tCt+1}(H_{Ct+1},A_{Ct+1})$ or residents who moved into the public housing project after the award),

iii) would have moved into a Revitalization neighborhood absent an award (residents for whom $u^i_{tBt}(H_{Ct},A_{Ct}) > u^i_{tCt}(H_{Ct},A_{Ct})$ and $u^i_{tBt+1}(H_{Ct+1},A_{Ct+1}) > u^i_{tCt+1}(H_{Ct+1},A_{Ct+1})$ and $u^i_{tBt+1}(H_{Ct+1},A_{Ct+1}) < u^i_{tCt+1}(H_{Ct},A_{Ct})$ or residents who

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\(^6\)The utility of a low-income household $i$ living in neighborhood $j$ at time $t$ is a function of the public housing stock and the amenities of the city center, which we denote $u^i_{ijt}(B_C,A_C) = y^t - \phi r^*_t + \delta A^*_t - \alpha P^*_t + \epsilon_{ijt}$ and $x^*$ denotes the equilibrium value pinned down by $H_C$ and $A_C$. 
would moved into the public housing project after the award but did not because of the reduction in $H_{Ct+1}$, and

iv) lived in other neighborhoods that may have been affected by program spillovers (residents for whom $u_{iBt}(H_{Ct}, A_{Ct}) > u_{iCt}(H_{Ct}, A_{Ct})$ and $u_{iBt+1}(H_{Ct+1}, A_{Ct+1}) > u_{iCt+1}(H_{Ct+1}, A_{Ct+1})$ and who were not in public housing before or after the award).

Sections 6.2.1 through 6.2.4 estimate $\Delta_g$ for each of the four subgroups. Section 6.3 then uses equation 2 to estimate $\Delta$.

4 Data

We combine survey and administrative data to track neighborhoods and individuals over time. The two key strengths of our data are that they include the near universe of Revitalization grants, and we observe annual data on income, place of residence, and participation in subsidized housing for nearly all individuals in the United States.

**Applicants and Awardees.** We use publicly available data to identify HOPE VI projects and the neighborhoods in which they were located. All applicants and awardees are publicly listed. We link these records to project-level summary files from HUD and assign each public housing project to one of three categories:

i) *Revitalization*: projects that received a HOPE VI Revitalization grant,

ii) *Failed Applicant*: projects that applied for but did not receive HOPE VI funding, and

iii) *Non-Applicant*: projects that did not apply for or receive a HOPE VI grant.\(^7\)

We limit our sample to large, non-senior public housing projects for which we can identify the geographic location. Table B.1 presents the impact of each sample restriction; after imposing all of the restrictions, we retain 88 percent of all Revitalization awards. We impose the same

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\(^7\)The HUD data identify projects with an alpha-numeric project ID and we assign a project ID to 99 percent of Revitalization grantees, and 98 percent of HOPE VI applicants. All of the Revitalization grantees and most of the applicants that were not assigned a project ID were scattered sites, which we omit from the analysis anyways. We use data from HUDUSER’s, ”Picture of Subsidized Households” to identify all projects that existed in 1993, map the project names to the project IDs, and measure project-level characteristics such as the geographic location. We also identify all projects that were awarded a HOPE VI Demolition grant and we drop these projects from our sample.
restrictions on non-Revitalization projects but additionally require that they be located at least one mile away from the nearest Revitalization site. This restriction is made because the Revitalization program could have directly affected nearby neighborhoods. Our final sample contains 251 Revitalization, 166 failed applicant, and 5,783 non-applicant projects. Figure A.1 maps the location of each Revitalization and failed applicant project.

**Neighborhoods.** We use data from HUDUSER’s “Picture of Subsidized Households” to identify the Census block group in which each project is located. Block groups are defined by the U.S. Census Bureau and typically contain around 1,500 residents. To account for the fact that multiple projects might be located in a single block group and some projects span multiple block groups, we group together clusters of nearby public housing projects into neighborhoods defined by the connected set formed by projects and Census tracts. 90 percent of neighborhoods contain one or two block groups, and the two largest neighborhoods contain five block groups. For much of our analysis we collapse the data to these neighborhoods, of which there are 125 failed applicant and 204 Revitalization neighborhoods.

Revitalization neighborhoods contain a mix of public and non-public housing units prior to an award. The average Revitalization neighborhood contained 1,059 households, 45 percent of whom lived in public housing in 1993. There is variation in the fraction living in public housing, ranging from 29 to 60 percent at the 25th and 75th percentiles, respectively.

**Individuals.** We use linked survey and administrative data to measure the outcomes of individuals. We rely on four main data sources. First, we use administrative data from HUD, which allow us to identify which individuals receive subsidized housing and where these individuals live. Second, we use administrative data from tax records, which provide annual measures of income and precise residential location for all filers. Third, we use administrative data from the U.S. Census Bureau’s Master Address File (MAF), which provide...
additional address data for individuals not in the tax records. Fourth, we use survey data from the Decennial Census Survey and the American Community Survey (ACS), which provide information on other variables including income, rent, and home ownership status. We link these datasets together to construct an individual-level panel that includes one observation per person per year between 1995 and 2018 for the near universe of people living in the United States.\(^\text{12}\)

We use adjusted gross income (AGI) to identify poor households. Specifically, we define individuals as poor if they reside in a household whose average AGI over the past five years is less than $15,000.\(^\text{13}\) The $15,000 threshold is approximately equal to the poverty line for a three-person family in 2007, which is the middle of our sample period. While there is considerable mobility in and out of poverty from year to year, our measure captures a persistent form of income deprivation (Larrimore et al., 2020).\(^\text{14}\) We have found similar results using AGI in a single year or calculating poverty based on the official poverty line. However, we prefer our measure to the official poverty line since the latter depends on family size, which we cannot measure with perfect accuracy in the administrative data. Unless otherwise noted, we use the term “neighborhood poverty rate” to refer to the share of individuals who meet this AGI-based definition of poverty.

We combine the data on neighborhoods and individuals to create two analysis datasets. We construct a repeated cross section dataset that summarizes the population that lives in each neighborhood in each year. We use these data to measure how neighborhoods change over time as well as to study the new residents that move into the sample neighborhoods after an award. Second, we construct a panel of original residents that follows the individuals that lived in the target neighborhoods in the year before an award. We use these data to measure the outcomes of the original residents and explore how a key group of intended beneficiaries were affected by the Revitalization program. The two datasets provide annual panels tracking the neighborhoods and original residents between 1995 (one year before the

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\(^{12}\) While the coverage is quite comprehensive, address data are not available for every individual in every year. We make the assumption that an individual lives in the same address until we observe a new address to reduce the missingness of address data. For children, we use the address data from the parent who most recently claimed them as a dependent.

\(^{13}\) For children, we use the AGI from the parent who most recently claimed them as a dependent.

\(^{14}\) Using a five-year average of AGI has the added advantage of providing a simple way to account for the fact that we do not have tax records for 1996 and 1997.
first award) and 2018 (eight years after the last award). In some cases we supplement these data with additional neighborhood-level information from the publicly available summary files from the 1990 and 2000 Decennial Census Surveys and the annual data from the 2009-2017 waves of the ACS, all of which are obtained through IPUMS (Manson et al., 2021).

5 Empirical Strategy

Our initial goal is to estimate the effect of the Revitalization program on the poverty rates in targeted neighborhoods. To motivate our empirical strategy, we begin by describing how poverty rates changed before and after the intervention. Figure 2(A) is a binned scatter plot of the average change in neighborhood poverty rates between 1980 and 1990 against the average neighborhood poverty rate in 1980 (all HOPE VI grants were awarded after 1990). Each point corresponds to 1 of 60 groups defined by treatment status and the ventile of neighborhood poverty rate. Figure 2(A) demonstrates that treatment status and baseline poverty rates are unrelated to changes in poverty rates prior to the intervention. Figure 2(B) presents analogous results for changes in poverty rates between 1990 and 2017, which is 6 years before the first and 7 years after the last Revitalization award, respectively. Conditional on baseline poverty rates, the failed applicant and non-applicant sites experienced similar changes in poverty rates after the intervention while the Revitalization sites experienced significantly larger reductions in neighborhood poverty. These results provide initial evidence that the program reduced poverty rates in targeted neighborhoods. The association between baseline poverty rates and subsequent changes in poverty rates highlights the importance of comparing Revitalization projects to similar untreated projects. Our main empirical strategy uses the failed applicant projects as our control group but, consistent with Figure 2(B), we show that our main results are robust to using other, observably similar projects.

15 Annual neighborhood-level statistics are from the 5-year ACS estimates, which are constructed by pooling data from the 5-year period centered on the year of interest. For example, we use data from the 2015-2019 ACS surveys to estimate neighborhood characteristics in 2017. We do not use the ACS to measure neighborhood characteristics after 2017 because data from these later years are affected by the COVID-19 pandemic.

16 We measure neighborhood poverty rate as the average poverty rate of all block groups that contain a public housing project. Because it is not possible to crosswalk the 1980 geographic codes to the 2010 block groups, Figure 2(A) measures the poverty rate at the tract level, not the block group level. We use the method developed by Logan et al. (2014) to crosswalk the 1980 Census tracts to the 2010 geography.
Figure 2: Changes in Neighborhood Poverty Rates Near Public Housing Projects

(A) Before Revitalization Program

(B) After Revitalization Program

Notes: Each figure plots the change in neighborhood poverty rates against the baseline poverty rate. Within the non-applicant, failed applicant, and Revitalization samples, projects are grouped into population-weighted ventiles based on the baseline poverty rate. Each point represents a population-weighted average of observations in a given ventile. In Panel A the baseline year is 1980 and the change is measured between 1980 and 1990. In Panel B the baseline year is 1990 and the change is measured between 1990 and 2017.

Source: Authors’ calculations based on summary files of Decennial Census survey and the ACS.
There are three reasons why the failed applicants are a useful comparison group. First, demand for the program far exceeded supply, so there were many projects that applied for but never received funding. Figure A.2 displays the number of applicants and awardees by grant year. On average, only 29 percent of applicants in a given year were awarded a grant. While applicants that were rejected in one year could apply again in a subsequent year, 34 percent of all applicants never received funding. Second, the average award size exceeds $20 million. This implies PHAs would have found it difficult to replace Revitalization funding and pursue the planned projects absent the HOPE VI grants. Third, failed applicants share the characteristics that led them to apply for the program. The PHA-level decision to apply for Revitalization funding for a project signals interest and an expectation that the project may benefit from Revitalization activities. This could imply that applicant projects and neighborhoods are more similar, in terms of observable and unobservable characteristics, to Revitalization grantees than the broader group of non-Revitalization projects and neighborhoods. Table B.2 presents baseline characteristics for non-applicant, failed applicant, and Revitalization projects and neighborhoods and shows that, while Revitalization projects tend to be more disadvantaged, the observable differences between the failed applicant and Revitalization projects are smaller than the differences between the non-applicant and Revitalization projects.

While there are observable differences between the failed applicant and Revitalization neighborhoods on average, there exist failed applicant neighborhoods that are very similar to Revitalization neighborhoods. Figure A.3(A) presents the distribution of poverty rates in 1990 for the failed applicants and Revitalization neighborhoods. While average poverty rates differ between the two groups, even for the highest-poverty Revitalization projects, there exist failed applicant neighborhoods that are located in similarly poor neighborhoods. Given the overlap of the two distributions, we view inverse propensity score weighting, particularly when combined with a stacked difference-in-differences estimator, as a promising way to adjust for observable differences.

We compare Revitalization awards from a given grant year to all failed applicants. To facilitate this comparison we create a stacked dataset that contains one observation for each Revitalization neighborhood and 15 observations for each failed applicant neighborhood, one

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17Panels B-D of Figure A.3 show a similar degree of overlap for other relevant pre-award variables.
for each of the 15 possible grant years between 1996 and 2010 (in this way, each failed applicant neighborhood appears in the event-specific panel for all grant years). Within each grant year, we estimate a propensity score by estimating a logistic regression of receipt of a Revitalization award on the population of the neighborhood, the share of the neighborhood that was Black non-Hispanic, the share below the poverty line, the median home value, and the size of the public housing project. Our approach allows for changes in the selection process over time and aims to balance the observable characteristics of the failed applicant and Revitalization neighborhoods within each grant year. When conducting the analysis at the neighborhood-level, we multiply the inverse propensity score weights by the neighborhood population in the year before the award. We normalize the weights for the failed applicant group such that within each grant year the sum of the weights across failed applicant neighborhoods is equal to the sum of the weights across the Revitalization neighborhoods.¹⁸

Weighting the data by the inverse estimated propensity score eliminates observable pre-Revitalization differences between the Revitalization and failed applicant neighborhoods. Figure A.4 presents balance tests in which we regress a neighborhood characteristic measured prior to the award on an indicator for receipt of a Revitalization grant. Panel A weights by population and illustrates that there remain some differences between the Revitalization and failed applicant neighborhoods. Panel B uses inverse propensity score weights and shows that these weights eliminate observable differences between the two groups.

In most cases we have data on pre-treatment outcomes and we operationalize the comparison between Revitalization neighborhoods and failed applicant neighborhoods using a stacked difference-in-differences estimator. To address concerns related to the staggered timing of treatment, we follow Cengiz et al. (2019) and stack the data, creating a panel dataset that has a clean “event” for each Revitalization grant year. For each potential grant year between 1996-2010, the panel includes all failed applicants and the awardees from that year, with all outcomes observed between 5 years before and 15 years after the award year.¹⁹

¹⁸For results based on individual-level data, we multiply the inverse propensity score weights by the baseline population in the neighborhood divided by the number of individuals in the sample for that analysis. Thus, the sum of these weights across individuals within a project is equal to the weights used in the neighborhood-level analysis. This weighting scheme makes our results comparable across specifications since all analyses, whether based on neighborhood- or individual-level data, weight by the exact same measure: baseline population in the neighborhood.

¹⁹This specification effectively compares the Revitalization awardees in a given year to all failed applicants. The propensity score is estimated within grant year to adjust for observable differences between these two
then stack the datasets from each award year and estimate the following specification,

\[ y_{nt} = \sum_{j \neq -1} \beta^j D^j_{nt} + \lambda_{gt} + \delta_{ng} + \epsilon_{nt} \]  

(3)

where \( \delta_{ng} \) is a neighborhood by grant year fixed effect, \( \lambda_{gt} \) is a fixed effect for grant year by year relative to award, and \( D^j_{nt} \) treatment indicator equal to one if neighborhood \( n \) received a Revitalization grant and year \( t \) is \( j \) years after the award.\(^{20}\) We estimate this specification via weighted least squares using the inverse propensity score as weights and cluster standard errors at the level of the neighborhood. The main coefficients of interest are the \( \beta^j \), which trace out treatment effects over time relative to the year before the award.

The key identifying assumption is that the outcomes of Revitalization and failed applicant sites would follow parallel trends absent treatment. We assess the plausibility of this assumption by examining trends in the estimated pre-treatment effects. Our estimator reweights the failed applicant sample to match the observable characteristics of the Revitalization sample, which addresses the concern that neighborhoods with different baseline levels might be on different trajectories. In practice, our results are largely robust to using population weights instead. This is because the failed applicant projects are observably similar to the Revitalization projects, even without weighting, and the treatment effects are large relative to any potential bias that could result from imbalance in observables in the year before treatment.

In cases where we lack repeated measures of the outcome variable prior to the award, we estimate the following specification,

\[ y_n = \alpha + \beta D_n + \lambda_g + \epsilon_n \]  

(4)

where \( y \) is the outcome variable (typically measured as an average between the 10 to 15 years after the award) for neighborhood \( n \), \( \lambda_g \) is a fixed effect for the grant year, and \( D \) is an indicator equal to one if the neighborhood received a Revitalization grant. We estimate this specification via weighted least squares using the inverse propensity score as weights.
and cluster standard errors at the level of the neighborhood. When possible, we control for pre-treatment covariates to increase precision.

6 Effect of the Revitalization Program

6.1 Effect on Neighborhoods

We begin by showing that the Revitalization program increased population churn in targeted neighborhoods. Figure 3 presents the results from equation 3 where the outcome variable is the log of total population. The Revitalization program led to a 26 log point reduction in population five years after the award. But population quickly recovered over the next five years. The results suggest the following timeline: (short-run) in the five years following the award people moved out and housing units were demolished; (medium-run) in the next five years people moved back into the neighborhood as housing units were rebuilt; and (long-run) around ten years after the award construction was largely complete and the population returned to where it would have been in the absence of the Revitalization award.\(^{21}\)

The Revitalization program led to a large, persistent reduction in neighborhood poverty rates. The blue circles in Figure 4 shows that the program led to an 8 percentage point reduction in the share of residents who are poor 15 years after the award. While not directly comparable, these estimates are qualitatively similar to those in Tach and Emory (2017).\(^{22}\)

The red diamonds represent estimates from a specification in which we use population weights instead of inverse propensity score weights. The insensitivity of the estimates to which weights are used, along with a failure to reject the null of no difference in neighborhood poverty between one and five years prior to the awards offer support for the assumption that outcomes would have evolved along similar paths in the absence of the Revitalization program.

Table 1 shows that the estimated effect on neighborhood poverty rates is robust to using

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\(^{21}\)Figure A.5 presents the effect on the physical housing stock. These results suggest a similar timeline, with a reduction in total housing units in the first five years and the construction of new housing units taking place over the subsequent five years. These estimates are less precise as the housing stock variables are measured from public data in 1990, 2000, and annual data are only available starting in 2007.

\(^{22}\)Tach and Emory (2017) pool together Demolition and Revitalization grants and estimate the combined effect of these two HOPE VI programs on the change in poverty rates between 1990 and 2010. They find that the program led to a 11 percentage point reduction in poverty rates.
Figure 3: Effect on Population of Neighborhood

Notes: This figure plots estimates from the stacked difference-in-differences specification described in equation 3. The outcome variable is the log of the total number of people living in the neighborhood. The shaded regions denote the 95 percent confidence intervals. Source: Authors’ calculations based on linked administrative data.

alternative comparison groups. We regress the block group poverty rate measured in 2017 from the ACS on an indicator for receiving a Revitalization grant and a vector of baseline covariates measured from the 1990 Decennial Census. Column 1 of Panel A presents estimates using the failed applicant comparison group and shows that we find similar effects using the public data: the Revitalization program reduced neighborhood poverty rates in 2017 by 7.7 percentage points. Columns 2 and 3 compare the Revitalization sites to block groups that contain projects that never applied for HOPE VI funding and block groups that do not contain public housing projects, respectively. Both specifications show similarly large impacts on neighborhood poverty rates. Columns 4 and 5 present estimates with these same two comparison groups but limit the sample to block groups between one and five miles of

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footnote: As discussed in Section 4, we classify households with an AGI below $15,000 as poor. Figure A.8 presents estimates from equation 3 where the outcome is the survey-based measure of neighborhood poverty rates. We impute missing values between Census surveys by assuming poverty rates do not change unless we have data that indicates otherwise. The survey-based poverty measure yields similar results: the program led to a 11 percentage point reduction in poverty rates 15 years after the award.
Notes: This figures plots estimates from the stacked difference-in-differences specification described in equation 3. The two series present estimates from specifications that weight by the inverse propensity score and the baseline population. The outcome is the proportion of current residents who are poor. The shaded regions denote the 95 percent confidence intervals.
Source: Authors’ calculations based on linked administrative data.

a Revitalization site; the specifications also include fixed effects for the closest HOPE VI site. These estimates show similarly large impacts on poverty rates when comparing HOPE VI sites to similar, nearby neighborhoods. The specifications in panel B do not control for baseline differences and the estimates vary widely across comparison groups. Taken together, Table 2 shows that we find similar effects using alternative comparison groups, as long as we control for pre-award differences.

Poverty rates fell in Revitalization neighborhoods because fewer poor, subsidized households and more non-poor, unsubsidized households moved in after awards. Table 2 presents estimates from equation 4 where the outcome variable is the average number of people (in groups defined by poverty, tenure, and subsidy status) who live in the neighborhood 10 to 15 years after the award. To increase precision, the specifications control for the number of poor and non-poor individuals in the neighborhood in the year before the award. Columns 1 and 2 indicate that the Revitalization program decreased the number of poor residents
by 269 and increased the number of non-poor residents by 156, on average.\textsuperscript{24} Columns 3 through 6 illustrate that both the reduction in poor residents and the increase in non-poor residents is driven by a change in the composition of new residents, as opposed to differences in out-migration for original residents. Specifically, the program reduced the number of new, poor residents by 195 and increased the number of new, non-poor residents by 199. Columns 7 through 14 further break these results out by subsidized housing status. The decline in the population of poor households is driven by fewer new residents with subsidized housing (column 9) and, to a lesser extent, a decline in the number of poor, original residents in subsidized housing. The growth in the population of non-poor individuals appears to be exclusively driven by new, non-poor residents without subsidized housing (column 14).

The program reduced the poverty rate in targeted neighborhoods, but did so at the cost of reducing access to these neighborhood for subsidized households. Columns 7 through 14 of Table 2 imply that the program reduced the size of the population with subsidized housing by 20 percent and increased the size of the population without subsidized housing by 8 percent.\textsuperscript{25} Figure A.6 presents estimates from equation 3 and shows a long-run decline in the subsidized population of similar magnitude. However, a reduction in the number of subsidized renters in the Revitalization neighborhoods need not imply a reduction in subsidized units in the broader housing market. Indeed, Section 6.3 presents evidence that at the city-level, the program reduced the stock of public housing but this was offset by an increase in the provision of housing vouchers.

The program reduced poverty rates by attracting residents who would have had higher incomes regardless of where they lived as opposed to increasing the income of new residents. For each neighborhood and year, we calculate the poverty rate for the population of individuals who move into the neighborhood in that year using their income in the previous, current, or subsequent year.\textsuperscript{26} Figure 5 presents estimates from equation 3, using these three measures of poverty as the outcome variable. The red circles represent estimates when

\textsuperscript{24}Figure A.9 shows the same finding using equation 3 to estimate the effect on log population by poverty status. In the long-run, the program led to a 10 log point reduction in the number of poor residents and a 20 log point increase in the number of non-poor residents.

\textsuperscript{25}We arrive at these calculations by taking the sum of the treatment effects divided by the sample size: $-0.20 = (-43-168-20-2)/(108+696+52+335)$ and $0.08 = (-31-27-23+201)/(177+595+172+544)$.

\textsuperscript{26}In contrast to our main measure of poverty, these outcomes are based on the individual’s income in a single year.
### Table 1: Effect on Neighborhood Poverty Using Alternative Comparison Groups

<table>
<thead>
<tr>
<th>Block Group Poverty Rate in 2017</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. With Covariates</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revitalization</td>
<td>-0.077</td>
<td>-0.118</td>
<td>-0.093</td>
<td>-0.101</td>
<td>-0.066</td>
</tr>
<tr>
<td>(0.016)</td>
<td>(0.008)</td>
<td>(0.005)</td>
<td>(0.012)</td>
<td>(0.006)</td>
<td></td>
</tr>
<tr>
<td>[0.000]</td>
<td>[0.000]</td>
<td>[0.000]</td>
<td>[0.000]</td>
<td>[0.000]</td>
<td>[0.000]</td>
</tr>
<tr>
<td>Comparison group</td>
<td>baseline</td>
<td>baseline</td>
<td>baseline</td>
<td>baseline+fe</td>
<td>baseline+fe</td>
</tr>
<tr>
<td>failed applicants</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>non-applicants</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>non-public housing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>near Revitalization</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>485</td>
<td>5,694</td>
<td>209,685</td>
<td>1,130</td>
<td>25,512</td>
</tr>
</tbody>
</table>

| **B. Without Covariates**       |      |      |      |      |      |
| Revitalization                  | -0.035 | 0.037 | 0.200 | -0.008 | 0.157 |
| (0.017)                         | (0.009) | (0.006) | (0.012) | (0.007) |      |
| [0.035]                         | [0.000] | [0.000] | [0.515] | [0.000] |      |
| Comparison group                | none | none | none | fe | fe |
| failed applicants               |      |      |      |      |      |
| non-applicants                  |      |      |      |      |      |
| non-public housing              |      |      |      |      |      |
| near Revitalization             |      |      |      |      |      |
| Observations                    | 485  | 5,694 | 209,803 | 1,130 | 25,535 |

Notes: Each column presents estimates from a separate regression in which the Census block group poverty rate in 2017 is regressed on an indicator for receiving a Revitalization grant. The comparison groups in columns 1-5 are block groups that contain failed applicant projects, projects that did not apply for HOPE VI funding, non-public housing projects, projects that did not apply for HOPE VI funding and are located within 1-5 miles of a Revitalization site, and non-public housing projects and are located within 1-5 miles of a Revitalization site. The vector of baseline covariates include the following characteristics of the block group measured in 1990: poverty rate, share of residents that are White, share of residents that are Black, median rent, median home value, share of households receiving public assistance income, share of residents with a college degree, unemployment rate, share of residents that are new renters or owners, share of units that are owner occupied, share of housing building before 1960, total population, total housing, and share of units vacant. Columns 4 and 5 include fixed effects (fe) for the closest Revitalization site. Each regression is estimated via weighted least squares, using block group population in 1990 as the weights. Standard errors are presented in parentheses and p-values in brackets.

Source: Authors’ calculations based on summary files of Decennial Census survey and the ACS.
Table 2: Effect on Size of Sub-Populations

<table>
<thead>
<tr>
<th></th>
<th>By Income</th>
<th>By Income and Tenure</th>
<th>By Income, Tenure, and Subsidized Housing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td></td>
<td>(74)</td>
<td>(65)</td>
<td>(15)</td>
</tr>
<tr>
<td></td>
<td>[0.000]</td>
<td>[0.017]</td>
<td>[0.000]</td>
</tr>
<tr>
<td>Mean</td>
<td>1580</td>
<td>1100</td>
<td>285</td>
</tr>
<tr>
<td>Poor</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>Original resident</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>Subsidized housing</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>Observations</td>
<td>2,000</td>
<td>2,000</td>
<td>2,000</td>
</tr>
</tbody>
</table>

Notes: Each column presents estimates from a separate regression in which an outcome variable is regressed on an indicator for the Revitalization award. The outcome variable differs across columns and is the size of the population defined by poverty, tenure, and subsidized housing status. Regressions are estimated via weighted-least squares using the inverse propensity score. All regressions control for the year of first award as well as the number of poor and non-poor households who lived in the neighborhood in the year before the award. Standard errors are clustered at the neighborhood and are presented in parentheses and p-values are presented in brackets.

Source: Authors’ calculations based on linked administrative data.
Figure 5: Effect on Poverty Rate of Newcomers

![Graph showing the effect on poverty rate of new residents moving into neighborhoods.](image)

Notes: This figure plots estimates from the stacked difference-in-differences specification described in equation 3. We identify the population of individuals who move in in a given year and the three series represent estimates from three separate regressions in which we measure the poverty rate of this population using their income in the previous, current, or subsequent year. The shaded regions denote the 95 percent confidence intervals.

Source: Authors’ calculations based on linked administrative data.

measuring the income of the new neighborhood residents in the year of the move and show that the poverty rate of the flow of households moving into the Revitalization neighborhoods drops by 6 percentage points in the long run. The blue squares and green diamonds represent estimates using the poverty rate measured in the year before the move or in the year after the move, respectively; both estimates are indistinguishable from those based on the contemporaneous measure of income. These results show that the higher-income residents who moved into the revitalized sites had higher incomes prior to moving into these neighborhoods.

The reduction in poverty rates in targeted neighborhoods is driven by the in-migration of moderate-income residents. For each neighborhood, we calculate the proportion of individuals whose AGI falls within narrow ranges 10 to 15 years after the awards and estimate the effect of the program on these proportions using equation 4. Figure A.7 presents the estimates. The program led to a reduction in the proportion of families in all income categories
Figure 6: Effect on Racial and Ethnic Composition of Neighborhood

![Graph showing the effect on racial and ethnic composition of neighborhoods over time.]

Notes: This figure plots estimates from the stacked difference-in-differences specification described in equation 3. The outcome is the proportion of the population that is White non-Hispanic, Black non-Hispanic, or Hispanic. The shaded regions denote the 95 percent confidence intervals.

Source: Authors' calculations based on linked administrative data.

below $15,000. Conversely, the program led to an increase in higher-income households, but the effects are largest for households with an AGI between $20,000 and $100,000.

The reduction in poverty was not driven by an influx of higher-income adults without children. The program was motivated, in part, by a desire to improve living conditions for children and it would thus be problematic if the changes in poverty rates were driven by childless adults, as is often discussed in the gentrification literature (McKinnish et al., 2010). We calculate the proportion of children whose parents are poor and Figure A.10 illustrates that the reduction in the proportion of poor families with children, is slightly larger than the reduction in the overall poverty rate.

Figure 6 presents results showing how the Revitalization program affected the racial composition of the neighborhoods. Many HOPE VI projects were predominately Black non-Hispanic, which explains why the Black non-Hispanic population share in Revitalization neighborhoods declined in the short-term as the public projects were demolished; the share
Table 3: Effect on Housing Prices and Home Ownership

<table>
<thead>
<tr>
<th></th>
<th>Log Rent (1)</th>
<th>Log Home Value (4)</th>
<th>Log Monthly Mortgage (7)</th>
<th>Owner (10)</th>
<th>Renter (11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revitalization</td>
<td>0.249</td>
<td>0.246</td>
<td>0.125</td>
<td>-0.014</td>
<td>0.014</td>
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<tr>
<td></td>
<td>(0.062)</td>
<td>(0.074)</td>
<td>(0.052)</td>
<td>(0.023)</td>
<td>(0.023)</td>
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<tr>
<td></td>
<td>0.192</td>
<td>0.136</td>
<td>0.044</td>
<td>0.002</td>
<td>0.042</td>
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<tr>
<td></td>
<td>(0.061)</td>
<td>(0.067)</td>
<td>(0.048)</td>
<td>(0.357)</td>
<td>(0.537)</td>
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<tr>
<td></td>
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<td>0.161</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.044)</td>
<td>(0.069)</td>
<td></td>
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<td>0.161</td>
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<td></td>
<td>(0.042)</td>
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<td>0.136</td>
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<td>(0.023)</td>
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<tr>
<td>Housing Characteristics</td>
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<td>Exclude New Housing</td>
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<td>X</td>
<td></td>
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<tr>
<td>Mean</td>
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<td>11.700</td>
<td>6.760</td>
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<td>33,000</td>
<td>23,000</td>
<td>2,000</td>
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</table>

Notes: Each column presents estimates from a separate regression in which an outcome variable is regressed on an indicator for the Revitalization award. Regressions are estimated via weighted-least squares using the inverse propensity score. All regressions control for the year of first award and the calendar year as well as the vacancy rate, median home value, neighborhood poverty rate, and share of population that is Black in the year before the award. When indicated some regressions further control for housing characteristics (building type, year built, persons per room) and limit to house units built before the award. In columns 1-9 the unit of observation is the housing unit. In column 10-13 the data are collapsed to the project level. Standard errors are clustered at the neighborhood and are presented in parentheses and p-values are presented in brackets. We also report the mean and standard deviations for the failed applicant neighborhoods.

Source: Authors’ calculations based on linked survey and administrative data.
of neighborhood residents that were White non-Hispanic responded in the opposite way: increasing immediately following a Revitalization grant and remaining persistently higher up to 10 years after a demolition. The share of Black non-Hispanic residents had largely recovered by 15 years after a Revitalization; we fail to reject that there is no difference between Revitalization and applicant neighborhoods in terms of the proportion of residents that were White non-Hispanic or Black non-Hispanic 15 years post-Revitalization.

The Revitalization program led to a substantial increase in housing costs, but had no impact on rates of home ownership. We measure housing-related variables using responses to the ACS in the 10 to 15 years after the award.\textsuperscript{27} Since we do not have ACS data in the pre-award period, we use equation 4 to estimate the effect of the program the outcomes from the ACS. Columns 1 to 9 of Table 3 show the effect on rent, home values, and monthly mortgage payments. For each outcome we present results from a baseline model, which controls for pre-award neighborhood characteristics; a modified specification that also controls for observable housing unit characteristics (building type, year built, persons per room), which is our preferred specification; and a specification that limits the sample to units that were built prior to the award. Across all outcomes and specifications we find positive effects on housing prices. The robustness of the price effects to controlling for housing characteristics and limiting the sample to old units, suggests that the program made the neighborhoods more appealing places to live rather than just improving the physical characteristics of existing housing. Columns 10 and 11 show that the program had no impact on home ownership rates.

6.2 Effect on Individual-Level Residential Outcomes

We next investigate whether the reduction in poverty rates in the Revitalization neighborhoods led subsidized renters to live in lower poverty neighborhoods. Sections 6.2.1 through 6.2.4 consider impacts on the four groups of subsidized renters defined in Section 3.

\textsuperscript{27}When measuring housing prices, we exclude households that receive subsidized housing. Respondents to the ACS often report the rent they pay (the tenant payment) as opposed to their contract rent. Because HOPE VI reduces the share of units that are subsidized, using all responses to the ACS would lead us to overestimate the effect on prices. Indeed, when we use all respondents to the ACS, we find increases in rent that are 43 percent larger than the estimates in Table 3.
6.2.1 Original Residents

Many of the original residents of the Revitalization neighborhood moved away and were not exposed to the changed neighborhood conditions. Figure 7(A) plots the proportion of original residents of the Revitalization neighborhoods—i.e., residents of the neighborhood in the year before the award—that had moved away between 0 and 15 years after an award. Residents of both public and non-public housing exhibited extremely high rates of residential mobility. Within five years of the award, over 70 percent of the original residents of the public housing projects and over 60 percent of the non-public housing residents in the area had moved away. While we show below that the program does increase the propensity of original residents to move, Figure A.11 demonstrates that there were similarly high rates of mobility in the failed applicant population: within five years of the award, nearly 60 percent of the original residents of the failed applicant public housing projects had moved away. These descriptive statistics foreshadow a main finding in this section: residents of high-poverty neighborhoods containing public housing projects are highly mobile, which limits their exposure to changes in neighborhood conditions.

The program induced original residents living in public housing and in non-subsidized housing to move away, with no impact on the mobility of households in other subsidized housing programs. Figure 7(B) presents estimates from equation 3 where the sample includes individuals who lived in the neighborhood in the year before the award. The outcome is the proportion of individuals that had moved by a given year, defined relative to the Revitalization award year. Five years after an award, the original residents of the Revitalization public housing projects were 18 percentage points more likely to have moved to a different neighborhood than residents from failed applicant public housing projects. Over the following decade, this size of this difference declines as more households in the failed applicants projects move away. The original Revitalization neighborhood residents without access to subsidized housing were also about 5 percentage points more likely to have moved within five years after the award. This difference remains approximately constant through 15 years after the award year. We find no effect on the residential mobility patterns of the original residents that had access to other forms of subsidized housing. One potential explanation is that these households were shielded from the increase in housing costs shown in Table 3.

Figure A.12 presents the effect of the program on housing subsidy type for the original
Figure 7: Residential Mobility of the Original Residents

(A) Rates of Residential Mobility in Revitalization Neighborhoods

(B) Effect of the Revitalization Program

Notes: Panel A plots the proportion of the original residents of the HOPE VI neighborhoods who moved to a different Census block group by a given year after the award. Panel B plots estimates from the stacked difference-in-differences specification described in equation 3. The outcome is the proportion of the original residents who moved. The shaded regions denote the 95 percent confidence intervals. All results are presented separately by original housing status (i.e., non-subsidized, other subsidized, or public housing).

Source: Authors’ calculations based on linked administrative data.
public housing project residents. Five years after a Revitalization award, the original residents of Revitalization public housing projects were 15 percentage points less likely to be living in public housing relative to the original residents of failed applicant public housing projects. However, this decline is partially offset by a 9 percentage point increase in the probability of receiving another form of housing assistance, primarily in the form of housing vouchers. On net, the program led to a 6 percentage point reduction in the receipt of any subsidized housing five years after the award. These displacement effects decline in size over time; by 15 years after an award, the Revitalization program led to a 4 percentage point increase in the probability of receiving any housing subsidy. These dynamics could be explained by the short-run displacement of households from public housing, with the households offered other forms of subsidized housing preferring the new programs to their original public housing project and thus being less likely to exit subsidized housing entirely in the future. These results could also reflect the time and effort households have to expend to identify a landlord that is willing to accept housing vouchers (Ellen, 2020).

Relative to the impact on neighborhoods, the Revitalization program had a much smaller effect on exposure to neighborhood poverty for the original residents. The red series in Figure 8 presents the effect of the program on the neighborhood poverty rate of the neighborhoods the original residents live in after the award (which may or may not be a different neighborhood). The Revitalization program led to a 1.5 percentage point decrease in the poverty rate of the neighborhoods in which the original residents lived 15 years after the award. For comparison, the blue series reproduces the estimates from Figure 4 of the effect of the program on poverty rates in targeted neighborhoods. The reduction in poverty rates in targeted neighborhoods is 5.4 times as large as the reduction in exposure to neighborhood poverty rates for the original residents.

To help reconcile the program impacts on the targeted neighborhoods and the original residents of those neighborhoods we construct counterfactual estimates of what the poverty rates in the Revitalization neighborhoods might have been absent the program. Specifically, for each year after 1990 we regress current poverty rate on the ventile of the neighborhood poverty rate in 1990. We estimate this specification on the sample of failed application

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28 These estimates are consistent with those from Haltiwanger et al. (2020), who find that children who resided in public housing projects demolished under HOPE VI moved to neighborhoods with only slightly lower poverty rates.
Figure 8: Effect on Exposure to Neighborhood Poverty for Original Residents

Notes: This figure plots estimates from the stacked difference-in-differences specification described in equation 3. The outcome in is the poverty rate of the original neighborhood, current neighborhood, or the counterfactual current neighborhood. The shaded regions denote the 95 percent confidence intervals. Source: Authors’ calculations based on linked administrative data.

neighborhoods, and then use the estimated coefficients to construct a predicted poverty rate in both the failed applicant and Revitalization neighborhoods. We then estimate a specification where we replace the true neighborhood poverty rate with this counterfactual poverty rate for individuals who remain in their original neighborhood. Any impacts on this counterfactual measure of neighborhood poverty will solely reflect reductions due to moves made by the original residents to lower-poverty neighborhoods. The results are presented in the green series of Figure 8 and are almost identical to the red series based on the actual neighborhood poverty rates. The similarity between the estimates suggests that the reductions in exposure to neighborhood poverty for original residents is attributable to the fact that the program led some households to move to lower poverty neighborhoods. This makes sense, given that the vast majority of original residents move within 10 years, leaving little room for the reductions in poverty rates in the targeted neighborhoods to translate into benefits for the original residents.
Figure A.13 illustrates how reductions in neighborhood poverty differ for groups of original residents defined by their housing subsidy in the year before the award. Residents of both public and non-subsidized housing experience similar reductions in exposure to neighborhood poverty. The point estimates for housing voucher holders are slightly smaller. In all cases, the estimates are quite imprecise and the confidence intervals include zero. That we fail to reject the null of no effect on poverty exposure for any sub-group of prior residents is unsurprising in light of the high rates of residential mobility among all low-income renters. Around 10 years after a Revitalization award just 20 percent of Revitalization and failed applicant neighborhood residents in other subsidized housing programs remained in their original neighborhood. Therefore, the original neighborhood residents—regardless of their assisted housing status—were unlikely to benefit from reduced poverty exposure driven by the Revitalization-induced neighborhood change.

Consistent with Chyn (2018) and Haltiwanger et al. (2020), we find no evidence that the program affected the income of the adults living in the neighborhoods prior to the award. Figure A.14 presents estimates from equation 3 where the outcome variable is the poverty rate of the original residents. For all time periods, the estimates are economically small and statistically insignificant.

To summarize, most of the original residents moved away within a few years of the award and therefore were not exposed to the changing neighborhood conditions. The high rates of out-migration were not driven solely by Revitalization-induced displacement. Instead, they are a common feature of all low-income populations in high-poverty neighborhoods. Thus, the likely beneficiaries of interventions that target distressed neighborhoods are the new residents who move in after, not the incumbent residents. Still, the Revitalization program did displace some of the original Revitalization neighborhood residents. While we find evidence that these families ended up living in lower-poverty neighborhoods,29 these moves also likely imposed disruption costs on affected individuals and families. While estimating the magnitude of these costs is outside the scope of this paper, it is important to acknowledge that these Revitalization-induced moves could have generated significant disruptions in the lives of these individuals.

29Chyn (2018) and Haltiwanger et al. (2020) also find that the children in these households earn more in adulthood
6.2.2 New Residents

The reduction in poverty rates in revitalized neighborhoods does not necessarily translate into a reduction in exposure to neighborhood poverty for new residents. The program could have attracted residents who, absent the intervention, would have chosen to live in different, low-poverty neighborhoods. To investigate this possibility, we construct a sample of individuals who move into a failed applicant or Revitalization neighborhood in the 5 years before to 15 years after the award. We then estimate equation 3 on individual-level panel data where the outcome is the poverty rate in the destination neighborhood (i.e., the poverty rate of the Revitalization or failed applicant neighborhood). The red squares in Figure 9(A) represent the results for individuals with subsidized housing. The results replicate the findings in Figure 4, and show that families who move into Revitalization neighborhoods after the award move into lower poverty neighborhoods. The blue circles represent estimates from a specification in which the outcome variable is the poverty rate of the origin neighborhood (i.e., the neighborhood the individual lived in before moving to the Revitalization or failed applicant neighborhood). These results quantify selection after the award: the new residents of the revitalized neighborhoods moved from neighborhoods that had slightly lower poverty rates (0.8 percentage points lower 15 years after the award), though we are unable to reject the null hypothesis that this difference is equal to zero.

Subsidized households who moved into the revitalized sites came from similarly poor neighborhoods as those that moved into failed applicant neighborhoods. We estimate a modified version of equation 3, which controls for the poverty rate of the prior neighborhood, the income of the individual before the move, and a quadratic in age. The green diamonds in Figure 9(A) display these estimates. The results are almost identical to the unadjusted estimates (the red squares): 15 years after the award the adjusted estimate is just 1 percent (or .06 percentage points) smaller. The similarity between these two estimates suggests that the subsidized households that moved into the Revitalization neighborhoods after the award lived in lower poverty neighborhoods because of the award, and the magnitude of the effect is equal to 99 percent of the size of the effect on the poverty rates in the targeted neighborhoods. In other words, the reduction in poverty in targeted neighborhoods translated into a reduction in exposure to poverty for the new subsidized renters.

Figure 9(B) presents analogous results for the non-subsidized households. Here we find
Figure 9: Effect on Exposure to Neighborhood Poverty for New Residents

(A) Subsidized Households

(B) Non-Subsidized Households

Notes: This figure plots estimates from the stacked difference-in-differences specification described in equation 3 but estimated on individual-level panel data. The sample in panel A includes individuals who move into a Revitalization or Failed applicants neighborhood and have subsidized housing. The outcome is either the neighborhood poverty rate in the destination or origin neighborhood. Panel B present analogous results for households without subsidized housing. The shaded regions denote the 95 percent confidence intervals.

Source: Authors’ calculations based on linked administrative data.
Figure 10: Effect on Out-Migration

![Graph showing the effect on out-migration with shaded regions indicating 95% confidence intervals. The graph plots the proportion of current residents who move to a different neighborhood in the following year against the year after the award. The shaded region denotes the 95% confidence intervals.]

Notes: This figure plots estimates from the specification described in equation 3. The outcome variable is proportion of current residents who move to a different neighborhood in the following year. The shaded region denotes the 95% confidence intervals.

Source: Authors' calculations based on linked administrative data.

more evidence of selection: individuals without subsidized housing who move into Revitalization neighborhoods 15 years after the award move from neighborhoods where the poverty rate is 1.3 percentage points lower. However, a comparison between the adjusted and unadjusted series suggests that this selection is still small relative to the size of the effect of the program on the targeted neighborhoods.

Figure 10 presents the effect on out-migration. We estimate equation 3 where the outcome variable is the proportion of current residents who move to a different neighborhood in the following year. These out-migration rates are calculated separately for subsidized and non-subsidized households. For subsidized households, the rate of out-migration spikes in the years following the award, during the period in which the demolitions occurred. However, in the long-run, there is a substantial reduction in out-migration rates for the households that continued living in the neighborhoods up to that point: subsidized households living in
Revitalization neighborhoods 10 to 15 years after the award are 3 percentage points less likely to move compared to subsidized households in failed applicant neighborhoods. This is a 14 percent reduction relative to the mean out-migration rate in failed applicant neighborhoods. An explanation for the lower rates of out-migration is that the new residents of revitalized neighborhoods are more satisfied with their housing. For the non-subsidized households we find much smaller displacement effects in the short-run and no evidence of a reduction in out-migration rates in the long-run.

6.2.3 Residents Who Would Have Moved in Absent the Award

There exist subsidized renters who would have moved into the Revitalization sites absent the award, but ended up living in a different neighborhood elsewhere in the city. The program reduced the size of the subsidized housing population in targeted neighborhoods by 20 percent in the long run (see Table 2 and Figure A.6) but did not reduce the city-wide supply of subsidized housing (Section 6.3 shows that the reduction in public housing was offset by an expansion in housing vouchers). While we cannot identify these individuals, they likely ended up in lower poverty neighborhoods as a result of the Revitalization program. Revitalization neighborhoods were amongst the poorest in the city before the award. For example, in 1990, 86 percent of Revitalization neighborhoods were in the top decile of the within-county poverty rate distribution and the 25th percentile and median Revitalization neighborhood were in the 95th percentile and the 98th percentile of the within-county poverty rate distribution, respectively. For households that would have moved to Revitalization neighborhoods absent the program but instead moved to alternative, new neighborhoods, there were a limited number of places they could have moved where their poverty rate would not have decreased.

To assess how poverty rates might have changed for households that would have moved to Revitalization neighborhoods, but instead stayed in their original neighborhoods, we can examine how neighborhood poverty changed for failed applicant in-migrants during this period. To do so, we identify all individuals with subsidized housing who moved into a failed applicant site in the 10 to 15 years after the award. On average, the poverty rate in the failed applicant neighborhood is 14 percentage points higher than the poverty rate in their original neighborhood. This difference captures the effect of the program on households who were unable to move into the Revitalization neighborhoods and remained in their original
neighborhoods instead. Thus, for households that would have moved into Revitalization neighborhoods in the absence of the program, regardless of whether they stayed in their original neighborhood or moved to a new location, their exposure to poverty likely decreased.

6.2.4 Spillovers

If the program shaped the spatial distribution of poverty by affecting where poor adults lived (as opposed to increasing the income of poor individuals), then the reduction in poverty rates in Revitalization sites must be offset by an increase in poverty rates in other neighborhoods. This would increase exposure to poverty for individuals residing in these neighborhoods.

Beyond affecting poverty in targeted neighborhoods, the Revitalization program also could have influenced poverty rates in non-targeted neighborhoods by altering residential mobility. One way this could have happened is if the program induced some poor, subsidized renters who would have moved into the Revitalization neighborhoods to stay in their original neighborhoods. To explore whether this occurred, we identify all subsidized renters who moved into a Revitalization or failed applicant neighborhood 1–5 years before an award and calculate the average, annual number of individuals who moved between each possible pair of origin-destination neighborhoods. For each Revitalization or failed applicant neighborhood, we rank the origin-destination pairs from most to least common, grouping together pairs ranked 11 and above. We then calculate the average, annual number of subsidized renters moving between these origin-destination pairs 10–15 years after an award. Next, we estimate equation 4 with the log of the post-award migration flow as the outcome, controlling for the log of the pre-award migration flow. Column 1 of Table 4 presents results for total migration flows across all neighborhoods and shows that the Revitalization program reduced average annual rates of in-migration by 14.5 log points. Columns 2 through 12 show similar effects for the most common and least common origin-destination pairs. Migration flows of subsidized renters into the Revitalization sites declined after the award, particularly for neighborhoods that were more common origin neighborhoods prior to the Revitalizations.

To explore how this change in migration flows might have affected poverty rates in the origin neighborhoods Panel B of Table 4 replicates the specification in panel A after replacing the migration flow outcomes with the annual poverty rates of the origin neighborhoods 10–15 years after the award. There is no evidence that the Revitalization program increased poverty rates in the neighborhoods that subsidized renters moved from when they departed
Table 4: Analysis of Migration Flows into Targeted Neighborhoods

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<th>Ranking of Origin Neighborhoods from Most (First) to Least (Eleventh) Common</th>
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<th>Second (3)</th>
<th>Third (4)</th>
<th>Fourth (5)</th>
<th>Fifth (6)</th>
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<th>Eighth (9)</th>
<th>Ninth (10)</th>
<th>Tenth (11)</th>
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<td>A. Log Number of Individuals</td>
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<tr>
<td>Revitalization</td>
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<td>(0.013)</td>
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<tr>
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<tr>
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<td>0.11</td>
<td>0.06</td>
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</table>

Notes: Column 1 of panel A presents estimates from a regression in which the outcome variable is the log of the average number of subsidized renters who move into a target neighborhood per year in the 10 to 15 years after the award and the independent variables include an indicator for the Revitalization award, a fixed effect for the award year, and the log of the average number of subsidized renters who move into the neighborhood per year in the 1 to 5 years before the award. The regression is estimated via weighted-least squares using the inverse propensity score. Standard errors are clustered at the neighborhood and are presented in parentheses and p-values are presented in brackets. For each target neighborhood, we rank origin neighborhoods based on the number of people who move from these neighborhoods in the 1 to 5 years before the award. Columns 2 presents estimates that are analogous to column 1, but where the migration flows are measured between the most common origin neighborhood and the target neighborhood. Columns 3 to 12 present results for the lower ranked origin neighborhoods, where column 12 groups neighborhoods together rank 11 or higher. Panel B presents analogous results to panel A except we replace the migration flow variables with the neighborhood poverty rate in the origin neighborhood. Panel C present estimates from the accounting exercise as well as the share of households in the origin neighborhoods that have subsidized housing. Source: Authors’ calculations based on linked administrative data.
for Revitalization sites. Admittedly, we may lack statistical power to detect these effects, which could be small and dispersed across many neighborhoods. Panel C uses an accounting exercise to ask how poverty rates would have increased in the origin neighborhoods for the failed applicant sites if the outflow of subsidized renters decreased by the amount depicted in Panel A and all of the poor, subsidized renters displaced non-poor households in their origin neighborhood. For each origin-destination pair in the failed applicant sample, we measure the number of poor, subsidized households per year that moved into the failed applicant sites 10–15 years after the award. We multiply this number by the Revitalization coefficient estimate in panel A and divide by the total number of households in the origin neighborhood. We then take a weighted-average of this neighborhood-level estimate, weighting by the inverse propensity score from equation 4. The estimates are presented in column 1 and suggest that the Revitalization program could have increased poverty rates in the origin neighborhoods by 0.07 percentage points per year, on average. Thus, the effects on population flows in panel A are unlikely to have meaningfully affected poverty rates in the origin neighborhoods.

The estimates in Panel C of Table 4 are likely to provide upper bounds for the spillover effects on exposure to poverty for subsidized renters. We assumed that the poor, subsidized renters unable to move into the Revitalization sites displaced only non-poor households when staying in their origin neighborhoods. It is possible that these households would have displaced other poor households, which would imply a smaller impact on poverty rates in these neighborhoods. Second, absent changes in neighborhood population levels, any displacement of residents in the Revitalization neighborhoods will affect other neighborhoods that receive these displaced residents. However, these neighborhoods tend to have fewer subsidized households compared to the origin neighborhoods and therefore any increase in poverty rates will have a smaller effect on the average exposure to poverty for subsidized renters. Column 1 and Panel C of Table 4 shows that 7 percent of the residents in neighborhoods that sent migrants to Revitalization or failed applicant neighborhoods had subsidized housing, on average. We identify all individuals who moved into the origin neighborhoods between 2014 and 2018 and find that the share of residents with subsidized housing in the origin neighborhoods is 2 percentage points greater.\textsuperscript{30} Thus, while the program may have triggered

\textsuperscript{30}To mimic the calculation of the estimates in Table 4, we identify all individuals who move into the origin neighborhoods between 2014 and 2018, calculate the share of residents with subsidized households in these neighborhoods, and then take the migration-flow weighted average. Thus for each neighborhood we
Figure 11: Effect on Poverty Rates in Surrounding Neighborhoods

![Figure 11](image)

Notes: This figure plots estimates from the specification described in equation 3. The outcome variable is the poverty rate in the target neighborhoods or the poverty rate in the contiguous Census block groups. The shaded region denotes the 95 percent confidence intervals. Source: Authors’ calculations based on linked administrative data.

a chain of displacements that affected poverty rates throughout the city, our estimates are likely to represent an upper bound on the spillover effects for exposure to poverty rates for subsidized renters.

The Revitalization program had a small impact on poverty rates in neighborhoods surrounding Revitalization and failed applicant sites. To estimate the effect of the program on surrounding neighborhoods we estimate equation 3 where the outcome variable is the poverty rate in the contiguous Census block groups to the Revitalization and failed applicant neighborhoods. Figure 11 plots the results. The Revitalization program led to a 1.6 percentage point reduction in the neighborhood poverty rate 15 years after an award. For comparison, the figure also presents the effect on the neighborhoods that contain the Revitalization projects. The results show that, while the program did decrease poverty in adjacent neighborhoods, the impacts were more than four times larger in targeted neighborhoods. Table directly measure the share of the population with subsidized housing as well as the same statistic for all neighborhoods connected by in-migration flows.
B.3 shows that the Revitalization program increased home values and monthly mortgage payments by a similar amount in the surrounding neighborhoods and in the targeted neighborhoods. The impact on rent, however, is substantially smaller in adjacent neighborhoods: around one-third of the size of the effect on rent in Revitalization neighborhoods. Still, the increase in home values provides some evidence that the surrounding neighborhoods became more appealing places to live after the Revitalization program.\(^{31}\)

### 6.3 Aggregate Effects

We estimate the effect of the Revitalization program on the exposure to neighborhood poverty for all subsidized renters, by taking the weighted average of the group-specific effects presented in Sections 6.2.1 through 6.2.4. The weights are a function of the share of subsidized units in the PHA that are targeted by the Revitalization program. See Appendix C for details.

Figure 12(A) presents the results from decomposition described in equation 2 in the case where a PHA revitalizes half of their subsidized housing units. The height of the first five bars represents the group-specific estimate of \(\Delta_y \omega_g\) and the bar on the right presents the cumulative effect. Our estimates imply that PHAs that revitalized half of their subsidized units reduced the average neighborhood poverty rate of all subsidized renters by 4.8 percentage points. Reductions in exposure to poverty for new, subsidized residents of the revitalized neighborhoods explain 65 percent of the reduction in average neighborhood poverty rates.

As a complimentary analysis, we also show that subsidized households experienced a larger reduction in exposure to neighborhood poverty in PHAs that revitalized more public housing. We construct a PHA-level dataset and estimate the following specification,\(^{32}\)

\[
y_h = \alpha + \beta D_h + \lambda S_h + \phi X_h + \delta D_h \times S_h + \theta S_h \times X_h + \epsilon_h
\]  

(5)

where \(h\) denotes a PHA, \(D_h\) is equal to one if any public housing project received a Revitalization grant and is zero if any project applied for Revitalization funding and no project

\(^{31}\)Figure A.15 uses publicly available data to examine changes in housing prices between 1990 and 2017 in neighborhoods within 3 miles of a Revitalization or failed applicant site. While, consistent with the results in Table B.3, impacts on rent are limited to the targeted neighborhoods, we find positive effects on home values in neighborhoods located within a mile of the Revitalization or failed applicant sites.

\(^{32}\)This PHA-level analysis uses data from HUD User’s Picture of Subsidized Households and we focus on changes between 1997 (which is the earliest year in which all the necessary variables are available) and 2018.
Figure 12: Analysis of Public Housing Authorities

(A) Aggregation of Group-Specific Estimates

(B) Comparison to PHA-Level Regression

Notes: The height of first five bars in Panel A represents estimates of $\Delta_{g'\omega_g}$ from equation 2 in the case where the PHA revitalized half of the subsidized housing units. The bar on the right presents the aggregate effect ($\Delta$ from equation 2). Panel B compares the aggregate effects based on the group-specific estimates to those obtained from the PHA-level regression described in equation 5. The figure presents the estimated effects as a function of the share of subsidized units that were targeted by HOPE VI.

Source: Authors’ calculations based linked administrative data for the group-specific estimates and the 1997 and 2018 vintages of HUD User’s Picture of Subsidized Households for the PHA-level regressions.
received HOPE VI funding, $S_h$ is the share of subsidized units in 1997 that were targeted by HOPE VI (awarded or applied for), and $X_h$ is the average poverty rate of the HOPE VI and failed applicant sites in 1990. ³³ The sample includes PHAs that received Revitalization funding or applied for but did not receive any HOPE VI funding. The main coefficient of interest is $\delta$, which captures the effect of revitalizing a larger share of subsidized units. Intuitively, equation 5 compares PHAs that were awarded HOPE VI funding to PHAs that applied to revitalize a similar share of units but were not awarded funding.

Table B.4 presents the coefficient estimates from equation 5. The outcome in column 1 is the change in the average census tract poverty rate for subsidized households between 1997 and 2018. The estimates imply that revitalizing half of the subsidized units is associated with an 8.1 percentage point reduction in exposure to poverty ($0.081 = -0.003 + 0.168/2$). We estimate a more flexible specification by replacing the linear interaction between $D_h$ and $S_h$ with the interaction between $D_h$ and deciles of $S_h$. Figure 12(B) shows that the estimates from this nonparametric PHA-level regression (the diamonds), equation 5 (the dashed line), and the aggregated estimates from Section 6.2 (the solid line) all suggest similar aggregate associations between the Revitalization program and exposure to neighborhood poverty.³⁴

Returning to Table B.4, the outcome in column 2 is the component of changes in exposure to poverty (outcome in column 1) attributable to changes in poverty rates in revitalized sites.³⁵ The estimates suggest that reductions in neighborhood poverty in revitalized sites explain 60 percent of the total reduction in neighborhood poverty ($0.60=0.101/0.168$), similar to our findings based on equation 2 (65 percent compared to 60 percent).

The outcome variables in columns 2 to 4 of Table B.4 are the change in the share of subsidized units in public housing, the change in total public housing stock, and the change.

³³ We control for baseline poverty rates, since this is a key potential confounder. We estimate that the program reduced poverty rates by 7.7 percentage points when regressing block group poverty rate in 2017 on the Revitalization indicator and a vector of 15 baseline covariates (see column 1 of Table 1). If we estimate the same regression but only control for baseline poverty rates the estimate is 6.9 percentage points. If we include no covariates, the estimate drops to 3.5 percentage points. Following Feigenberg et al. (2023) we include the interaction between $S_h$ and $X_h$.

³⁴ The diamond markers in Figure 12(B) plot the estimated coefficient on the interaction between $D_h$ and deciles of $S_h$ against the average value of $S_h$ for that decile.

³⁵ We can write the average poverty rate for subsidized households in a given PHA at time $t$ as, $p_t = \omega_t p_r^t + (1 - \omega_t) p_n^t$, where $\omega_t$ is the share of units in revitalized neighborhoods and $p_r$ and $p_n$ denote the average poverty rates in revitalized and other neighborhoods, respectively. Then we can write the change as, $p_{t+1} - p_t = \omega_t (p_{r,t+1} - p_r^t) + p_{r,t+1} (\omega_{t+1} - \omega_t) + (1 - \omega_{t+1}) p_{n,t+1}^t - (1 - \omega_t) p_n^t$. The outcome in column 1 of Table B.4 is $p_{t+1} - p_t$ and the outcome in column 2 is $\omega_t (p_{r,t+1} - p_r^t)$. 

45
in county-level poverty rates. These estimates suggest that HOPE VI shifted subsidized units from public to voucher housing but did not reduce the overall supply of subsidized housing. Furthermore, there is no evidence that Revitalizations reduced the overall poverty rates in the city, which is consistent with the idea that the program altered where poor households lived but did not affect the incomes of individual adults.\footnote{\textit{It is possible that the program could have improved long-term outcomes for children growing up in subsidized housing or near the Revitalized neighborhoods, but looking at these intergenerational effects is outside the scope of our paper.}}

### 6.4 Heterogeneity Across Revitalization Sites

To shed light on the factors associated with the successful transition to economically integrated neighborhoods, we exploit observable differences across Revitalization sites. To create economically integrated communities, the Revitalization program had to attract higher-income residents to move into the market-rate units. Thus, for each project we calculate the poverty rate among households that move into the market-rate units that were built after the award. Within the Revitalization sample, we then regress the poverty rate of households in these new market-rate units against various site-level characteristics.

There is a tension between attracting higher income residents and providing broader access to the neighborhoods. This is partly a mechanical relationship: more market-rate units imply fewer units can be provided for poor households through public housing. However, columns 1 and 2 of Table 5 highlight an additional dynamic whereby providing greater access to the neighborhoods makes it more difficult to attract higher income residents to the existing market-rate units. Specifically, column 1 shows that a 10 percentage point increase in the share of units that are reserved for public housing is associated with a 2.7 percentage point increase in the poverty rate of the new residents of the market-rate units. Similarly, column 2 shows that a 10 percentage point increase in the poverty rate of public housing residents is associated with a 2.0 percentage point increase in the poverty rate of the new residents of the market-rate units. Thus, Revitalization sites that built more public housing and allocated those units poorer residents tended to attract poorer households to the market-rate units.

There is also a tradeoff between attracting higher income residents and targeting the most disadvantaged neighborhoods. The independent variable in columns 3 and 4 of Table 5 is the pre-award poverty rate of the targeted and surrounding neighborhoods, respectively.
### Table 5: Heterogeneity Across Revitalization Sites

<table>
<thead>
<tr>
<th>Poverty Rate, Residents of New Market-Rate Units</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public housing</td>
<td>0.273</td>
<td>0.141</td>
<td>0.044</td>
<td>0.037</td>
<td>0.000</td>
</tr>
<tr>
<td>Poverty rate, public housing residents</td>
<td>0.204</td>
<td>0.109</td>
<td>0.072</td>
<td>0.054</td>
<td>0.005</td>
</tr>
<tr>
<td>Poverty rate, target neighborhood</td>
<td>0.378</td>
<td>0.256</td>
<td>0.034</td>
<td>0.040</td>
<td>0.000</td>
</tr>
<tr>
<td>Poverty rate, surrounding neighborhoods</td>
<td>0.404</td>
<td>0.174</td>
<td>0.048</td>
<td>0.050</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Observations 251 251 251 251 251

Notes: Each column presents estimates from a separate regression. The sample includes only the Revitalization sites and the unit of observation is a site. The dependent variable is the poverty rate among individuals who move into market-rate units that were constructed after the award. The independent variable in columns 1-4 is the share of new units that are public housing, the share of public housing residents that are poor, the poverty rate in the targeted neighborhood prior the award, and the poverty rate in the surrounding neighborhoods prior to the award, respectively. Regressions are estimated via weighted-least squares, weighting by the baseline population. Standard errors are presented in parentheses and p-values are presented in brackets.

Source: Authors’ calculations based on linked administrative data.

Column 3 implies that a 10 percentage point increase in the poverty rate of the neighborhood prior to the award is associated with a 3.8 percentage point increase in the poverty rate of the new residents of the market-rate units after the award. In other words, neighborhoods that were originally poorer, tended to attract poorer residents to the new market-rate units after the award. The poverty rate of the surrounding neighborhoods is similarly important. These results suggest that creating economically integrated communities is most difficult in the neighborhoods that are most disadvantaged to begin with. Column 5 estimates a multivariate regression and shows that all four variables have an independent and economically meaningful association with the income composition of the new resident of the market-rate units. These patterns are broadly consistent with research showing that individuals’ valuations of a neighborhood depends both on the presence of public housing and on the demographic composition of the residents (Diamond and McQuade, 2019; Bayer et
al., 2022; Li, 2023).37

7 Discussion

Was the Revitalization program a cost-effective way of improving neighborhood conditions for subsidized households? The average revitalized site contained about 250 affordable units and the average grant size was $24 million. On a per unit basis the program is very expensive, with $96,000 spent per unit (96,000=24,000,000/250). However, the program produced a durable change in neighborhood conditions. Over a 20-year period the average cost per unit per year is $4,800 (4,800=96,000/20). This cost, is comparable to the subsidy costs of the housing voucher program: the average subsidy per unit per year for the housing voucher program was $5,500 in 2003, which is in the middle of our sample period (Finkel et al., 2003). These rough cost estimates suggest that, when considered over a sufficiently long time horizon of one or two decades, the Revitalization program is potentially a cost-effective strategy for improving neighborhood conditions for subsidized households.

8 Conclusion

Reducing exposure to neighborhood poverty is a central goal for housing policymakers. While past research has demonstrated the promise of programs that enable low-income households to move to less segregated neighborhoods, there remain questions about the scalability of this approach. Conversely, owing largely to data constraints, there is limited rigorous empirical evidence on the potential of place-based policies for reducing exposure to poverty for individuals. In this paper, we use individual-level administrative data to investigate the interplay between neighborhood-level transformation and individual-level residential outcomes in the context of a large, place-based policy: the HOPE VI Revitalization program.

We find that the Revitalization program led to a large, persistent reduction in neighbor-
hood poverty rates, and that this reduction in poverty in targeted neighborhoods translated into a reduction in exposure to poverty for the new subsidized renters. This suggests that the program was successful at enabling subsidized renters to live in less segregated neighborhoods. However, most of the original resident moved away and did not benefit from the changing neighborhood conditions. The high-rates of residential mobility suggest that place-based policies are an ineffective way to targeted specific individuals (i.e., the original residents) but nonetheless may be an effective way to target populations of interest (i.e., subsidized renters). While most of the original residents would have moved absent the program, some original residents were displaced by the demolitions and rising home prices. The provision of housing vouchers to the original neighborhood residents offers one promising approach for attenuating price-driven displacement.

Our results suggest that place-based policies can be a useful tool for reducing exposure to neighborhood poverty for subsidized renters. However, the Revitalization program ultimately sought to create better living conditions, not just reduce exposure to poverty. We find that the program increased house prices and reduced rates of out-migration, which is indirect evidence that the revitalized neighborhoods became more appealing places to live. Future work should aim to more directly quantify improvements in neighborhood conditions. For example, understanding whether the children who grow up in revitalized neighborhoods achieve better outcomes as adults is one promising avenue for future research.
References


Green, Bill and Vincent Lane, The final report of the National Commission on Severely Distressed Public Housing, A report to the Congress and the Secretary of Housing and Urban Development, 1992.
Appendix A  Additional Figures

Figure A.1: Geographic Distribution of Applicants and Awardees

Notes: The blue circles and red diamonds represent the location of HOPE VI Revitalization and failed applicant sites, respectively. The size of the markers is proportional to the number of units in the project. Source: Authors’ calculations based on project-level summary files from HUD.
Figure A.2: Number of Awardees and Failed Applicants by Year

Notes: The figure presents the number of public housing projects per grant year for projects that applied for and: (1) did not receive funding in that year, (2) did not receive funding in any year, and (3) received a HOPE VI Revitalization grant in that year. If a project received more than one HOPE VI grant, then we report the earliest year. Projects not awarded a grant in one year could apply in a subsequent year. We do not observe application data for 2009 and 2010.

Source: Authors’ calculations based on the publicly available list of awardees of and applicants to HOPE VI funding.
Figure A.3: Distribution of Baseline Characteristics

(A) Poverty

(B) Home Value

(C) Minority

(D) Disability

(E) Single Parents

(F) Occupied Units

Notes: Each figure presents a kernel density plots of characteristics measured prior to the award. Panels A and B summarize characteristics of the block group and are based on data from the 1990 Decennial Census. Panels C-F summarize characteristics of the projects as measured in the 1993 vintage of HUD User’s Picture of Subsidized Households. Distributions are presented separately by treatment status. Source: Authors’ calculations based on summary files of 1990 Decennial Census survey and project-level summary files from HUD.
Figure A.4: Balance of Baseline Characteristics

(A) Population Weights

(B) Inverse Propensity Score Weights

Notes: Each point represents an estimate from a separate regression in which we regress a characteristic of the neighborhood measured prior to the award (standardized by mean and s.d.) against a treatment dummy. In panels A and B we weight by population and the inverse propensity score, respectively. The red diamonds denote variables constructed using our internal data and the blue triangles denote variables based on publicly available data. Standard errors are clustered at the level of the neighborhood and the horizontal bars denote the 95 percent confidence interval.

Source: Authors' calculations based on linked administrative data.
Figure A.5: Effect on Housing Stock

(A) Total Housing

(B) New Housing

Notes: This figure plots estimates from the stacked difference-in-differences specification described in equation 3. The outcomes are the total housing stock and the proportion of housing built within the past few years. The vertical bars denote the 95 percent confidence intervals.

Source: Authors’ calculations based on summary files of Decennial Census surveys and the ACS.
Figure A.6: Effect on Number of Subsidized Housing Units

Notes: This figures plots estimates from the stacked difference-in-differences specification described in equation 3. The outcome is the log of the total number of subsidized housing units in the neighborhood. The vertical bars denote the 95 percent confidence intervals. Source: Authors’ calculations based on linked administrative data.
Figure A.7: Effect on Income Distribution in Neighborhood

Notes: This figure plots estimates from the equation 4. Each point represents an estimate from a separate regression in which the outcome variable is the proportion of individuals living in the neighborhood 10 to 15 years after the award whose AGI falls within the range defined by the horizontal axis. The vertical bars denote the 95 percent confidence intervals.
Source: Authors’ calculations based on linked administrative data.
Figure A.8: Effect on Alternative Measures of Poverty Rates

Notes: This figure plots estimates from the specification described in equation 3. The outcome variable is either the share of the population with an AGI below $15,000 (based on the administrative data) or the share of the population whose income falls below the poverty line (based on survey data). The shaded region denotes the 95 percent confidence intervals.

Source: Authors’ calculations based on linked administrative data.
Figure A.9: Effect on Population by Poverty Status

Notes: This figure plots estimates from the stacked difference-in-differences specification described in equation 3. The outcome is the log number of poor or non-poor individuals in the neighborhood. The shaded regions denote the 95 percent confidence intervals.
Source: Authors’ calculations based on linked administrative data.
Figure A.10: Effect on Neighborhood Poverty, Families with Children

Notes: This figure plots estimates from the stacked difference-in-differences specification described in equation 3. The outcome is the poverty rate for all individuals in the neighborhood (diamond markers) or the poverty rate for those 18 and younger (triangle markers). The shaded regions denote the 95 percent confidence intervals.

Source: Authors’ calculations based on linked administrative data.
Figure A.11: Residential Mobility of the Original Residents, Failed Applicants

Notes: This figure plots the proportion of the original residents of the failed applicant neighborhoods who moved to a different Census block group by a given year after the award.
Source: Authors’ calculations based on linked administrative data.
Figure A.12: Effect on Subsidy Status, Original Residents of Public Housing

Notes: This figure plots estimates from the stacked difference-in-differences specification described in equation 3. The outcome is the proportion of the original residents of the public housing project that were living in public, other subsidized, or non-subsidized housing. The shaded regions denote the 95 percent confidence intervals.

Source: Authors' calculations based on linked administrative data.
Figure A.13: Effect on Exposure to Poverty for Original Residents, By Subsidy Status

Notes: This figure plots estimates from the stacked difference-in-differences specification described in equation 3. The outcome is the poverty rate of the current neighborhood, and results are estimated separately by subsidized housing status. The shaded regions denote the 95 percent confidence intervals. Source: Authors’ calculations based on linked administrative data.
Figure A.14: Effect on Income of Original Residents

Notes: This figure plots estimates from the stacked difference-in-differences specification described in equation 3. The outcome is the proportion of the original residents who are poor. The shaded regions denote the 95 percent confidence intervals.
Source: Authors’ calculations based on linked administrative data.
Figure A.15: Effect on Housing Prices in Surrounding Neighborhoods

Notes: For each Revitalization and failed applicant site we identify all block groups within 3 miles and group them into deciles based on distance from the targeted neighborhoods. We then regress an outcome variable on the interaction between the distance and treatment, a project fixed effect, and a vector of baseline covariates measured in 1990 (log median home value, log median rent, poverty rate, share Black, and an indicator for whether the block group contains public housing). The outcome variables are the change in log median home value or log median rent between 1990 and 2017. The regression illustrates the relationship between changes in housing prices, distance from the targeted neighborhood, and treatment status of the targeted neighborhood. We estimate this specification via weighted least squares using the population in 1990 as weights and cluster standard errors at the level of the neighborhood. The vertical bars denote the 95 percent confidence intervals.

Source: Authors’ calculations based on summary files of Decennial Census surveys and the ACS.
### Appendix B  Additional Tables

#### Table B.1: Sample Restrictions

<table>
<thead>
<tr>
<th></th>
<th>Non-Applicant</th>
<th></th>
<th>Failed Applicant</th>
<th></th>
<th>Revitalization</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>count</td>
<td>percent</td>
<td>count</td>
<td>percent</td>
<td>count</td>
<td>percent</td>
</tr>
<tr>
<td>Full sample</td>
<td>16,300</td>
<td>100%</td>
<td>244</td>
<td>100%</td>
<td>286</td>
<td>100%</td>
</tr>
<tr>
<td>Located in state</td>
<td>15,932</td>
<td>98%</td>
<td>242</td>
<td>99%</td>
<td>286</td>
<td>100%</td>
</tr>
<tr>
<td>Not in indian housing</td>
<td>13,233</td>
<td>81%</td>
<td>242</td>
<td>99%</td>
<td>286</td>
<td>100%</td>
</tr>
<tr>
<td>In picture of subsized housing</td>
<td>13,233</td>
<td>81%</td>
<td>233</td>
<td>95%</td>
<td>272</td>
<td>95%</td>
</tr>
<tr>
<td>Not scattered site or vacant</td>
<td>12,618</td>
<td>77%</td>
<td>220</td>
<td>90%</td>
<td>271</td>
<td>95%</td>
</tr>
<tr>
<td>At least 25 units in 1993</td>
<td>8,913</td>
<td>55%</td>
<td>210</td>
<td>86%</td>
<td>266</td>
<td>93%</td>
</tr>
<tr>
<td>Not senior housing</td>
<td>6,946</td>
<td>43%</td>
<td>204</td>
<td>84%</td>
<td>262</td>
<td>92%</td>
</tr>
<tr>
<td>Non-missing location</td>
<td>6,084</td>
<td>37%</td>
<td>198</td>
<td>81%</td>
<td>251</td>
<td>88%</td>
</tr>
<tr>
<td>At least one mile from Revitalization</td>
<td>5,783</td>
<td>35%</td>
<td>166</td>
<td>68%</td>
<td>251</td>
<td>88%</td>
</tr>
</tbody>
</table>

Notes: The column headers define the sample (the three samples are mutually exclusive). Each row presents the count of projects that remain after imposing the sample restriction as well as the percent of the full sample.

Source: Authors' calculations based on project-level summary files from HUD and the publicly available list of awardees of and applicants to HOPE VI funding.
<table>
<thead>
<tr>
<th></th>
<th>Non-Applicant</th>
<th>Failed Applicant</th>
<th>Revitalization</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mean</td>
<td>s.d.</td>
<td>mean</td>
</tr>
<tr>
<td><strong>A. Project</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupied units</td>
<td>430</td>
<td>960</td>
<td>293</td>
</tr>
<tr>
<td>Percent minority</td>
<td>61.6</td>
<td>38.9</td>
<td>77.7</td>
</tr>
<tr>
<td>Percent majority income earned</td>
<td>21.1</td>
<td>15.2</td>
<td>19.9</td>
</tr>
<tr>
<td>Average household size</td>
<td>2.3</td>
<td>1.1</td>
<td>2.7</td>
</tr>
<tr>
<td>Percent 62 or older</td>
<td>26.4</td>
<td>21.4</td>
<td>15.0</td>
</tr>
<tr>
<td>Percent with disability</td>
<td>12.9</td>
<td>11.1</td>
<td>10.9</td>
</tr>
<tr>
<td>Percent single parent</td>
<td>35.5</td>
<td>25.0</td>
<td>47.4</td>
</tr>
<tr>
<td>Percent with female head</td>
<td>69.0</td>
<td>25.7</td>
<td>75.4</td>
</tr>
<tr>
<td>Percent crowded housing</td>
<td>6.8</td>
<td>8.5</td>
<td>7.4</td>
</tr>
<tr>
<td>Average rent</td>
<td>273</td>
<td>145</td>
<td>248</td>
</tr>
<tr>
<td>Average income (thousands)</td>
<td>13.1</td>
<td>6.9</td>
<td>11.6</td>
</tr>
<tr>
<td>Observations</td>
<td>5,783</td>
<td>166</td>
<td>251</td>
</tr>
<tr>
<td><strong>B. Census block group</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent Black</td>
<td>31.9</td>
<td>33.8</td>
<td>48.3</td>
</tr>
<tr>
<td>Median rent</td>
<td>606</td>
<td>260</td>
<td>501</td>
</tr>
<tr>
<td>Median home value (thousands)</td>
<td>119</td>
<td>103</td>
<td>111</td>
</tr>
<tr>
<td>Percent with public assistance</td>
<td>19.2</td>
<td>13.0</td>
<td>31.3</td>
</tr>
<tr>
<td>Percent unemployed</td>
<td>12.1</td>
<td>8.2</td>
<td>19.4</td>
</tr>
<tr>
<td>Percent below poverty</td>
<td>30.8</td>
<td>17.2</td>
<td>45.0</td>
</tr>
<tr>
<td>Number of people (thousands)</td>
<td>1.5</td>
<td>0.6</td>
<td>1.6</td>
</tr>
<tr>
<td>Observations</td>
<td>5,391</td>
<td>178</td>
<td>308</td>
</tr>
</tbody>
</table>

Notes: The columns define one of three mutually exclusive samples including non-HOPE VI, failed applicant, and Revitalization neighborhoods. Each row presents statistics for a different variable. In panel A the variables are measured at the project level in 1993. In panel B the variables are measured at the block group level in 1990. In panels A and B we weight by the population of the project and block group, respectively.

Source: Authors’ calculations based on project-level summary files from HUD and summary files from the 1990 Decennial Census.
Table B.3: Effect on Housing Prices and Home Ownership in Surrounding Neighborhoods

<table>
<thead>
<tr>
<th></th>
<th>Log Rent</th>
<th>Log Home Value</th>
<th>Log Monthly Mortgage</th>
<th>Owner</th>
<th>Renter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td>Revitalization</td>
<td>0.031</td>
<td>0.053</td>
<td>0.034</td>
<td>0.141</td>
<td>0.143</td>
</tr>
<tr>
<td></td>
<td>(0.032)</td>
<td>(0.025)</td>
<td>(0.021)</td>
<td>(0.048)</td>
<td>(0.044)</td>
</tr>
<tr>
<td></td>
<td>[0.320]</td>
<td>[0.037]</td>
<td>[0.095]</td>
<td>[0.004]</td>
<td>[0.001]</td>
</tr>
<tr>
<td>Housing Characteristics</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Exclude New Housing</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Mean</td>
<td>6.810</td>
<td>6.810</td>
<td>6.890</td>
<td>12.000</td>
<td>12.000</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>0.032</td>
<td>0.025</td>
<td>0.021</td>
<td>0.048</td>
<td>0.044</td>
</tr>
<tr>
<td>Observations</td>
<td>157,000</td>
<td>157,000</td>
<td>73,000</td>
<td>217,000</td>
<td>212,000</td>
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</tbody>
</table>

Notes: Each column presents estimates from a separate regression in which an outcome variable is regressed on an indicator for the Revitalization award. Regressions are estimated via weighted-least squares using the inverse propensity score. All regressions control for the year of first award and the calendar year as well as the vacancy rate, median home value, neighborhood poverty rate, and share of population that is Black in the year before the award. When indicated some regressions further control for housing characteristics (building type, year built, persons per room) and limit to house units built before the award. In columns 1-9 the unit of observation is the housing unit. In column 10-13 the data are collapsed to the project level. Standard errors are clustered at the neighborhood and are presented in parentheses and p-values are presented in brackets. We also report the mean and standard deviations for the failed applicant neighborhoods.

Source: Authors’ calculations based on linked survey and administrative data.
Table B.4: Analysis of Public Housing Authorities

Change in Outcome from 1997 to 2018

<table>
<thead>
<tr>
<th></th>
<th>Census Tract Poverty Rate</th>
<th>Poverty Rate in Revitalized Sites</th>
<th>Share Subsidized Units in Public Housing</th>
<th>Log Subsidized Units</th>
<th>County Poverty Rate</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
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<tr>
<td><strong>Revitalization</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.003</td>
<td>0.006</td>
<td>0.035</td>
<td>-0.020</td>
<td>-0.005</td>
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<tr>
<td></td>
<td>(0.021)</td>
<td>(0.010)</td>
<td>(0.054)</td>
<td>(0.087)</td>
<td>(0.010)</td>
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<td>[0.541]</td>
<td>[0.516]</td>
<td>[0.816]</td>
<td>[0.613]</td>
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<tr>
<td><strong>Units Targeted</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.158</td>
<td>0.250</td>
<td>0.280</td>
<td>-0.505</td>
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<tr>
<td></td>
<td>(0.077)</td>
<td>(0.037)</td>
<td>(0.197)</td>
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<td>(0.036)</td>
</tr>
<tr>
<td></td>
<td>[0.043]</td>
<td>[0.000]</td>
<td>[0.157]</td>
<td>[0.114]</td>
<td>[0.703]</td>
</tr>
<tr>
<td><strong>Revitalization × Units Targeted</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.168</td>
<td>-0.101</td>
<td>-0.790</td>
<td>0.360</td>
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<tr>
<td></td>
<td>(0.074)</td>
<td>(0.035)</td>
<td>(0.184)</td>
<td>(0.297)</td>
<td>(0.033)</td>
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<tr>
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<td>[0.024]</td>
<td>[0.004]</td>
<td>[0.000]</td>
<td>[0.227]</td>
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<tr>
<td><strong>Baseline Poverty</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.193</td>
<td>0.007</td>
<td>-0.013</td>
<td>-0.294</td>
<td>-0.059</td>
</tr>
<tr>
<td></td>
<td>(0.058)</td>
<td>(0.027)</td>
<td>(0.146)</td>
<td>(0.237)</td>
<td>(0.027)</td>
</tr>
<tr>
<td></td>
<td>[0.001]</td>
<td>[0.789]</td>
<td>[0.932]</td>
<td>[0.215]</td>
<td>[0.029]</td>
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<tr>
<td><strong>Baseline Poverty × Units Targeted</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>-0.594</td>
<td>-0.604</td>
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<tr>
<td></td>
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<td>(0.090)</td>
<td>(0.476)</td>
<td>(0.770)</td>
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<td>[0.000]</td>
<td>[0.339]</td>
<td>[0.234]</td>
<td>[0.610]</td>
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<tr>
<td><strong>Observations</strong></td>
<td></td>
<td></td>
<td></td>
<td>193</td>
<td>195</td>
</tr>
</tbody>
</table>

Notes: Each column presents estimates from a separate regression in which an outcome is regressed on an indicator for receiving Revitalization funding, the average poverty rate of targeted neighborhoods in 1990, the share of subsidized units targeted by HOPE VI, and the interaction between the share of subsidized units and the other two variables. The outcome variables in columns 1-4 include the change between 1997 and 2018 in the: average census tract poverty rate of subsidized households, the component of column 1 attributable to changes in poverty rates in the revitalized neighborhoods, share of subsidized units in public housing, total number of subsidized units, and county-level poverty rates. Each observation represents a PHA and the sample includes Revitalization PHAs (any public housing project received a Revitalization grant) and Failed Applicant PHAs (any public housing project applied for Revitalization funding but no project received HOPE VI funding). Each regression is estimated via weighted least squares, using the total number of subsidized units targeted by HOPE VI as the weights. Standard errors are presented in parentheses and p-values are presented in brackets.

Source: Authors’ calculations based the 1997 and 2018 vintages of HUD User’s Picture of Subsidized Households.
Appendix C  Aggregate Effects

Consider a modified version of equation 2,

\[
\Delta(s) = \sum_g \Delta_g \omega_g(s),
\]  

(C.1)

where \( \Delta_g \) is the change in the average neighborhood poverty rate between time \( t \) and \( t + 1 \) for subsidized renters in group \( g \), \( \omega_g \) is the share of subsidized renters who belong to group \( g \), and \( s \) is the share of public housing units in the PHA that are targeted by the Revitalization program. The estimates of \( \Delta_g \) are presented in Sections 6.2.1 through 6.2.4 and we consider implications for \( \Delta(s) \) for PHAs that revitalize a given share of their public housing stock. The subsections below describes how we estimate \( \Delta_g \) and \( \omega_g(s) \) for each group \( g \).

C.1 Original Residents

Figure 8 shows that program led the original residents to live in neighborhoods where the poverty rate was 1.46 percentage points lower 15 years after the award. We assume that the program had the same effect on households that remained and left subsidized housing. 27.1 percent of the original residents of the Revitalization projects resided in subsidized housing 15 years after the award. Thus, \( \beta_1 = -0.0146 \) and \( \omega_1(s) = 0.271 \times s \).

C.2 New Residents

Figure 4 shows that the program reduced the poverty rate in targeted neighborhoods by 7.8 percentage points 15 years after the award. Figure 9(A) shows that the new subsidized renters captured 99 percent of this effect. Table 2 shows that the program led to a 20 percent reduction in the number of subsidized units in the revitalized neighborhoods. Thus, \( \Delta_2 = -0.078 \times 0.99 \) and \( \omega_2(s) = 0.8 \times s \).

C.3 Residents Who Would Have Moved in Absent the Award

On average, individuals who move into a failed applicant neighborhoods in the 10 to 15 years after the award come from neighborhoods in which the poverty rate is 14 percentage points lower. Table 2 shows that the program led to a 20 percent reduction in the number of subsidized units in the revitalized neighborhoods. Thus, \( \Delta_2 = -0.14 \) and \( \omega_2(s) = 0.2 \times s \).
C.4 Spillovers

Section 6.2.3 discusses spillover effects from two different sources.

First, we consider spillovers from migration flows. Section 6.2.3 argues that the reduction in subsidized housing in targeted neighborhoods implies that there exist a set of households who would have moved into the Revitalization sites after the award and that the displacement of these households increases poverty rates in these non-targeted neighborhoods by 0.07 percentage points per year (see panel C and column 1 of Table 4). We consider effects that accumulate over a ten-year period and we assume that share of subsidized households affected by these spillover effects rises from zero when \( s = 0 \) to 0.5 when \( s = 0.5 \). Thus, \( \Delta_{4a} = 0.007 \) and \( \omega_{4a} = (1 - s) \times s \times 2 \).

Second, we consider spatial spillovers. Section 6.2.4 shows that the program reduced poverty rates by 1.6 percentage points in surrounding neighborhoods. Using data from HUD User’s a Picture of Subsidized Households we calculate that the median ratio of total number of subsidized households in nearby neighborhoods to the targeted neighborhoods in failed applicant sites is 0.53, which yields: \( \Delta_{4b} = -1.6 \) and \( \omega_{4b} = s \times 0.53 \).

Combining the migration and spatial spillover effects yields: \( \Delta_{4} = \omega_{4} = 0.007 \times (1 - s) \times s \times 2 - 1.6 \times s \times 0.53 \).