Examining the Housing and Neighborhood Trajectories for Former HUD-Assisted Households with Children

U.S. Department of Housing and Urban Development | Office of Policy Development and Research

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Foreword

There is significant turnover in HUD housing assistance, with current HUD-assisted families with children having a median length of subsidy receipt of about 5 years. However, to date, there has been little systematic research on the short- or long-term outcomes of households who leave HUD-assisted housing, nor are there unambiguous measures of positive and negative exits for most HUD programs.

In 2020, HUD's Office of Policy Development and Research announced funding for research to help us learn more about how households that exit HUD-assisted housing fare after exit and to help HUD and housing providers identify ways to support positive exits and improve long-term outcomes. To do this research, HUD asked applicants to leverage HUD administrative data on tenants by linking it with other secondary longitudinal data sources.

This report, "Examining the Housing and Neighborhood Trajectories for Former HUD-Assisted Households With Children," is one of the two exploratory studies supported by those research grants. The research team linked HUD data on assisted tenants to private sector data on where families with children move in 14 U.S. counties to examine three research questions: 1) What factors influence whether a family exiting HUD-assisted housing transitions into sustainable homeownership?; 2) Does an exit from HUD-subsidized housing lead to subsequent housing instability, and which types of households experience higher rates of residential moves?; 3) Do families who leave HUD-assisted housing move to neighborhoods with higher or lower poverty rates?

The exploratory findings suggest that when people move out of public housing, they are generally moving to new neighborhoods that have lower poverty rates than the neighborhood in which the public housing is located; however, for voucher tenants leaving housing assistance, their unassisted units are generally in neighborhoods with a similar poverty rate to the neighborhood where they were receiving assistance. This is consistent with other research that generally shows public housing neighborhoods to have higher poverty rates than voucher tenant neighborhoods.

The study also shows about 20 percent of the families leaving assistance moved into homeownership (as the owner themselves or with a family member). This rate was higher for families that had participated in HUD's Family Self-Sufficiency (FSS) program. Other FSS research shows that FSS families can build up significant escrow account savings that likely assists with achieving homeownership.

In August 2022, HUD released an **agenda for economic justice** that described actions that the department will take to help low-income renters build assets, including through programs like FSS. This agenda featured strategies to help renters in HUD programs build savings and improve credit. This research is an important component that will inform HUD's continued

work to help renters that we assist to build assets and thereby increase the chances of a positive exit from our rental assistance programs.

Solomon Greene
Principal Deputy Assistant Secretary for Policy Development and Research
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Table of Contents

List of Exhibits

Executive Summary

Approximately 3.5 million households in the United States benefit from housing assistance that the U.S. Department of Housing and Urban Development (HUD) administers through its public housing and Housing Choice Voucher (HCV) programs (McClure, 2018; HUD, n.d.). These households often have very low incomes—on average approximately $15,000 a year—and receive a deep housing subsidy, generally paying 30 percent of their income in rent. Despite the fact that many households remain in assisted housing for long periods of time (Bahchieva and Hosier, 2001; Freeman, 2005), recent scholarship suggests that turnover within HUD-assisted housing can be significant. An estimated 14 to 18 percent of households leave either the HCV or public housing programs each year (McClure, 2018). A number of factors can influence a household's decision to exit, including involuntary moves (such as eviction due to noncompliance with program rules), household composition or life course changes, or no longer requiring assistance due to rising income and improved financial stability.

What happens to these households upon exiting HUD housing assistance? Are they able to successfully obtain and sustain housing in the private market once their subsidies end? Or do they experience worse housing outcomes due to the lack of financial support? To date, systematic research has been sparse on the long-term outcomes of households that leave HUD-assisted housing (Smith et al., 2015). The few studies that exist suggest divergent trajectories. Although some households that leave housing assistance fare well, others experience high rates of housing instability and poverty (McInnis, Buron, and Popkin, 2007; Smith et al., 2015). However, due to data constraints, these previous studies focus only on a small subset of housing assistance recipients who previously lived in severely distressed public housing. As a result, it is unknown whether leaving HUD-assisted housing is broadly indicative of either housing mobility or instability.

This research project focuses on housing outcomes for households with children that leave HUD assistance, in an effort to shed some light on what happens to families post-exit. Research that documents the long-term trajectories of those who leave HUD-assisted housing—and the factors that contribute to either upward mobility or greater instability—is needed in order to develop policies that can support these households and ensure that leaving does not result in falling through the holes of the social safety net. The study relies on a unique dataset that matches records collected between 2006 and 2019 from two data sources: HUD administrative data on households in public housing and the tenant-based HCV programs along with a large longitudinal sample of household residential address locations from consumer data provider Data Axle (2020). Matching HUD administrative records with Data Axle residential location history data allows the research team to track long-term residential moves, tenure status, and neighborhood characteristics for households that leave HUD-assisted housing.

This study explores three questions.

- How do the neighborhood attainment trajectories compare for households that remained in HUD-assisted housing relative to those that exited?
- What is the probability that a household will transition to homeownership upon exiting HUD-assisted housing, and what influences that probability?
- Which household characteristics are associated with increased housing stability for households that exit HUD-assisted housing?

For each question, the report begins with a descriptive examination of outcomes, stratifying the analysis for public housing and HCV households. It then presents multivariate regression models that assess what factors are associated with differences in outcomes after exiting assistance.

The research shows that on average, those who exit housing assistance were able to successfully navigate the private housing market, although those outcomes were conditioned on factors such as race, ethnicity, and the strength of the local housing market.

- Households that left public housing assistance saw a large and significant decrease in their neighborhood poverty rate. This finding holds across multiple robustness checks and model specifications. These reductions in neighborhood poverty are meaningful. On average, households that exited public housing moved to neighborhoods with poverty rates that were 6 percentage points lower than for those who stayed in the public housing program.
- The post-exit dynamics for households that participated in the HCV program are more complex. Although those who exited the HCV program saw a slight improvement overall in their neighborhood poverty rate, those who remained in the program saw similar or, in some cases, larger declines. However, exiting the program was associated with a higher probability of moving from a high-poverty (more than 30 percent) to a low-poverty (less than 25 percent) neighborhood.
- Approximately one in five households leaving housing assistance moved into a home that was owned either by them or by a family/household member. This outcome was more likely for Asian and higher income households and for households participating in the Family Self-Sufficiency program.
- Most households that exited housing assistance between 2006 and 2018 were observed only moving once more after exiting. For those who moved more frequently, households exiting public housing (compared with former HCV recipients), older households, and Asian households were more likely to experience greater residential stability over time.
- The data reveal consistent and significant disparities in housing market outcomes by race and ethnicity; disparate outcomes were also significant for female-headed households and households that included a member with a disability. These findings suggest ongoing constraints in the private housing market for certain types of households and point to the need to continue to affirmatively further fair housing efforts.

Although exploratory, this research is the first to follow and examine the housing outcomes for households with children leaving HUD assistance across a range of metropolitan housing market contexts. Understanding whether exiting housing assistance leads to changes in neighborhood poverty exposures and housing stability for families with children has important implications for their long-term economic mobility (Chetty, Hendren, and Katz, 2016; Chyn and Katz, 2021), as well as for policy and the administration of HUD programs.

This report proceeds as follows. First, it presents an overview of the literature relevant to this research project, including prior work that looked at exits from HUD-assisted housing. The second section provides an overview of the methods, including data sources and the approach to data matching. The report then turns to the findings related to each of the three questions previously listed and concludes with the implications of the analysis for public policy, highlights its limitations, and provides suggestions for future research.

Literature Review

This project draws on four main areas of scholarship. The first area is research that focuses specifically on the length of tenure in HUD-assisted housing and some studies that followed households post-exit. Although not extensive, this body of work provides the framework and motivation for the analysis. This section then briefly summarizes the literature motiving the choice of housing outcomes for households with children, including neighborhood poverty, homeownership, and residential mobility.

Exiting HUD-Assisted Housing

Very little research has specifically assessed the experiences of households that leave HUD-assisted housing. Instead, most research has focused on residential mobility outcomes for households living in public housing undergoing mixed-income redevelopment and among HUD-assisted households within the Housing Choice Voucher (HCV) program (Ellen, 2020; Goetz, 2010; Goetz and Chapple, 2010; Reina and Aiken, 2022; Wang, 2018; Wang and Walter, 2018). This lack of research leaves a significant gap in the literature in respect to the effects of exiting HUD-assisted housing on household outcomes.

In the late 1990s, concurrent with policy discussions on welfare reform, a number of studies focused on the potential reasons why a household might exit from public housing assistance (Ambrose, 2005; Freeman, 2005; Hungerford, 1996; Rohe and Kleit, 1997). Subsequently, researchers who studied program attrition rates found that the median length housing assistance ranges between 4 and 5 years (Lubell, Shroder and Steffen, 2003; Thompson, 2007). More recent studies found slightly longer periods of assistance. For example, Joice (2017) followed a cohort of households receiving HUD assistance in 2010 and found that 40.4 percent had exited within 5 years. McClure (2018) estimates that between 14 to 18 percent of households exit HUD rental assistance programs each year, although some differences exist across subsidy types. Dantzler and Rivera (2019) further found that more than one-half of public housing residents in their sample expressed their intention to move, even if those intentions were not always realized, suggesting that a higher proportion of subsidized households might be likely to move if provided with the opportunity and resources to do so. A key take-away is that despite some differences in measured length of stay, all of these studies show that a significant share of households exit HUD housing assistance each year, highlighting the importance of understanding what happens next for these households.

These studies also highlight the complex factors that shape household assistance use, including individual and household characteristics (including life cycle), local economic context, duration of welfare use, and self-perceptions and self-efficacy (Freeman, 1998; Hungerford, 1996; Santiago and Galster, 2004). At the household level, empirical studies have found that larger households and households with children are more likely to leave assisted housing than those that have residents who are elderly or have a disability, with the age of children influencing exits

(Ambrose, 2005; Cortes, Lam, and Fein, 2008; Lubell, Shroder, and Steffen, 2003; Olsen et al., 2005). Black and Hispanic households tend to be less likely to exit (Dantzler and Rivera, 2019; McClure, 2018).

The research also points to contextual factors that influence the decision to stay or leave subsidized housing. McClure (2018) highlights the importance of disaggregating analyses by subsidy type and taking into account whether the public housing agency has implemented Moving to Work, the Rental Assistance Demonstration, and/or the Family Self-Sufficiency (FSS) programs (McClure, 2018). Dantzler and Rivera (2019) further argue that housing policy regimes affect the likelihood that a household exits public housing; for example, redevelopment under HOPE VI and Choice Neighborhoods has been found to influence attrition rates (Joice, 2017). Recent evidence also suggests that the introduction of Small Area Fair Market Rents (SAFMRs) has increased attrition in the HCV program, particularly among working-age adults and households living in areas with lower rents (Geyer, Dastrup, and Finkel, 2019). Results related to employment and housing market conditions are more mixed across studies, suggesting that interactions between a household's financial circumstances, the likelihood of either a voluntary or involuntary exit (such as eviction for nonpayment of rent), and alternative options in the private market are complex (Ambrose, 2005; Dantzler and Rivera, 2019; Olsen et al., 2005).

However, studies that follow households after they leave assistance are more limited and generally focus on a smaller sample of housing assistance households. McInnis, Buron, and Popkin (2007) used data from the Urban Institute's HOPE VI Panel Study to examine whether those who leave housing assistance are at greater risk of homelessness. Of the 887 households in the panel study, 103 left housing assistance for both positive and negative reasons. Those leaving housing assistance were found to have higher incomes, were more likely to be married, and lived in communities with lower poverty or in safer communities than those who remained in public housing, although those who left for negative reasons were found to be worse off than those who left for positive reasons. However, the researchers also noted that those who left demonstrated high levels of residential mobility and posited that even with higher incomes than those who stayed, "leavers" could still face considerable material hardship and, in effect, exit the safety net of a housing subsidy only to enter a new state of housing precarity.

Smith et al. (2015) draw on a combination of survey (1,149 leavers) and interview data (N = 24) from participants in the Moving to Opportunity (MTO) program to provide critical insights into what happens to those who exit assisted housing. They similarly find that household trajectories can be either positive or negative. For example, although 28 percent of leavers were able to transition into homeownership, others experienced homelessness (7 percent) and unemployment (36 percent). Incomes of leavers also varied considerably. Households that left for positive reasons reported a median income of $37,865, whereas families leaving for negative reasons reported a median income of $13,950. As Smith et al. (2015) pointed out, this difference in income has implications for the ability of these households to afford market-rate housing,

which in turn influences their housing security and ability to access lower poverty neighborhoods.

The lack of research on either the reasons for exiting or post-exit outcomes suggests that a lot remains to be learned about how households fare after leaving HUD assistance. For some households, leaving HUD assistance could represent steps toward economic advancement, particularly if the receipt of the subsidy for a few years allowed the household to stabilize and improve their financial situation. However, most households that leave HUD assistance do not have incomes significantly above the poverty line or at a level that makes them no longer eligible for housing assistance, suggesting that exiting typically represents a loss of resources with a concomitant effect on housing outcomes (Geyer, Dastrup, and Finkel, 2019; Gubits, Khadduri, and Turnham, 2009).

Neighborhood Poverty

Research from the MTO demonstration and the broader literature on neighborhood effects shows that neighborhoods matter and that moving to lower poverty neighborhoods has measurable benefits, particularly for children (Arcaya et al., 2016; Chetty, Hendren, and Katz, 2016; Chyn, 2018; Ellen and Turner, 1997; Galster and Hedman, 2014; Kling, Ludwig, and Katz, 2005; Ludwig et al., 2013; Sharkey and Faber, 2014). Still, the MTO research also shows how "sticky" neighborhoods can be; even those who received mobility vouchers, nevertheless, stayed in or returned to neighborhoods that were similar to those in which they lived as public housing residents (Briggs, Popkin, and Goering, 2010). In addition, research has shown the durability of neighborhood environments and the difficulty of moving out of poor neighborhoods, particularly for Black households (Li et al., 2019; Sharkey, 2013; South, Crowder, and Chavez, 2005).

Understanding how housing assistance influences exposures to neighborhood poverty is particularly important given the legacy of where the majority of households receiving housing assistance live. Public housing in particular was often located in the poorest and most racially isolated neighborhoods, fostering racial and income segregation (Goering, Kamely, and Richardson, 1997; McClure and Johnson, 2015). Furthermore, as McClure and Johnson (2015) pointed out, project-based housing reinforced and intensified existing neighborhood disadvantage by housing extremely low-income households; this finding was particularly true in cities characterized by very large public housing developments (Goetz, 2011a; Joseph, Chaskin, and Webber, 2007). Households in project-based housing assistance programs, such as public housing, are far more likely to reside in areas of concentrated poverty relative to households receiving vouchers (Fenelon, Slopen, and Newman, 2022). As a result, public housing residents—and children in public housing in particular—face the greatest risk among subsidized households experiencing negative effects associated with living in contexts of concentrated poverty.

Notwithstanding the potential benefits of moving away from spaces of concentrated poverty, households face a number of constraints in achieving such moves (Krysan and Crowder, 2017; Rosenblatt and DeLuca, 2012). Low-income households face substantial housing cost constraints during the housing search process, which may limit their ability to move to neighborhoods that tend to have greater amenities and lower poverty rates. The location of more affordable housing stock can exacerbate this challenge; restrictive land use zoning measures may restrict the ability of lower-income households and households of color to access many neighborhood submarkets (Lens and Monkkonen, 2016; Rothwell, 2011). Within the context of the HCV program, Fair Market Rent standards also have been shown to contribute to challenges in accessing lower poverty neighborhoods. Recent experiments with SAFMRs have attempted to rectify this programmatic limitation by allowing rent standards to vary at the scale of small geographies, such as ZIP Codes, instead of setting single metropolitan-wide standards (Reina, Acolin, and Bostic, 2019). Evaluations found some evidence that implementing SAFMRs has improved the neighborhoods that voucher recipients with children are able to access (Dastrup, Finkel, and Ellen, 2019).

Low-income households also face constraints due to various forms of discrimination, including source of income discrimination while receiving housing subsidies such as HCVs (Tighe, Hatch, and Mead, 2017). Many landlords refuse to accept households with vouchers, using a variety of tactics that include outright refusal, with some evidence that landlords in higher-opportunity neighborhoods are more likely to refuse prospective renters on the basis of having a housing voucher (Cunningham et al., 2018; Garboden et al., 2018). Source of income antidiscrimination laws may increase the ability of voucher recipients to access higher opportunity neighborhoods, although they are not sufficient to reduce the neighborhood concentration of voucher holders (Freeman and Li, 2014).

The housing search process may also impose limitations on the ability of low-income households to move to lower-poverty areas due to lack of social connections or knowledge about higher-opportunity areas. Households generally use a combination of their existing knowledge about particular neighborhood spaces and social network connections to facilitate the housing search process (Krysan and Crowder, 2017). Consequently, low-income households may not even search for housing in areas they know little about or that are perceived to be inaccessible; voucher holders have been shown to move to higher-opportunity neighborhoods when they receive counseling and other supports during the housing search process (Bergman et al., 2019).

The existing literature on the intersection between housing assistance and neighborhood poverty suggests that exiting housing assistance is likely to change the neighborhood environments of families with children, with potential implications for their long-term well-being.

Homeownership

Although most HUD housing assistance programs are not focused on homeownership per se, since the mid-1990s and the passage of the Personal Responsibility and Work Opportunity Reconciliation Act, a shift has tended toward policies that seek to build the financial self-sufficiency of households receiving household assistance (Santiago and Galster, 2004). Through programs such as the Family Self-Sufficiency Program, Jobs Plus, and local initiatives that seek to expand access to matched savings accounts, public housing authorities (PHAs) have expanded efforts to promote financial self-sufficiency and asset building, including expanding access to homeownership (Retsinas and Belsky, 2002; Rohe and Kleit, 1999). Although many have criticized these shifts as emblematic of efforts to reduce access to the social safety net and privatize public housing, they are also reflective of a growing body of research documenting the benefits of homeownership, especially for children (Boehm and Schlottmann, 1999; Green and White, 1997; Grinstein-Weiss et al., 2012, 2011; Harkness and Newman, 2005; Haurin, Parcel, and Haurin, 2002; McKernan and Sherraden, 2008).

Evidence for the people moving from HUD-assisted housing into homeownership is mixed and largely comes from a few places that have implemented targeted programs. The Charlotte Public Housing Authority (now called INLIVIAN), for example, launched its Gateway program in 1989. Qualitative research on the program found challenges in recruiting and graduating program participants (Rohe, 1995; Rohe and Kleit, 1997). However, an evaluation of Denver Housing Authority's Foundations for Homeownership Program found that 30 percent of participants who complied with program requirements were able to purchase a home within 5 years (Galster et al., 2019). Research has found that HUD-assisted households do transition into homeownership (Smith et al., 2015), with qualitative research in Seattle suggesting that the lower rents that come with living in public housing can serve as an important mechanism through which households save for downpayments (Reid, 2004). However, research has not explored what share of households that leave HUD-assisted housing are able to transition into homeownership and what factors might influence that transition.

Housing Stability

Housing stability is a critical factor shaping household well-being, including health, economic security, and educational achievement (Crowley, 2003; Jelleyman and Spencer, 2008; Lubell and Brennan, 2007; Sharkey and Sampson, 2010; Ziol-Guest and McKenna, 2014). However, low-income renters often face involuntary moves that contribute to deepening poverty and housing insecurity (Desmond, 2012; Desmond, Gershenson, and Kiviat, 2015; Desmond and Perkins, 2016). Renting on the private market, living in substandard housing, and living in disadvantaged neighborhoods all contribute to residential instability, as does intimate partner violence and changes in employment or relationship status (Kull, Coley, and Lynch, 2016). Households with children—the demographic thought to experience the greatest long-term effects associated with living in a context of concentrated poverty—are also the most likely to

experience residential instability, which may further hinder their ability to benefit from living in a stable low-poverty environment (Desmond and Perkins, 2016).

Data and Matching Methodology

This study focuses on housing outcomes for households with children that leave HUD assistance. It relies on a unique dataset that matches HUD administrative data on subsidized housing, focusing on public housing and Housing Choice Voucher (HCV) programs, with proprietary consumer data from Data Axle that include a large sample of household residential addresses from 2006 through 2019. These data are supplemented with neighborhood-level characteristics using the American Community Survey. The matched data are used Data Axle to track long-term residential moves, tenure status, and neighborhood characteristics for households that leave HUD-assisted housing. This section describes the sample construction and methodology used for matching and cleaning the data.

Study Sample

This study focuses on HUD households participating in either public housing or HCV programs across 14 metropolitan statistical areas (MSAs; exhibit 1). These MSAs were selected to represent a diversity of geographic, demographic, programmatic, and housing market conditions (exhibit 2). The sample includes MSAs such as Seattle (with the lowest poverty rate and lowest vacancy rate in the sample) and San Francisco (with the highest rent at more than $2,000), as well as places like Cleveland (with the highest poverty rates and lowest rents) and Tampa (with the highest vacancy rate). These study areas also feature a wide range of demographic characteristics, exemplified by racial composition. The sample includes both the Salt Lake City (less than 2 percent Black) and Atlanta metropolitan areas (more than one-third Black). Furthermore, programmatic differences are also among the study areas, encompassing a variety of public housing agencies (PHAs), including those participating in the Moving to Work (MTW) and Family Self-Sufficiency programs.

Exhibit 1. Metropolitan Statistical Areas in the Study Sample

Source: U.S. Census Metropolitan Statistical Areas TigerLine Shapefile

Exhibit 2. Characteristics of Sample Metropolitan Statistical Areas

Metropolitan Statistical Areas	Poverty Rate(%)	Median Rent ($)	Vacancy Rate (%)	Percent Black (%)	Percent Hispanic (%)
Atlanta	10.5	1,224	7.4	34.2	11.0
Baltimore	9.4	1,316	9.1	29.3	6.3
Cleveland	13.5	813	9.5	19.4	6.2
Dallas	10.5	1,202	8.5	15.9	29.3
Los Angeles	12.4	1,655	6.9	6.3	45.1
Louisville	11.9	880	10.3	15.0	5.3
Minneapolis	8.2	1,144	5.0	8.6	6.0
Philadelphia	11.8	1,162	7.3	20.3	9.9
Phoenix	12.1	1,188	10.4	5.4	31.3
Providence	11.0	1,003	11.2	5.4	13.6

Metropolitan Statistical Areas	Poverty Rate(%)	Median Rent ($)	Vacancy Rate (%)	Percent Black (%)	Percent Hispanic (%)
Salt Lake City	8.6	1,181	6.6	1.8	18.5
San Francisco	8.2	2,057	6.5	7.2	21.9
Seattle	7.8	1,621	6.3	5.9	10.4
Tampa	12.4	1,160	15.3	11.6	20.6

Source: American Community Survey 2019 1-year estimates

HUD Administrative Data

Since the mid-1990s, data on HUD program participants have been uploaded to different centralized data repositories. HUD compiled these different data repositories into one longitudinal database that includes detailed tenant records across the different programs (Lloyd et al., 2017). Data are typically collected at three times—when a tenant initially moves into a unit, annually to recertify incomes and calculate rents, and at the end of program participation, although, as the following discusses, these end-of-participation data have reliability limitations that affect their usability for this study. Data collection practices can also vary, especially for MTW PHAs (Rohe, Webb, and Frescoln, 2016).[1] Although other researchers who have used these data have identified data quality issues associated with the raw file, it nevertheless presents researchers with a unique opportunity to track households across housing assistance programs over time (Lloyd et al., 2017).

The initial sample for this study includes all households that lived in HUD assisted housing between 2006 and 2019 and had children living in the unit at any point during that time period. To ensure that the sample has at least 3 years of data, only households that entered housing assistance by 2018 are included. The sample is further limited to households for which the final observation in the HUD data with an identifiable census tract is within 1 of the 14 MSA study areas. After exiting subsidized housing, these households may either remain within the MSA study areas or move elsewhere.

This analysis focuses on households participating in one of two HUD-assistance programs: Public housing and the tenant-based HCV program. Households that participated in other HUD assistance programs as of their final observation are excluded, even if they had previously

[1] Prior to the early 2000s, PHAs submitted data on HCV and public housing recipients to the Multifamily Tenant Characteristics System. After the early 2000s, PHAs submitted data to the Public and Indian Housing Information Center, which was recently updated into the Information Management System of the Public and Indian Housing Information Center. For multifamily program participants, data are uploaded to the Tenant Rental Assistance Certification System.

participated in the HCV or public housing programs, which results in a final sample of 420,677 HUD households with children (exhibit 3).

Exhibit 3. Filtering Process

Data Subset	Sample Size
Total households with children	825,515
Household entered program by 2018	783,425
Household's final location with a valid census tract identifier (located within study area)	573,406
Receiving housing choice vouchers or public housing assistance during final observation	420,677
Final sample of HUD households	420,677

Source: HUD Administrative Data

The research limits the analysis to residents participating in the public housing and the HCV programs because of their distinct approaches in providing housing assistance. Public housing is a project-based subsidy, meaning that households are required to live at a specific property. Due to the legacy of how and where public housing projects were sited, these properties are often associated with concentrated poverty and stigma (Vale and Freemark, 2012). Public housing households that want to move to different neighborhoods would face barriers doing so and to retaining assistance.

In contrast, the tenant-based HCV program is a portable subsidy that allows a household to rent a unit in the private market and, within programmatic limitations, move to a different neighborhood while retaining their subsidy. These different program structures may thus lead to different neighborhood outcomes for stayers and movers, a key question motivating this study. Households living in project-based voucher or rental assistance units were excluded. Although project-based vouchers represent important forms of HUD housing assistance, it is more complicated to interpret findings due to the diversity of ways they are used. For example, households could live in a former public housing site (due to a Rental Assistance Demonstration conversion as an example), in a Low-Income Housing Tax Credit building in which the project-based voucher is applied to provide deeper affordability, or in a privately owned multifamily building. Because this is the first time HUD assistance data are matched to consumer reference data, limiting the sample and the number of potential confounding factors helps minimize complexity and potential errors.

The HUD administrative data also include household-level characteristics that are used as controls across all of the models in this report. These variables include—

- Household income, grouped into four categories: Equal to or less than $5,000; $5,001–$15,000; $15,000–$25,000; and greater than $25,000.
- Length of tenure in HUD, grouped into four categories: Up to 1 year, between 2 and 5 years, between 6 and 10 years, or 10 or more years.

- The presence of children in three different age groups: Under 5 years old, between 5 and 12, and between 12 and 18.
- The absolute number of children in the household.
- Amount of rent the household pays.
- Race and ethnicity of the household head: Non-Hispanic White, Black and African-American, Hispanic and Latinx, Asian, and other.
- Gender of the household head: Female or male.
- Age of the household head, grouped into four categories: 18–34, 35–49, 50–64, and 65 or older.
- Whether any household member has a disability.
- Whether any household member has wage income.

The models also include a variable indicating whether the household moved outside its original study area (metropolitan region) after exiting housing assistance to examine different effects associated with longer distance moves and moves to different regional contexts. Models also include fixed-effects for the metropolitan region from which the household originates, as well as the year of observation to control for non-observable time-varying characteristics across the study time period.

Consumer Reference Data

Post-exit outcomes rely on data drawn from a private consumer reference dataset that Data Axle (formerly Infogroup) provided, which includes household-level information, including occupant names and locations, estimates of household tenure status, annual income, wealth, and racial composition. Consumer reference datasets that companies such as Data Axle and Infutor generate are increasingly used in social science research, particularly with respect to housing markets and intraregional residential mobility (Acolin et al., 2022; Greenlee, 2019; Phillips, 2020).

Data Axle maintains a consumer database, which at the national level contains residential address and demographic information for approximately 185 million households. Data Axle obtains its residential addresses from three address databases—the National Change of Address database, the Locatable Address Coding System (LACS), and the Delivery Point Verification database—to identify and verify residential location changes.[2] It also collects, cleans, and matches other sources of public records, including deed transfer and tax assessor information, which they use to document the housing tenure (rent or own) of each household. Each residential address (housing unit) and household is assigned a unique identification number that can be used to link records over time.

[2] LACS is a database of converted addresses that primarily arise from the implementation of the 911 system, which commonly involves changing rural addresses to city-style addresses. LACS also contains existing city-style addresses that have been renamed or renumbered. Delivery Point Validation confirms that an address actually exists and can receive deliveries—down to the apartment or suite number.

Records in Data Axle are matched to households within the HUD administrative data using name and addresses.

Data Axle also includes a measure of housing tenure, which is used to to assess the effect of exits from HUD assistance on homeownership. This measure is provided within the consumer reference data as a numeric 0–9 scale, with 0 signifying households that are most likely to be renters and 9 signifying households that are most likely to be homeowners. For the purposes of this analysis, households moving to homeownership are limited to those households receiving a tenure score of 7 or higher, households with scores between 0 and 3 are identified as renters, and scores between 4 and 6 are treated as ambiguous.[3] Information on race, ethnicity, income, or wealth in Data Axle are not used because of concerns about not being able to validate their methodology for estimating these household characteristics.

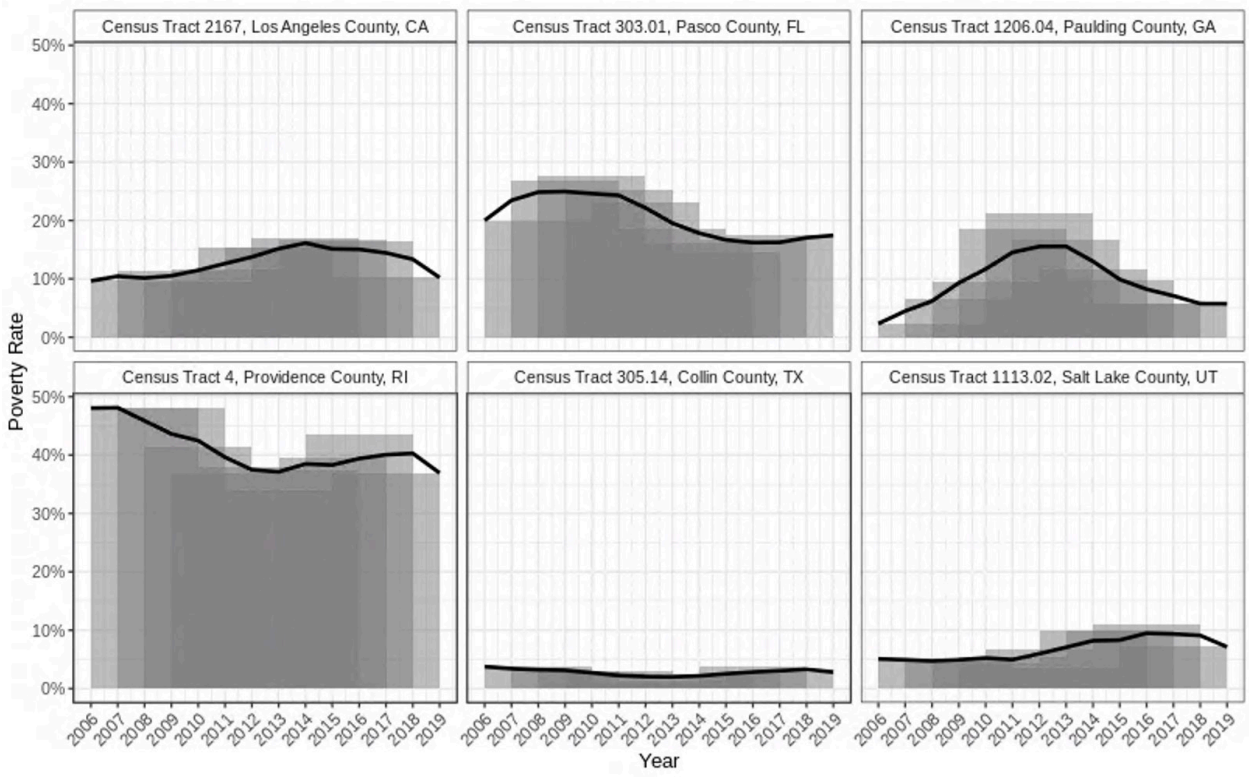
Neighborhood-Level Characteristics

Neighborhood-level characteristics are derived from the American Community Survey (ACS) 5-year estimates. Given that households exiting from HUD programs occurred at different points in time, static estimates of tract poverty rates at a single point in time may not accurately reflect the changes in poverty for those that remained in the same location and those that moved.

To address this limitation, the research team developed smoothed estimates of tract-level characteristics by averaging all of the ACS 5-year estimates, including data between 2006 and 2019 that overlap with the year of a household observation. Although the poverty rate assigned to an observation in 2019 is therefore based solely on ACS 2015–2019 estimates, the poverty rate assigned to an observation in 2015 is based on the average of the ACS 2011–2015, 2012–2016, 2013–2017, 2014–2018, and 2015–2019 estimates. Exhibit 4 illustrates this approach, showing the correspondence between overlapping 5-year survey estimates (shaded background) and smoothed estimates (solid line) for six randomly selected census tracts within the sample MSAs. This approach creates a smoother estimate of poverty rate over time and avoids threshold effects associated with using multiple non-overlapping ACS 5-year periods.

[3] Tenure was validated by randomly spot-checking a sample of households in Data Axle with tax assessor data. In this process, scores of 7 or higher were strongly correlated with owner-occupancy status in the tax assessor database.

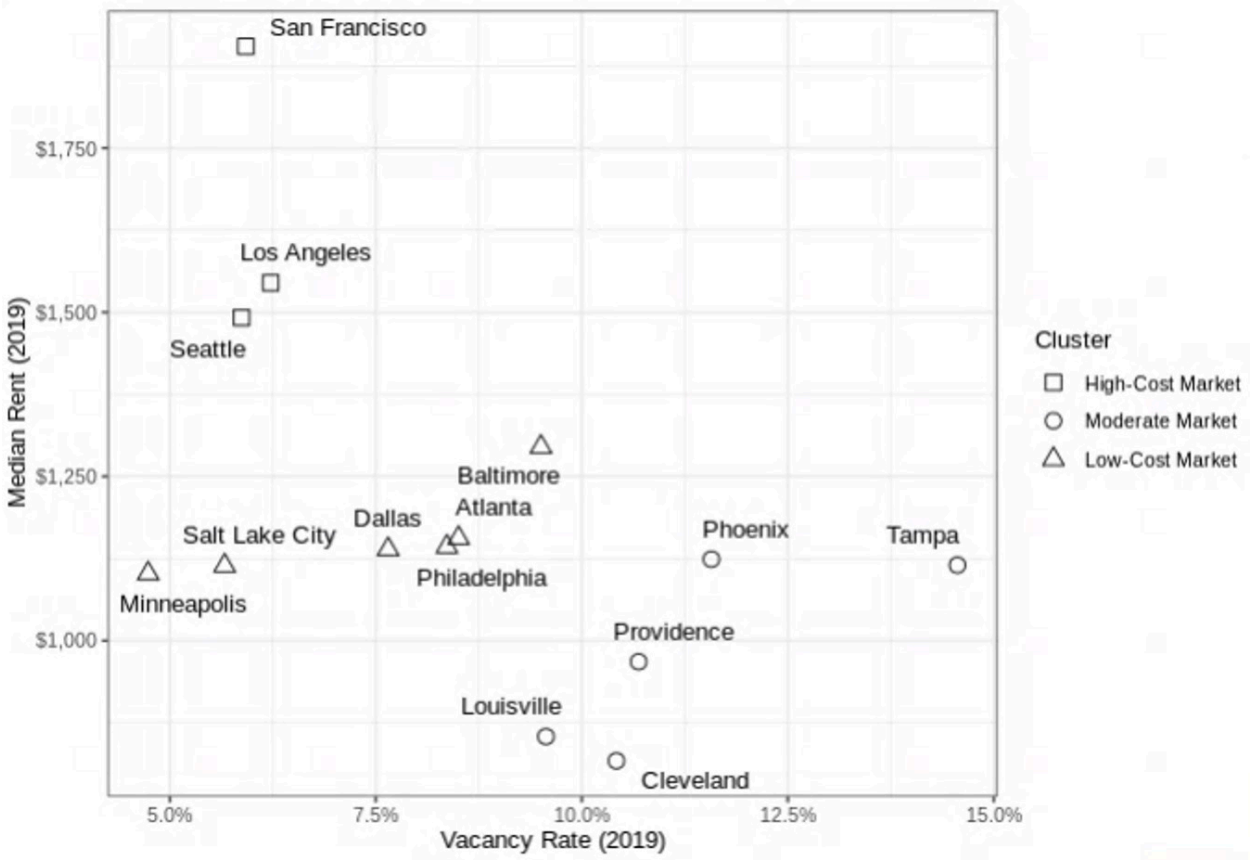
Exhibit 4. Illustration of Neighborhood Poverty Rate Smoothing



Source: American Community Survey 2010–19 5-year estimates

To analyze the role of housing market conditions in the outcomes of exits from HUD assistance, the research team classified MSAs based on two key housing market indicators according to the ACS 2019 1-year estimates: median rents and vacancy rates. Using a k-means clustering algorithm, MSAs were divided into three distinct groups (exhibit 5). The MSAs are first, with high median rents and low vacancy rates, indicating a tight and competitive rental market, which are the West Coast MSAs in the sample: Los Angeles, San Francisco, and Seattle. On the other end of the spectrum are those MSAs with low median rents and high vacancy rates, encompassing rental markets that either have very low median rents (Cleveland, Louisville, and Providence) or very high vacancy rates (Phoenix and Tampa). The final category includes the remaining MSAs, which share relatively moderate rent levels and vacancy rates that fall somewhere between those in the aforementioned categories, including Atlanta, Baltimore, Dallas, Minneapolis, Philadelphia, and Salt Lake City. Although various mechanisms dictate the rent and vacancy levels within each metropolitan area, these categories provide a heuristic for examining the outcomes of households within different housing market contexts.

Exhibit 5. Metropolitan Statistical Area Housing Market Typology



Source: American Community Survey 2019 1-year estimates

Data Matching

Residential outcomes for households were assessed by linking HUD program data on public and assisted housing programs from the HUD Longitudinal File with the Data Axle consumer reference data. HUD program records were iteratively matched to Data Axle records based on name and address information, with each successive stage of matching permitting a greater degree of flexibility in matching criteria.

Methodology

Exhibit 6 shows a summary of each matching stage. In the first stage of matching (Matching Stage A), households were matched between the two datasets only if an exact match is based on first name, last name, *and* street address for *any* individual within a particular household. These matches did not need to occur in the same year, because a lag may exist between when a household is observed at a particular location in the HUD dataset and the time at which that household is observed at that location in the consumer reference data. Therefore, although matches are not necessarily based on observations from the same year, subsequent analysis of exit trajectories focuses only on comparing addresses from the HUD dataset with *different*

addresses observed in the Data Axle dataset after the household has exited assistance. This analysis assumes that household locations are accurate as long as they appear in the HUD dataset, and Data Axle observations are used for the years following household exits from housing assistance. Therefore, the timing of the match is less significant than whether any match can be identified.

Exhibit 6. Origin HUD Administrative Records Matching Process

Matching Stage	Exact Matching	Fuzzy Matching	Total Matches (Share of Total)
A	Census Tract Street Address First Name Last Name	N/A	276,537 (79%)
B	Census Tract	Street Address (≤ 2 characters) First Name (≤ 2 characters) Last Name (≤ 2 characters)	42,211 (12%)
C	Census Tract First Name Last Name	N/A	13,381 (4%)
D	Census Tract	First Name (≤ 2 characters) Last Name (≤ 2 characters)	12,111 (3%)
E	First Name Last Name	Census Tract (within 1,000m)	7,561 (2%)

N/A = data not available.
Source: Authors' analysis of HUD Administrative and Data Axle datasets

Subsequent stages of the matching process progressively reduced the threshold for a positive match. In the second stage of matching, first and last name and street address strings were allowed to differ between the two datasets by a maximum of two characters, selecting the matches for each HUD household that minimize the overall string distance between these three fields (Matching Stage B).

One complication in using the HUD administrative data is that the residential address for the household is sometimes recorded as the address of the property manager's office, meaning that multiple households within a public housing project may have the same recorded street address. For households not matched in the first two stages, the research team used exact matches on tenant first and last names but allowed for a match anywhere within the same census tract (Matching Stage C). This matching technique was extended to include all households for which the first and last names differ by a maximum of two characters within the same census tract (Matching Stage D). Finally, records were matched on the first and last names of tenants in *neighboring* census tracts, defined by census tracts within a 1-kilometer radius of a given HUD

household location. The latter stage of matching was necessary, because the central location (for example, property manager office) within a larger development can be in a different census tract.

Validating Matches

The research team conducted a number of spot checks to validate our matching process in order to ensure that matched records did not include a large share of false positives (a common problem with fuzzy matching). Erroneous matches were more likely to be associated with short names, particularly in the stage that used fuzzy string matching for names within the same census tract (Stage D). Consequently, matches from Stage D, for which both the first and last names associated with the match had four characters or fewer and for which the total string distance for the first and last names combined was greater than 2, were excluded.

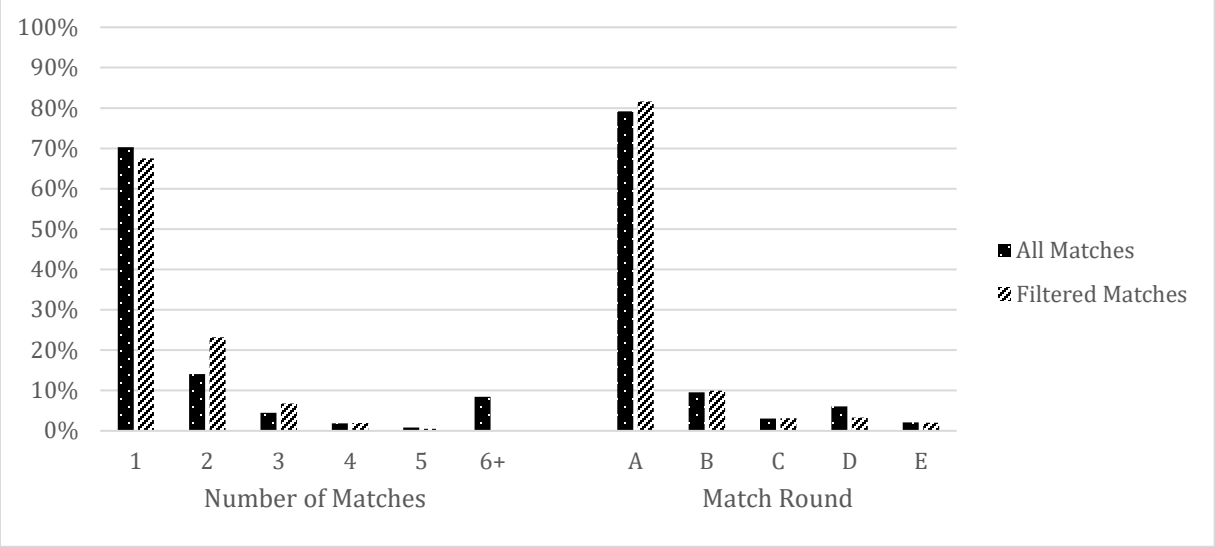
Another limitation arose from the occurrence of multiple matches associated with each individual HUD household. Multiple matches occur for two reasons: (1) multiple individuals within the Data Axle households are matched via name and address to individuals within the same HUD household, and (2) similarities in name and locational characteristics may yield multiple matches. Multiple-match cases obtained in Matching Stage A most likely derive from the former case due to differences in the way Data Axle defines household records. In the case of married couples with different last names, each individual may be treated as a separate household, although the individuals consistently live in the same location. Data Axle may also observe members of a HUD household subsequently living in different locations, perhaps due to relationship dissolution. On the other hand, multiple-match cases from subsequent matching stages may occur due to name and locational similarities between different households.

To address this, matched observations are weighted such that the sum of the weights for all matched observations for any given HUD household sum to 1. If a HUD household is matched to four separate Data Axle records, for example, each match receives a weight of 0.25. In the case of married couples that consistently live in the same locations, this weighting produces an equivalent outcome to following a single individual within the household. In cases where individuals move to different locations—or in cases where the matching is less certain—equal weights to all possible locational outcomes associated with the original HUD household were assigned. Tenants with common names are more likely to be assigned inaccurate matches, particularly during the latter stages of matching. Therefore, the research team further restricted the matched sample to HUD households for which five or fewer distinct matches are identified in the Data Axle dataset, which aligns with the maximum number of named individuals within each Data Axle household record.

Exhibit 7 shows the effect of matching restrictions on the final sample. It presents the original matched sample next to the distribution of the filtered sample for both (1) the number of total matches obtained from Data Axle for a given HUD household and (2) the matching stage during which the match was obtained. Filtering the matched sample has a limited effect on the overall

distribution of the dataset, although it does slightly increase the share of matches obtained through exact matching on name and address (Stage A), decrease the share of matches obtained through fuzzy string matching at the census tract level (Stage D), and reduce the share of the sample with multiple matches.

Exhibit 7. Impact of Filtering Fuzzy Matches on Final Sample



Source: Authors' analysis of HUD Administrative and Data Axle datasets

Determining Exits

"Exiters" are defined as any household in the sample (n = 420,677), which is coded as moving out of assistance prior to 2019,[4] *and for whom there is a recorded subsequent address in the Data Axle dataset that is different from the most recently observed HUD address*. Conversely, "stayers" are those who are still observed with recorded actions with an effective date in 2018 and for those without a new address. The one potential downside to this approach is that it may miss HCV households that exited the program and yet elected to stay at the same address without the HUD subsidy.

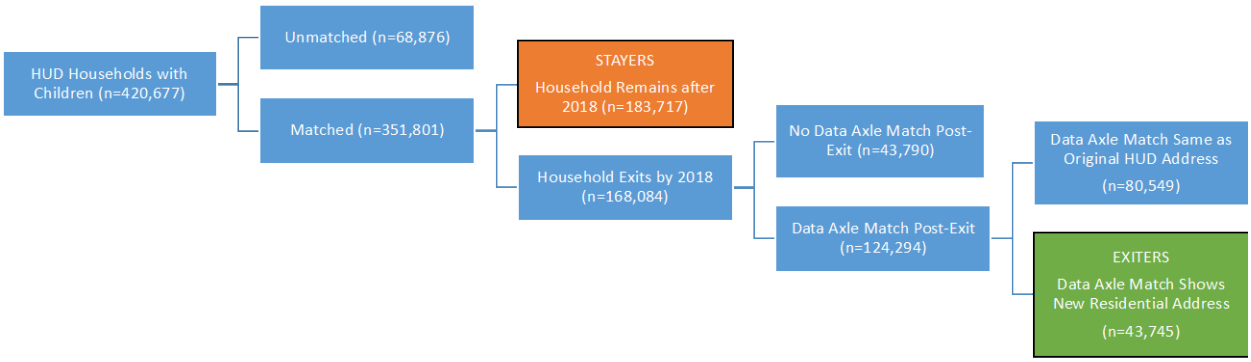
Matching Results

Accounting for these quality control measures, roughly 86 percent of eligible households in the HUD dataset were matched to Data Axle records. Out of these matched records, roughly 39 percent remained in the HUD administrative data through 2019, and the other 61 percent exited the HUD dataset before 2019. The former group serves as the reference category for subsequent comparative analysis and includes 183,717 households. After accounting for households that were matched but for which there was not a Data Axle observation subsequent to the household exiting the HUD dataset (43,790) and households for which all observations following the household's exit were at the same location as the origin HUD address (80,549), the sample

[4] Exits are defined using the ACTN_TYPE_CD and effective date in the Longitudinal File. Households that were identified as '6: end of participation' (EOP) were coded as exiting assistance. For HCV recipients who (1) did not have a EOP code and (2) did not have another recorded action within 2 years for non-Moving to Work and 4 years for MTW agencies, it was assumed that they exited assistance. This assumption was necessary, because an address change within the HCV program could just reflect moving within the program.

includes 43,745 households that (1) had at least one match with the Data Axle dataset and (2) where the matched Data Axle households appeared in different locations following the year that the household exited the HUD dataset (exhibit 8).

Exhibit 3. Matching Results



Source: Analysis of HUD Administrative Data and HUD/Data Axle Matched Sample

Although this matching process leads to attrition in the overall HUD sample, the different stages show that the groups are relatively similar in terms of household characteristics, with some exceptions (exhibit 9). Compared with the HUD sample of households with children, matched households that remained in HUD-subsidized housing as of 2019 (matched stayers)—the comparison group for the subsequent analyses—were more likely to have Black and female household heads and slightly higher incomes and rents. Matched households that exited HUD-assisted housing (matched exits) are more likely to be wage earners and more likely to be White.

Exhibit 4. Household Characteristics for Different Matched Groups

	Full Dataset	Matches	Matched Stayers	Matched Exits	Moves	Moves (Exact Match)	Moves (Partial Match)
Head Black	64.3%	65.9%	67.8%	63.5%	61.6%	61.7%	61.0%
Head Hispanic	15.5%	15.1%	15.2%	15.0%	13.5%	13.2%	14.7%
Head White	15.5%	14.4%	12.3%	16.9%	20.0%	20.2%	19.3%
Head Asian	3.4%	3.4%	3.6%	3.2%	3.5%	3.5%	3.7%
Head Other	1.3%	1.2%	1.1%	1.3%	1.4%	1.4%	1.3%
Female Head	90.6%	91.9%	92.6%	91.0%	90.8%	91.0%	90.2%
Head Age	36.3	36.3	36.4	36.2	36	36	36
Child Under 5	37.8%	38.1%	39.1%	36.8%	36.4%	36.2%	37.3%
Child 5–12	56.1%	60.0%	60.4%	59.5%	60.4%	61.3%	57.7%
Child 12–18	48.2%	52.0%	49.8%	54.6%	54.5%	55.3%	51.2%
Disability	22.4%	22.4%	24.0%	20.4%	19.1%	19.2%	18.3%
Wage Earner	47.0%	47.2%	44.7%	50.3%	56.0%	56.0%	55.8%
Income	$13,692	$13,892	$13,334	$14,568	$16,275	$16,278	$16,068
No Assets	67.3%	67.6%	67.8%	67.4%	62.5%	61.9%	65.1%
Assets <$1000	26.9%	26.8%	26.9%	26.8%	30.1%	30.7%	27.4%
Assets >$1000	5.7%	5.6%	5.4%	5.8%	7.4%	7.4%	7.5%
Rent Paid	$236	$236	$224	$251	$286	$285	$293
N	420,677	351,801	183,717	168,084	43,745	35,207	8,538

Source: Analysis of HUD Administrative Data and HUD/Data Axle Matched Sample

Matched households are slightly more likely to have a White household head, a wage earner, and slightly higher incomes, and they are less likely to have children under the age of 12 but were otherwise reasonably similar to the original sample of HUD households with children. Exhibit 9 also shows that households matched through exact matching on name and address compared with fuzzy matching approaches are reasonably similar to one another, with households obtained through exact matching slightly more likely to have Black household heads, a disability, assets under $1,000, and older children relative to those obtained through partial matching. However, the data overall do not show large differences resulting from the matching and filtering processes, suggesting that the final sample of movers versus stayers is reflective of the larger sample of HUD households with children within this study's 14 metropolitan statistical areas.

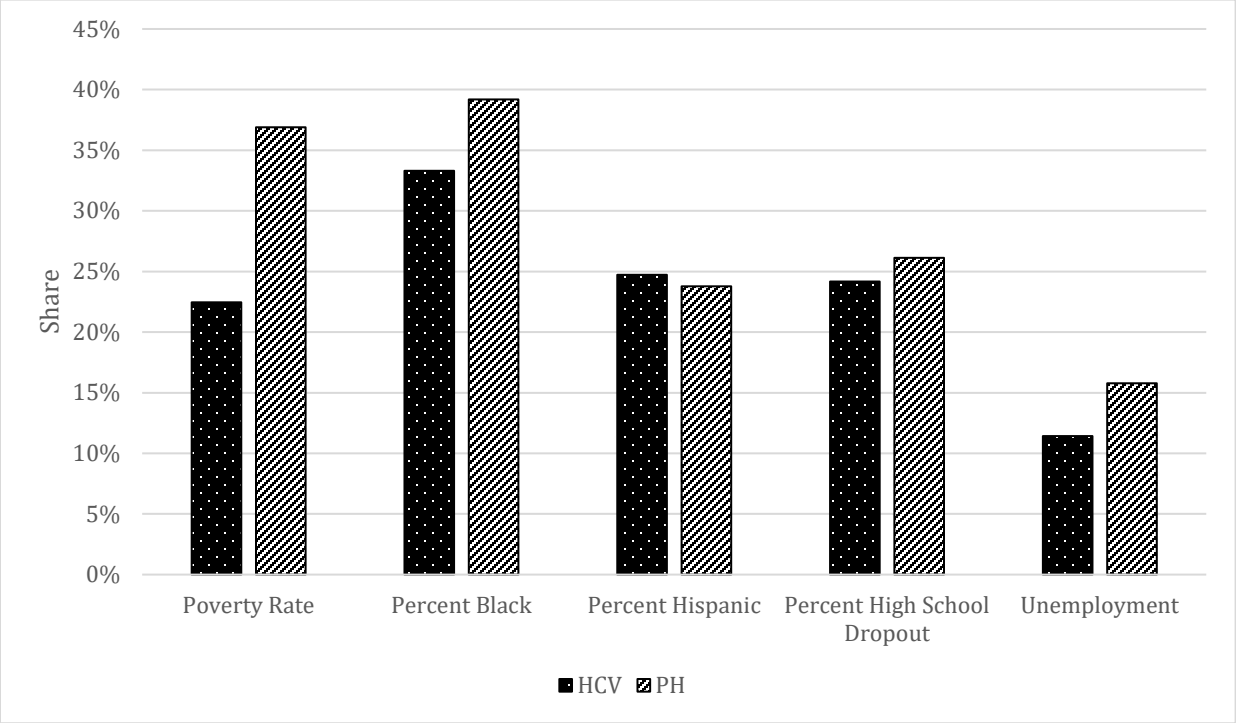
Neighborhood Poverty

This section presents the results of the analysis that seek to answer the question: **How do the neighborhood attainment trajectories compare for households that remained in HUD-assisted housing relative to those that exited?** It focuses specifically on neighborhood poverty. Other relevant neighborhood characteristics were considered, including racial composition, median rents and house values, share owner occupied, and median income, but the results were largely consistent with neighborhood poverty. For this reason, and because much of the literature on neighborhood effects focuses on poverty as a meaningful measure of disadvantage, only results for neighborhood poverty rates are presented below.

Origin Neighborhood Poverty Rates

The distribution of neighborhood poverty rates for the sample of households living in HUD assisted housing reflects the ongoing legacy of residential segregation in the siting and evolution of public housing (Fenelon, Slopen, and Newman, 2022; Rothstein, 2017; Trounstine, 2018). Consistent with other research, public housing residents in the sample originated in neighborhoods with significantly higher rates of poverty, higher shares of Black residents, and higher levels of both people who drop out of high school and unemployment compared with housing choice voucher (HCV) households. However, even among HCV residents, average neighborhood poverty rates are more than 20 percent (exhibit 10).

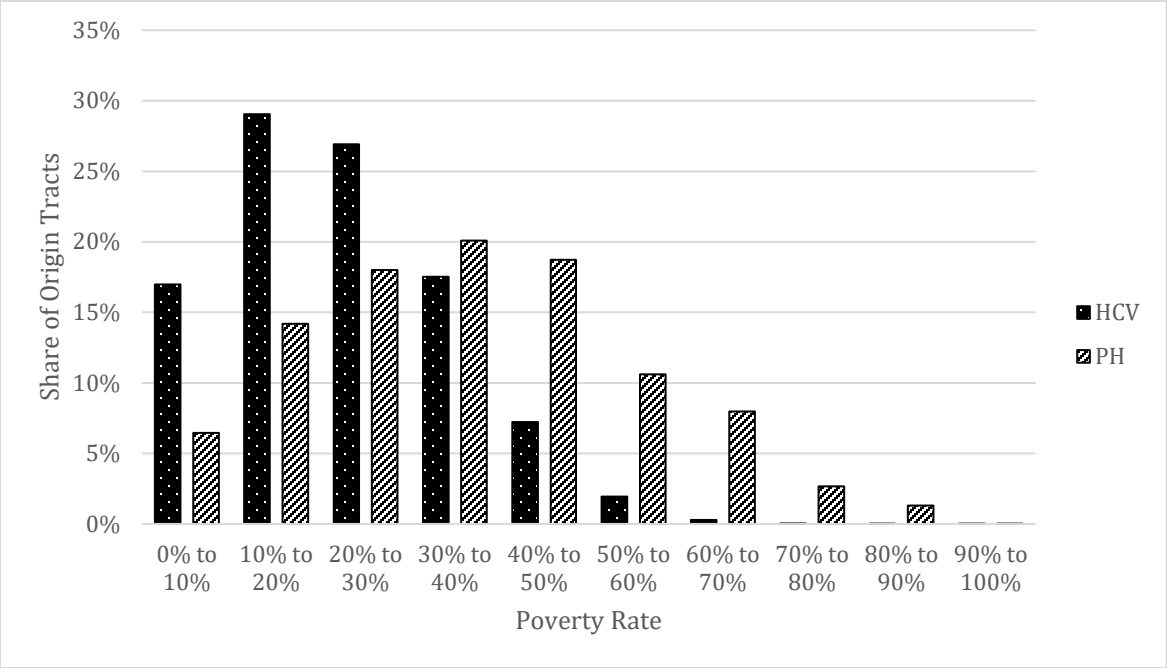
Exhibit 5. Neighborhood Characteristics at Origin for HUD Sample



HCV = Housing Choice Voucher. PH = public housing.
Note: Neighborhood characteristics measured in the first observed year in HUD assistance.
Source: HUD/Data Axle Matched Sample of Stayers and Movers

The data also show that the distribution of neighborhood poverty rates varies by program (exhibit 11). Public housing residents were more likely to be in higher-poverty neighborhoods at the time of their first observation. More than one-half of the public housing households began in tracts with poverty rates exceeding 30 percent. By contrast, less than one-third of the HCV households were in neighborhoods with poverty rates above 30 percent. Overall, public housing residents were in census tracts with significantly higher poverty rates while receiving HUD assistance than HCV recipients, due to the legacy of poverty concentration associated with public housing and the greater spatial flexibility of the HCV program.

Exhibit 6. Distribution of Neighborhood Poverty Rates



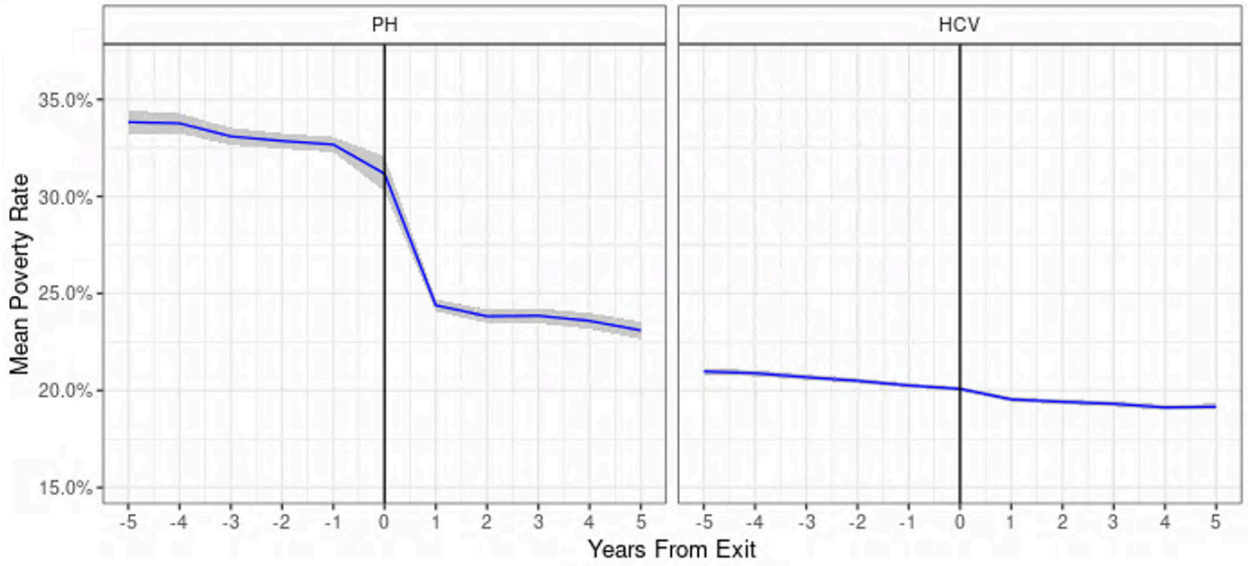
HCV = Housing Choice Voucher. PH = public housing.
Note: Neighborhood characteristics measured in the first observed year in HUD assistance.
Source: HUD/Data Axle Matched Sample of Stayers and Movers

Change in Neighborhood Poverty Rates

The results show that exiting assistance has a dramatic effect on tract poverty rate for public housing residents (exhibit 12). Although the average tract poverty rate for public housing residents in the years leading up to exiting remained roughly between 30 and 35 percent, the year immediately after exiting public housing assistance shows a sharp decrease of more than 6 percentage points, followed by a gradual decline in subsequent years. The sharp decrease at year 1 suggests that exiting public housing enables households to immediately transition to

neighborhoods with much lower poverty rates on average, although the steady decrease in the following years likely reflects overall improving economic conditions coming out of the Great Recession.[5] By contrast, although HCV recipients also appear to experience a gradual decline in tract poverty over time, no apparent decrease is directly associated with exiting the HCV program. This result means that on average, although HCV recipients were in lower poverty neighborhoods than public housing residents upon exit, public housing residents experienced far more substantial decreases over time.

Exhibit 7. Change in Neighborhood Poverty Rate Before and After Exiting HUD Assistance

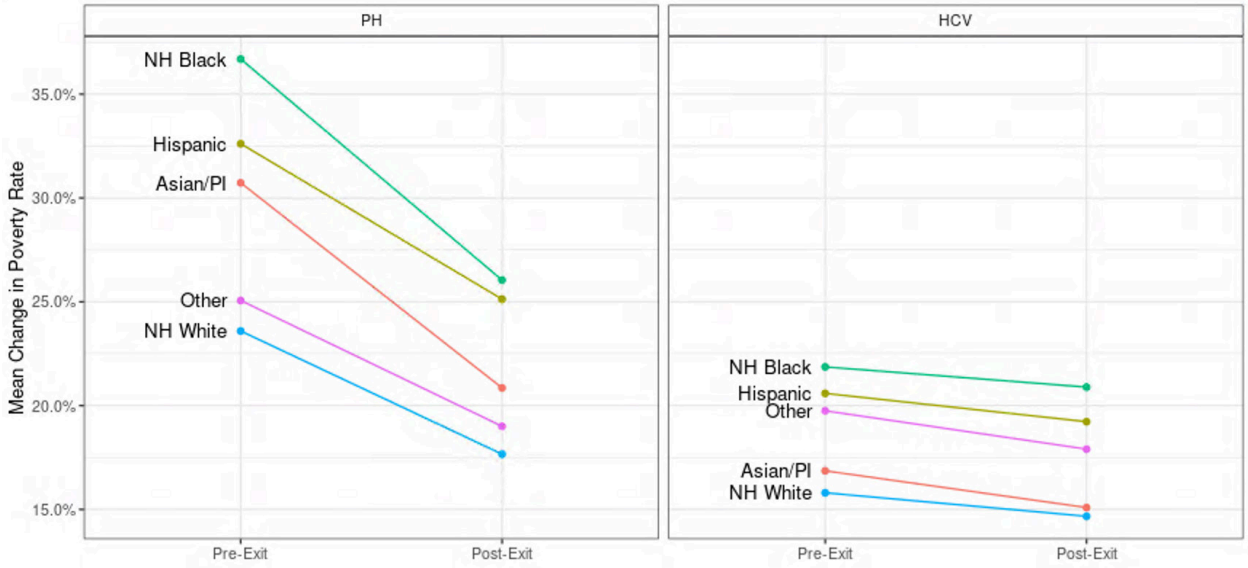


HCV = Housing Choice Voucher. PH = public housing.
Source: HUD/Data Axle Matched Sample of Stayers and Movers

When disaggregated by race and ethnicity (exhibit 13), households with household heads identified as Asian or Pacific Islander were more likely to experience a decrease in poverty relative to other racial groups in both the HCV and public housing programs. Black and Hispanic households exiting public housing also saw substantial reductions in the neighborhood poverty rate. However, it is important to note that Black and Hispanic households were still likely to move to much higher poverty neighborhoods than Asian and non-Hispanic White households.

[5] This study period includes the foreclosure crisis, subsequent economic downturn, and the post-2013 recovery. These macroeconomic dynamics will change neighborhood-level poverty rates, even if the distribution of households across neighborhoods did not change.

Exhibit 8. Change in Neighborhood Poverty Rate by Race and Ethnicity Immediately Before and After Exiting HUD Assistance



HCV = Housing Choice Voucher. NH = non-Hispanic. PH = public housing. PI = Pacific Islander.
Source: HUD/Data Axle Matched Sample of Stayers and Movers

Regression Models

To assess whether these descriptive findings remain after controlling for household and housing market characteristics, and to assess the relative association between different household characteristics and subsequent neighborhood attainment, the change in neighborhood poverty post–exit is situated within a regression framework. Three different approaches are used to model neighborhood attainment. First, a simple linear regression model is used to assess changes in neighborhood poverty between the periods immediately preceding and immediately following the household's exit. Second, an interaction model compares neighborhood outcomes between those who exit housing assistance and those who stay to assess the relative change in neighborhood poverty for movers versus stayers. Third, given the potential threshold effects of concentrated poverty logistic regression is used to examine the probability that a household living in a census tract with a poverty rate above 30 percent moves to a census tract at least 5 percentage points below that threshold.

Linear Regression Model

Although the descriptive results point to significant reductions in neighborhood poverty for public housing residents, with minimal changes for HCV residents, these findings may mask differences for households with different characteristics. To explore differences in neighborhood attainment experienced by households exiting housing assistance, the outcome variable is the neighborhood poverty rate for the destination census tract for the first new address observed in the Data Axle consumer reference database. The model is specified as—

$$y_{it} = \beta_0 + \beta_1 y_{it-1} + \Sigma(\beta_j X_{ij}) + Metro_i + Exit\ Year_i + \epsilon_i$$

where y_{it} is the neighborhood poverty rate immediately following the exit from housing assistance, y_{it-1} represents the neighborhood poverty rate immediately preceding the exit from housing assistance, and X_{ij} is a vector of time-invariant household characteristics. This model also controls for fixed effects based on the metropolitan area in which the household was initially observed and the cohort effect associated with the year that the household exited assistance.

The model shows that household characteristics matter in shaping subsequent neighborhood poverty outcomes (exhibit 14). First, a strong association exists between origin and destination poverty rates. Public housing residents, despite experiencing significant declines in neighborhood poverty rates, still live in higher poverty neighborhoods post-exit than those leaving the HCV program. The poverty rate of the origin neighborhood is also associated with subsequent outcomes: the higher the origin poverty rate, the higher the destination poverty rate. The model provides mixed evidence that the financial circumstances of the household influence subsequent neighborhood attainment. Although income is not significant in the model, households that were paying higher rent upon exit and with a wage earner in the household moved to lower poverty neighborhoods than their counterparts.

Exhibit 9. Linear Regression Modelling Neighborhood Poverty Outcomes Upon Exit

	Full	PH	HCV
(Intercept)	10.683***	9.889***	15.426***
Initial Poverty	0.289***	0.322***	0.219***
Program (PH)	0.477**	–	–
Age (18–34)	–	–	–
Age (35–49)	0.811***	0.848***	0.593
Age (50–64)	1.046***	1.011***	1.167*
Age (65+)	1.191**	0.725	3.012**
Income (<$5,000)	–	–	–
Income ($5,001–$15,000)	– 0.014	0.049	– 0.365
Income ($15,001–$25,000)	0.088	0.133	–0.252
Income ($25,000+)	– 0.562	–0.33	– 1.561*
HUD Tenure (1 Year)	–	–	–
HUD Tenure (2–5 Years)	– 0.063	0.06	– 1.452
HUD Tenure (5–10 Years)	0.294	0.459	– 1.392
HUD Tenure (11+ Years)	0.337	0.438	– 1.721
Child (< 5)	0.435**	0.448*	0.301
Child (5–12)	– 0.6***	– 0.545**	– 0.633
Child (12–18)	– 0.419**	– 0.404*	– 0.286
Rent Paid	– 1.485***	– 1.612***	– 0.497
White	–	–	–
Asian	1.721***	1.04**	4.109***
Black	4.282***	4.093***	4.701***
Hispanic	3.212***	2.84***	3.932***
Other	1.97***	2.092***	1.02
Female Head	0.481*	0.548*	0.292
Disability	0.987***	0.855***	1.509***
Wage Earner	– 0.554***	– 0.581**	– 0.486
Number Kids	0.25***	0.209**	0.388**
Out Metro	– 0.589***	– 0.206	– 2.739***
Exit Year FE	Yes	Yes	Yes
Metro FE	Yes	Yes	Yes
N	37,108	30,031	7,077

*p < .05. **p < .01. ***p < .001.
FE = fixed effects]. HCV = Housing Choice Voucher. PH = public housing.
Source: HUD/Data Axle Matched Sample of Movers

The model also shows continuing disadvantage in the private housing market for different types of households. Households with a head that was older, Black, or Hispanic, and households in which at least one member had a disability, all moved to higher-poverty neighborhoods than their comparison groups.

These effects were broadly similar across metropolitan area categories based on the relative cost and vacancy rates of rental housing markets, although variable significance was substantially reduced for most variables (exhibit 15). The race of the household head was significant across all housing market types, with Black-headed households experiencing higher poverty regardless of regional conditions. Other household characteristics had a significant bearing on change in neighborhood poverty only in certain types of regional housing markets. For example, higher incomes contributed to decreases in neighborhood poverty only for public housing residents in more expensive housing markets. In contrast, HCV exiters who were paying higher rents within the program were more likely to move to lower poverty neighborhoods in lower-cost metropolitan rental housing markets, suggesting that they may have had more housing choices than their counterparts in metropolitan areas with high costs where rents in lower-poverty neighborhoods may be out of reach.

Exhibit 10. Linear Regression Modelling Neighborhood Poverty Outcomes on Exiting Assistance, by Housing Market Typology

	High–Cost Market (PH)	Moderate Market (PH)	Low–Cost Market (PH)	High–Cost Market (HCV)	Moderate Market (HCV)	Low–Cost Market (HCV)
(Intercept)	13.235**	11.84***	15.097***	8.367***	7.532***	11.239***
Initial Poverty	0.285***	0.204***	0.241***	0.343***	0.361***	0.32***
Age (18–34)	–	–	–	–	–	–
Age (35–49)	0.412	1.108*	–0.095	0.576	1.169***	0.997**
Age (50–64)	1.66	1.57	0.367	0.737	1.27***	1.285**
Age (65+)	3.394	4.285***	2.514	–0.214	1.86**	0.918
Income (<$5,000)	–	–	–	–	–	–
Income ($5,001–$15,000)	– 4.639**	0.598	0.089	0.826	0.301	– 0.205
Income ($15,001–$25,000)	– 4.226*	1.209	– 0.495	0.488	0.564	0.52
Income ($25,000+)	– 4.735*	– 0.891	–1.477	0.07	0.614	0.329
HUD Tenure (1 Year)	–	–	–	–	–	–
HUD Tenure (2–5 Years)	– 0.498	– 1.148	– 2.485	–0.259	0.175	0.112
HUD Tenure (5–10 Years)	– 1.152	– 1.154	– 2.42	–0.074	0.712	0.461
HUD Tenure (11+ Years)	0.527	– 2.426	– 2.453	0.176	0.784	–0.07
Child (< 5)	1.176	0.375	0.204	0.424	0.177	0.877*
Child (5–12)	0.951	– 0.553	– 0.764	– 0.145	– 0.387	– 1.105***
Child (12–18)	– 0.837	– 0.389	0.354	– 0.08	– 0.355	– 0.513
Rent Paid	0.495	– 1.05	– 0.459	– 0.292	– 4.345***	– 2.813***
White	–	–	–	–	–	–
Asian	1.123	4***	3.094	0.2	1.686	1.863
Black	4.326***	6.786***	5.056***	3.827***	4.46***	5.169***
Hispanic	6.326***	4.364***	4.776***	3.046***	3.119***	3.665***
Other	– 0.89	2.459	0.934	–0.29	2.777**	2.131*
Female Head	– 0.931	1.418	0.656	0.522	1.158**	0.225
Disability	1.542	0.8	1.671*	1.144***	0.72**	0.86**
Wage Earner	– 1.17	– 0.172	– 0.874	– 0.688*	0.079	– 1.084**
Number Kids	– 0.058	0.125	0.487	– 0.066	0.105	0.438**
Out Metro	0.224	– 2.825***	– 3.765***	– 0.276	0.685**	– 1.547***
Exit Year FE	Yes	Yes	Yes	Yes	Yes	Yes

N	874	3,116	3,087	7,974	13,086	8,971

*p < .05. **p < .01. ***p < .001.
FE: fixed effects. HCV = Housing Choice Voucher. PH = public housing.
Source: HUD/Data Axle Matched Sample of Movers

Linear Interaction Model

Although these findings are suggestive of the effects associated with exiting the HCV program and public housing, it may be that households remaining in housing subsidy programs also experience changes in exposure to poverty over time due to neighborhood change. Therefore, the researchers compare matched movers and stayers using a linear interaction model to assess the difference in the *relative* changes in poverty exposure experienced by households that remained in HUD programs and those that exited. The model focuses on the neighborhood poverty rate for the first and last time each household was observed in the dataset, rather than the neighborhood to which a household moved directly after exiting assistance (as in the previous analysis). This approach accounts for the fact that the control group (stayers) do not have a comparable exit event or year. The model is as follows:

$$y_{it} = \beta_0 + \beta_1 Exit_i + \beta_2 After_t + \beta_3 (Exit_i * After_t) + \Sigma(\beta_j X_{ij}) + Metro_i + First\ Year_i + Final\ Year_i + \epsilon_i$$

where y is the neighborhood poverty rate, β_3 represents the interaction between a household's treatment status (mover or stayer) and a prepost indicator (delineating the first and last observations for the household), and X_i is a vector of time-invariant household characteristics. The model also controls for fixed effects based on the metropolitan area in which the household was initially observed and the first and most recent years that the household was observed to account for cohort effects. Because neighborhood poverty rates also vary substantially across the 14 metropolitan statistical areas (MSAs) in the sample, researchers also ran the model using the census tract's poverty percentile within the MSA, allowing for a normalized comparison of poverty changes across the metropolitan areas. Overall, results are similar across the two different approaches to constructing the dependent variable.

Model results show that for both HCV recipients and public housing residents, households that exited HUD assistance were in lower-poverty tracts to begin with compared with households that stayed (exhibit 16), and all groups saw a decline in neighborhood poverty over time. These declines in overall poverty rates are likely due to macroeconomic changes, because the study period (2006–2021) covers both the Great Recession and subsequent economic recovery.

Exhibit 11. Neighborhood Poverty Change, Movers Versus Stayers

	PH (Rate)	PH (Percentile)	HCV (Rate)	HCV (Percentile)
(Intercept)	24.592***	69.766***	17.765***	61.399***
Exit	– 1.962***	– 0.735*	– 1.049***	– 1.605***
Post	– 3.54***	– 2.608***	– 2.528***	– 4.676***
Exit ´ Post	– 6.775***	– 9.971***	0.635***	– 0.657***
Age (18–34)	–	–	–	–
Age (35–49)	– 0.512***	– 0.419*	– 0.306***	– 0.713***
Age (50–64)	– 1.12***	– 0.752**	– 0.059	– 0.211
Age (65+)	– 0.701*	0.669	0.005	0.024
Income (<$5,000)	–	–	–	–
Income ($5,001–$15,000)	– 2.586***	– 1.951***	– 0.237***	0.104
Income ($15,001–$25,000)	– 4.048***	– 3.126***	0.02	0.732***
Income ($25,000+)	– 7.383***	– 6.474***	0.157	1.259***
HUD Tenure (1 Year)	–	–	–	–
HUD Tenure (2–5 Years)	0.894	2.975***	0.432***	0.495*
HUD Tenure (5–10 Years)	1.362*	3.576***	0.754***	1.004***
HUD Tenure (11+ Years)	0.294	3.034***	1.473***	2.294***
Child (< 5)	0.104	– 0.036	– 0.141**	– 0.192*
Child (5–12)	– 0.572***	– 1.134***	– 0.747***	– 1.542***
Child (12–18)	– 0.41**	– 0.513**	– 0.908***	– 1.995***
Rent Paid	3.656***	1.728***	– 3.267***	– 7.546***
White	–	–	–	–
Asian	9.4***	13.358***	3.366***	6.57***
Black	9.049***	10.247***	5.933***	12.248***
Hispanic	6.342***	9.458***	4.142***	8.326***
Other	3.011***	4.342***	3.809***	8.434***
Female Head	–0.164	– 0.154	–0.077	0.18

Disability	0.097	0.795***	0.404***	0.671***
Wage Earner	– 1.406***	– 0.984***	– 0.186***	– 0.492***
Number Kids	0.192***	0.342***	0.043**	– 0.24***
Out Metro	– 3.005***	– 7.219***	– 0.734***	– 4.498***
Entry Year FE	Yes	Yes	Yes	Yes
Final Year FE	Yes	Yes	Yes	Yes
Metro FE	Yes	Yes	Yes	Yes
N	84,164	84,164	465,250	465,250

*p < .05. **p < .01. ***p < .001.
FE=fixed effects. HCV = Housing Choice Voucher. PH = public housing.
Source: HUD/Data Axle Matched Sample of Stayers and Movers

The results show significant differences in outcomes for public housing residents and HCV voucher recipients when looking at the interaction effects. Public housing residents who exited HUD assistance experienced a significant decrease in poverty relative to public housing residents who remained—slightly more than 6 percentage points. By contrast, HCV residents who exited HUD assistance actually experienced *less* substantial decreases than HCV residents who continued to receive HUD assistance. These findings may be interpreted in terms of the very different programmatic contexts associated with the two primary program types. Given that public housing residents are located in higher-poverty neighborhoods than HCV recipients to begin with, the potential gains associated with exiting public housing could be far greater. Despite programmatic limitations of the voucher program, such as Fair Market Rent standards that limit the scope of accessible neighborhoods, the HCV program nevertheless provides much greater spatial flexibility within the housing market while also providing a subsidy that defrays the cost of housing. Unless a household exiting the HCV program gains enough income to more than compensate for the loss of housing subsidy, that household may not be able to access lower-poverty neighborhoods.

The controls also point to important differences in who is able to access lower poverty neighborhood upon exiting assistance. For public housing residents, higher incomes are associated with greater reductions in neighborhood poverty rates—both absolute and in percentile terms. However, this same effect is not observed for HCV households. Households of color are also less likely to see as great reductions in neighborhood poverty, including Asian, Black, and Hispanic households. Although the coefficient on Asian households was unexpected given the previous descriptive findings, Asian households in the Minneapolis MSA almost entirely drive this result, which may reflect specific characteristics of the subsidized household population within that regional context. The fact that moving out of the metropolitan area is associated with large reductions in neighborhood poverty is also interesting.

Households in low-cost rental markets that exited public housing fared best compared with those that remained, indicating that the concentration of public housing units in high-poverty neighborhoods is particularly severe in low-cost housing markets (exhibit 17). Public housing

residents in higher-cost rental markets still experienced decreases in poverty as a result of leaving public housing, but to a lesser extent. In contrast, HCV recipients who exited the program consistently fared worse in terms of neighborhood poverty outcomes than households that remained in the program, and households that exited HCV in *moderate* rental markets appeared to experience the least substantial decreases compared with households that remained. Households exiting HCV in both lower- and higher-cost markets still experienced less substantial decreases than households that remained, but they fared better than exiters in moderate housing markets in relative terms. Reasons for these patterns likely differ across market types. Households may be able to access a wider array of neighborhoods in metropolitan rental markets with low costs and high vacancy rates, but poverty rates are also generally higher in those markets, meaning it is harder to access lower-poverty spaces. Meanwhile, in higher-cost rental markets, poverty rates are generally lower, so even if households cannot access the best neighborhoods, they may be able to translate an exit into a neighborhood with similar poverty characteristics with or without a voucher.

Exhibit 12. Neighborhood Poverty Change, Movers Versus Stayers, by Housing Market Typology

Variable	High–Cost Market (PH)	Moderate Market (PH)	Low–Cost Market (PH)	High–Cost Market (HCV)	Moderate Market (HCV)	Low–Cost Market (HCV)
(Intercept)	24.762***	20.732***	34.493***	16.511***	17.65***	20.401***
Exit	– 6.443***	– 2.029***	– 2.321***	– 2.143***	– 1.104***	– 1.076***
Post	– 4.493***	– 3.102***	– 2.629***	– 2.492***	– 2.945***	– 1.744***
Exit ´ Post (Interaction)	– 5.31***	–8.042***	– 6.716***	0.479**	1.702***	– 0.508**
N	20,974	34,510	28,664	150,016	190,596	124,070

*p < .05. ** p < .01. *** p < .001.
HCV = Housing Choice Voucher. PH = public housing.
Source: HUD/Data Axle Matched Sample of Stayers and Movers

Threshold Model

Models examining the change in poverty rates over time indicate broad trends toward decreases in tract-level poverty. However, these models do not account for the threshold effects thought to be associated with concentrated neighborhood poverty (Galster, 2005). The effects of living in a neighborhood with a poverty rate of less than 30 percent may be qualitatively different from those living in a neighborhood with a poverty rate greater than 30 percent.[6] Thus, a nominal change of 10 percentage points in the tract poverty rate may be indicative of very different

[6] Many researchers use a neighborhood poverty threshold of 30 or 40 percent to identify a neighborhood as distressed or subject to the negative spillover effects of concentrated poverty, but it is important to note that poverty rate is often a proxy for other neighborhood characteristics, including high rates of unemployment, crime, and lack of infrastructural investments.

outcomes for a household that moves from a neighborhood with a 30 percent poverty rate than one that moves from a neighborhood with a 60 percent poverty rate. To assess patterns of neighborhood attainment given these threshold effects, the research team employed logistic models to examine the probability that a household living in a census tract with a poverty rate above a given threshold ultimately relocates to a census tract at least 5 percentage points below that threshold. The model employs a 30-percent threshold, estimating the probability that households that were first observed in census tracts with poverty rates greater than or equal to 30 percent ultimately moved to census tracts with poverty rates below 25 percent. The following model is used to assess this outcome, examining the subset of households in high-poverty tracts during their first observation:

$$ln(\frac{p}{1-p}) = \beta_0 + \beta_1 Exit_i + \Sigma(\beta_i X_i) + Metro_i + First\ Year_i + Final\ Year_i + \epsilon_i$$

where p refers to the probability that a household transitions into a lower-poverty neighborhood, *Exit* specifies whether a household exited housing assistance, and X_{ij} represents the vector of household-level covariates. The model also includes fixed effects for metropolitan area and exit year.

This analysis is not an exact analogue of the interaction modeling approach previously outlined. First and foremost, it focuses on one specific subset of households—those that are beginning in census tracts above a certain poverty threshold. Furthermore, it does not measure the magnitude of these changes (beyond ensuring that the poverty rate difference between higher-poverty and lower-poverty tracts is at least 5 percentage points). However, given the theoretical importance of poverty threshold effects and the large numbers of subsidized households living in higher-poverty neighborhoods, this analysis has important implications for understanding the effect of exits on neighborhood attainment.

Model results reveal that households beginning in census tracts with a poverty rate more than 30 percent were more likely to be able to move to census tracts with a poverty rate below 25 percent if they exited HUD assistance (exhibit 18). Public housing residents who exited were nearly five times as likely to move from higher- to lower-poverty neighborhoods relative to those who stayed. Unlike the poverty change models previously presented, exiting assistance led to relative greater changes for HCV recipients as well. In the baseline model with exit year and metropolitan fixed effects, HCV recipients that exited assistance were roughly 48 percent more likely to move from higher-poverty to lower-poverty tracts as HCV recipients that remained in the program. These differences between movers and stayers remain largely consistent after controlling for household-level factors. Households for which the household head was older or a person of color were less likely to transition from higher- to lower-poverty tracts, with Black-headed households in particular less likely to make the transition. Households with a disability were likewise less likely to make the transition. For public housing residents, higher incomes and lower rents were associated with an increased probability of transitioning. By contrast, HCV recipients who paid higher rents were *more* likely to transition to lower-poverty neighborhoods,

perhaps indicating that those households were better equipped to transition into higher-rent areas. Moving out of the origin metropolitan area has a strong, positive effect on the probability of moving out of a concentrated poverty neighborhood.

Exhibit 13. Probability of Moving From a Neighborhood of Concentrated Poverty, Threshold Model

Variable	PH	HCV	PH (Full)	HCV (Full)
(Intercept)	0.861***	0.201***	2.165***	0.368***
Exit	1.787***	7.256***	1.478***	6.285***
Age (18–34)	–	–	–	–
Age (35–49)	–	–	0.812***	0.864**
Age (50–64)	–	–	0.7***	0.713***
Age (65+)	–	–	0.667***	0.564***
Income (<$5,000)	–	–	–	–
Income ($5,001–$15,000)	–	–	0.978	1.107
Income ($15,001–$25,000)	–	–	0.99	1.341***
Income ($25,000+)	–	–	1.071	1.675***
HUD Tenure (1 Year)	–	–	–	–
HUD Tenure (2–5 Years)	–	–	0.846*	0.748
HUD Tenure (5–10 Years)	–	–	0.879	0.781
HUD Tenure (11+ Years)	–	–	0.91	0.953
Child (< 5)	–	–	1.006	1.007
Child (5–12)	–	–	1.106***	1.193***
Child (12–18)	–	–	1.091***	1.146**
Rent Paid	–	–	1.164***	0.901
White	–	–	–	–
Asian	–	–	0.932	0.937
Black	–	–	0.701***	0.661***
Hispanic	–	–	0.758***	0.91
Other	–	–	0.973	0.89
Female Head	–	–	1.072	0.973
Disability	–	–	0.973	1.007
Wage Earner	–	–	1.029	0.909
Number Kids	–	–	1.008	0.939**
Out Metro	–	–	2.008***	3.076***
Entry Year FE	Yes	Yes	Yes	Yes
Final Year FE	Yes	Yes	Yes	Yes
Metro FE	Yes	Yes	Yes	Yes
N	65,044	26,801	65,039	26,747

*p < .05. **p < .01. ***p < .001.
FE= fixed effects. HCV = Housing Choice Voucher. PH = public housing.
Note: Includes only households that originated in census tracts with a poverty rate of more than 30 percent.

Source: HUD/Data Axle Matched Sample of Stayers and Movers

These results look broadly similar when comparing between metropolitan area types, with public housing residents in higher-cost housing markets most likely to transition from higher- to lower-poverty neighborhoods than public housing residents in lower-cost housing markets (exhibit 19). Although the mechanism underlying this pattern is not clear, it may be that households exiting housing assistance in these markets have a greater array of options for lower-poverty census tract destinations.

Exhibit 14. Probability of Moving From a Neighborhood of Concentrated Poverty, Threshold Model, by Housing Market Typology

Variable	High–Cost Market (PH)	Moderate Market (PH)	Low–Cost Market (PH)	High–Cost Market (HCV)	Moderate Market (HCV)	Low–Cost Market (HCV)
(Intercept)	0.938	0.315**	0.814	1.337	1.971***	1.276
Exit	8.704***	8.791***	3.933***	2.128***	1.215***	1.608***
N	7,161	10,771	8,815	15,574	26,645	22,820

**p < .01. ***p < .001.
HCV = Housing Choice Voucher. PH = public housing.
Note: Includes only households that originated in census tracts with a poverty rate of more than 30 percent. Source: HUD/Data Axle Matched Sample of Stayers and Movers

Homeownership

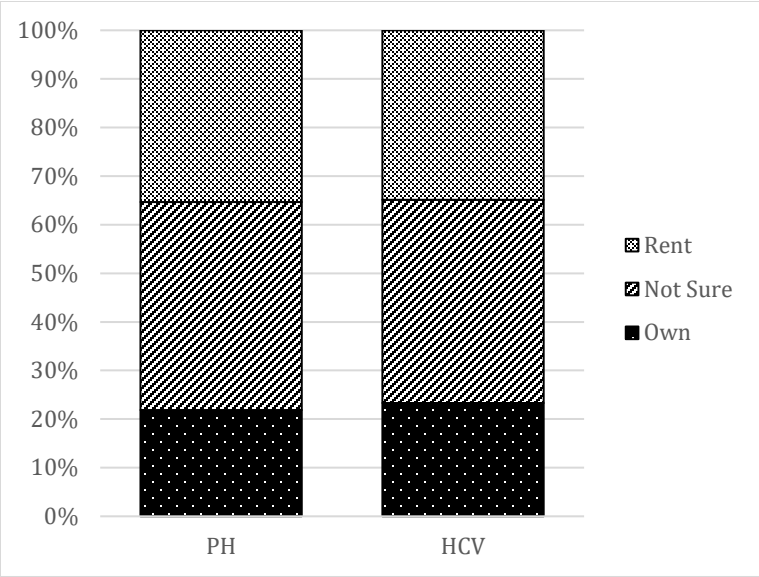
This section presents the results from the second question motivating this research: **What is the probability that a household will transition to homeownership upon exiting HUD-assisted housing, and what influences that probability?** As previously noted, policy efforts to move HUD-assisted households into homeownership have characterized the past few decades. Although qualitative research has indicated that some households do buy homes when leaving public housing (Reid, 2004), the prevalence of this transition for those leaving housing assistance has not been studied.

One important caveat is that despite the fact that Data Axle collects data from tax assessors that document changes in ownership and lien status, the data on tenure were less robust than anticipated. Rather than providing data on the lien holder at a specific address, Data Axle provides a list of household member names living at that address, as well as a derived score for the probability that the household owns its home. This score ranges from 0 to 9, with 0 signifying the highest probability that the household occupant is a renter and 9 signifying the highest probability that the household occupant is an owner. As the Limitations and Suggestions for Future Research section discusses further, concerns over this derived measure and the inability to assess household transitions in and out of homeownership over time using consumer reference data argue for the need for more research to better understand homeownership outcomes for people leaving HUD assisted housing.

Descriptive Findings

Housing tenure scores provided by Data Axle are used to assess the probability that households in the Housing Choice Voucher (HCV) and public housing programs were able to transition to homeownership after exiting HUD assistance. The analysis focuses on the same subset of households used for the linear regression models used in the prior section—namely, households with observations both preceding and following the exit year. Focusing on cases with households more definitively labeled as renters (tenure score between 0–3) or homeowners (tenure score between 7–9), roughly 20 percent of households in the sample exiting the HCV program transitioned to homeownership, compared with 18 percent of households exiting public housing (exhibit 20). Although this percentage may seem high, it is consistent with Smith et al. (2015), who found that approximately 28 percent of their sample of Moving to Opportunity public housing residents transitioned into homeownership post-exit.

Exhibit 15. Post-Exit Household Housing Tenure



HCV = Housing Choice Voucher. PH = public housing.
Source: HUD/Data Axle Matched Sample of Movers

Descriptive characteristics of those defined as owners versus renters align with *a priori* expectations (exhibit 21). Those indicated as living in an owned home were more likely to be Asian or non-Hispanic White and less likely to be Black or Hispanic. Female-headed households and households in which an occupant with a disability resides were also less likely to be classified as owning their homes. Owner households were also more were more likely to have wage income and higher incomes, and those receiving housing assistance were less likely to have no assets and paid higher rents.

Exhibit 16. Exiting Household Characteristics by Destination Tenure

Variable	Rent (PH)	Not Sure (PH)	Own (PH)	Rent (HCV)	Not Sure (HCV)	Own (HCV)
Head Black	36.8%	44.8%	18.4%	37.2%	42.6%	20.1%
Head Hispanic	41.1%	38.7%	20.2%	35.9%	40.7%	23.5%
Head White	27.9%	44.8%	27.3%	27.6%	41.8%	30.5%
Head Asian	25.4%	32.7%	41.9%	25.8%	35.6%	38.6%
Head Other	41.6%	32.0%	26.4%	37.0%	39.2%	23.8%
Female Head	36.1%	43.7%	20.2%	35.4%	42.2%	22.4%
Disability	35.8%	43.5%	20.7%	35.2%	42.1%	22.8%
Child under 5	38.3%	43.2%	18.5%	34.0%	44.1%	21.9%
Child 5–12	33.1%	43.8%	23.0%	31.7%	44.4%	23.8%
Child 12–18	32.2%	43.8%	24.1%	32.9%	42.7%	24.4%
Wage Earner	33.2%	41.6%	25.2%	33.4%	40.8%	25.8%
Income	$19,082	$20,826	$28,530	$22,542	$23,068	$27,606
No Assets	40.4%	44.4%	15.2%	37.0%	43.7%	19.3%
Assets <$1,000	34.4%	41.9%	23.8%	34.5%	40.2%	25.3%
Assets >$1,000	24.8%	32.3%	42.9%	28.1%	35.7%	36.3%
Rent Paid	$337	$352	$464	$460	$450	$554
N	2,873	3,491	1,779	12,141	14,652	8,107

HCV = Housing Choice Voucher. PH = public housing.
Source: HUD/Data Axle Matched Sample of Movers

Regression Analysis

As the previous analysis suggests, households that moved from subsidized housing to homeownership represent a small but important subset of all moves. A logistic regression model is therefore employed to explore how transitions to homeownership relate to specific household characteristics, using the same set of variables previously outlined. The logistic regression model is specified as—

$$ln(\frac{p}{1-p}) = \beta_0 + \Sigma(\beta_i X_i) + Exit\ Year_i + \ Metro_i + \epsilon_i$$

where p represents the probability that a household transitions to homeownership, and X represents a vector of household covariates. This model also includes year and metropolitan statistical area (MSA) fixed effects.

The results show that several factors affect a household's odds of transitioning to homeownership after exiting subsidized housing (exhibit 22). Overall, public housing residents

are less likely to enter homeownership than HCV recipients. However, separate models for HCV recipients and public housing residents reveal similar relationships between covariates. In both cases, moves to homeownership are associated with higher household incomes. Households with younger children (under 5) are less likely to transition into homeownership, although the inverse is true for households that include children between the ages of 5 and 12. Black- and Hispanic-headed households were less likely than White-headed households to enter homeownership after exiting HUD assistance, whereas Asian-headed households were more likely to do so. Female-headed households and households with a member with a disability were less likely to transition into homeownership. Among HCV recipients, the probability of transitioning to homeownership also increased with amount of rent paid and total number of children.

Exhibit 17. Probability of Transitioning Into Homeownership Post-Exit

Variable	Full	PH	HCV
(Intercept)	0.34***	0.286***	0.338***
Program (PH)	0.898**	–	–
Age (18–34)	–	–	–
Age (35–49)	1.158***	1.167*	1.14***
Age (50–64)	1.346***	1.239	1.343***
Age (65+)	1.304**	1.047	1.333**
Income (<$5,000)	–	–	–
Income ($5,001–$15,000)	1.099	1.035	1.112
Income ($15,001–$25,000)	1.139*	1.232	1.101
Income ($25,000+)	1.487***	1.985***	1.336***
HUD Tenure (1 Year)	–	–	–
HUD Tenure (2–5 Years)	1.131*	1.293	1.118
HUD Tenure (5–10 Years)	1.27***	1.326	1.276***
HUD Tenure (11+ Years)	1.234*	1.257	1.267**
Child (< 5)	0.931*	0.838*	0.957
Child (5–12)	1.174***	1.298**	1.138***
Child (12–18)	1.143***	1.118	1.14***
Rent Paid	1.318***	1.092	1.414***
White	–	–	–
Asian	1.224**	1.046	1.234**
Black	0.525***	0.548***	0.52***
Hispanic	0.714***	0.791*	0.702***
Other	0.724**	1.042	0.664***
Female Head	0.698***	0.645***	0.726***
Disability	0.907**	0.794**	0.935

Wage Earner	1.129***	1.105	1.142**
Number Kids	1.034**	0.992	1.049**
FSS	1.214***	1.256	1.201***
Out Metro	0.926*	0.921	0.921*
Exit Year FE	Yes	Yes	Yes
Metro FE	Yes	Yes	Yes
N	42,990	8,090	34,900

*p < .05. **p < .01. ***p < .001.
FE = fixed effects. HCV = Housing Choice Voucher. PH = public housing.
Source: HUD/Data Axle Matched Sample of Movers

Interestingly, the model shows a positive and meaningful effect of the Family Self-Sufficiency (FSS) program on transitions to homeownership. Although it is not significant for public housing residents, the p-value is .09, so the lack of significance may be partly a function of sample size. Overall, participating in the FSS program boosts the likelihood of homeownership by approximately 25 percent. The descriptive statistics show that households that transitioned to homeownership were proportionally more likely to have been in the FSS category. Among public housing residents, 4.9 percent of those who became owners were enrolled in FSS versus 3.1 percent for renters; among former HCV recipients, the shares were 7.4 percent for owners versus 5.8 percent for renters.

Housing markets, however, play an important mediating factor in whether a household can transition into homeownership (exhibit 23). Not surprisingly, households in higher-cost markets are the least likely to be able to buy a home. Furthermore, households that moved out of their origin MSA experienced an increased probability of homeownership. Both of these results point to potential future areas of research on the choices households make as it relates to location and housing tenure.

Exhibit 18. Probability of Transitioning Into Homeownership, by Housing Market Typology

Variable	Full	PH	HCV
(Intercept)	0.214***	0.197***	0.204***
Program (PH)	0.901**	–	–
High–Cost Market	–	–	–
Moderate Market	1.422***	1.597***	1.404***
Low–Cost Market	1.177***	1.034	1.239***

**p < .01. ***p < .001.
HCV = Housing Choice Voucher. PH = public housing.
Source: HUD/Data Axle Matched Sample of Movers

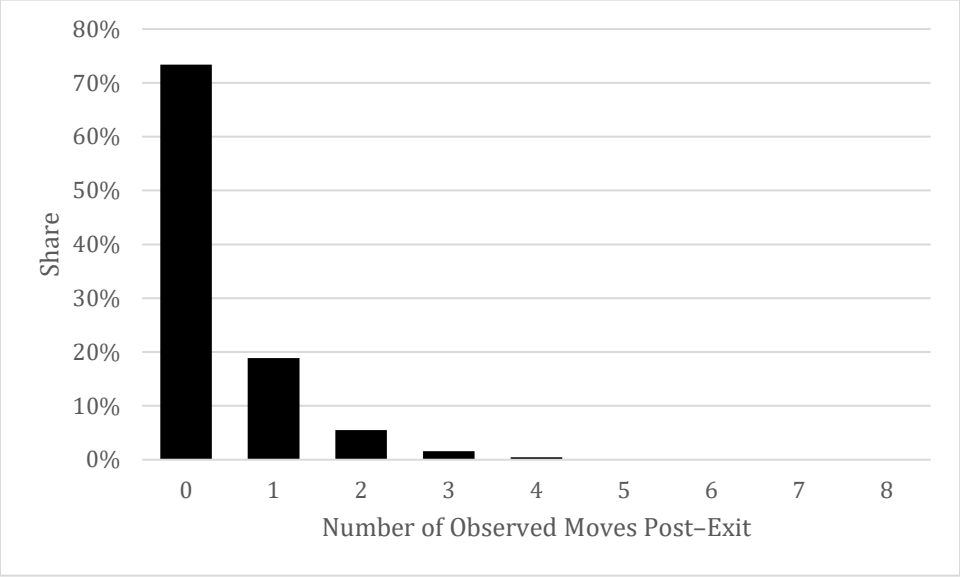
Residential Stability

This section addresses the third question: **Which household characteristics are associated with increased housing stability for households that exit HUD-assisted housing?** Research has consistently shown that lower-income renters have high rates of housing instability. Poor households with children are almost twice as likely to experience residential instability than higher-income households, with consequences for social and health disparities (Desmond, Gershenson, and Kiviat, 2015). To better understand residential stability post-exit, this section examines the data for households that leave HUD assistance and explores patterns in their subsequent moves.

Descriptive Findings

Research suggests that that approximately one-half of low-income families move at least once in a 5-year period, suggesting that given this study's long timeframe (2006–2018), the analysis should show more than one move post-exit. However, most households that exited housing assistance (75 percent) were observed only moving once—during the initial exit from their subsidized unit (exhibit 24). Only 25 percent of households that exited subsidy programs were observed living in at least two locations in the Data Axle data. It is hard to know whether this finding reflects overall housing stability among those who exit or whether the "stickiness" of the consumer reference data means that the analysis is registering fewer moves than actually occurred. The Limitations and Suggestions for Future Research section addresses this consideration further.

Exhibit 19. Number of Moves Post-Exit



Source: HUD/Data Axle Matched Sample of Movers

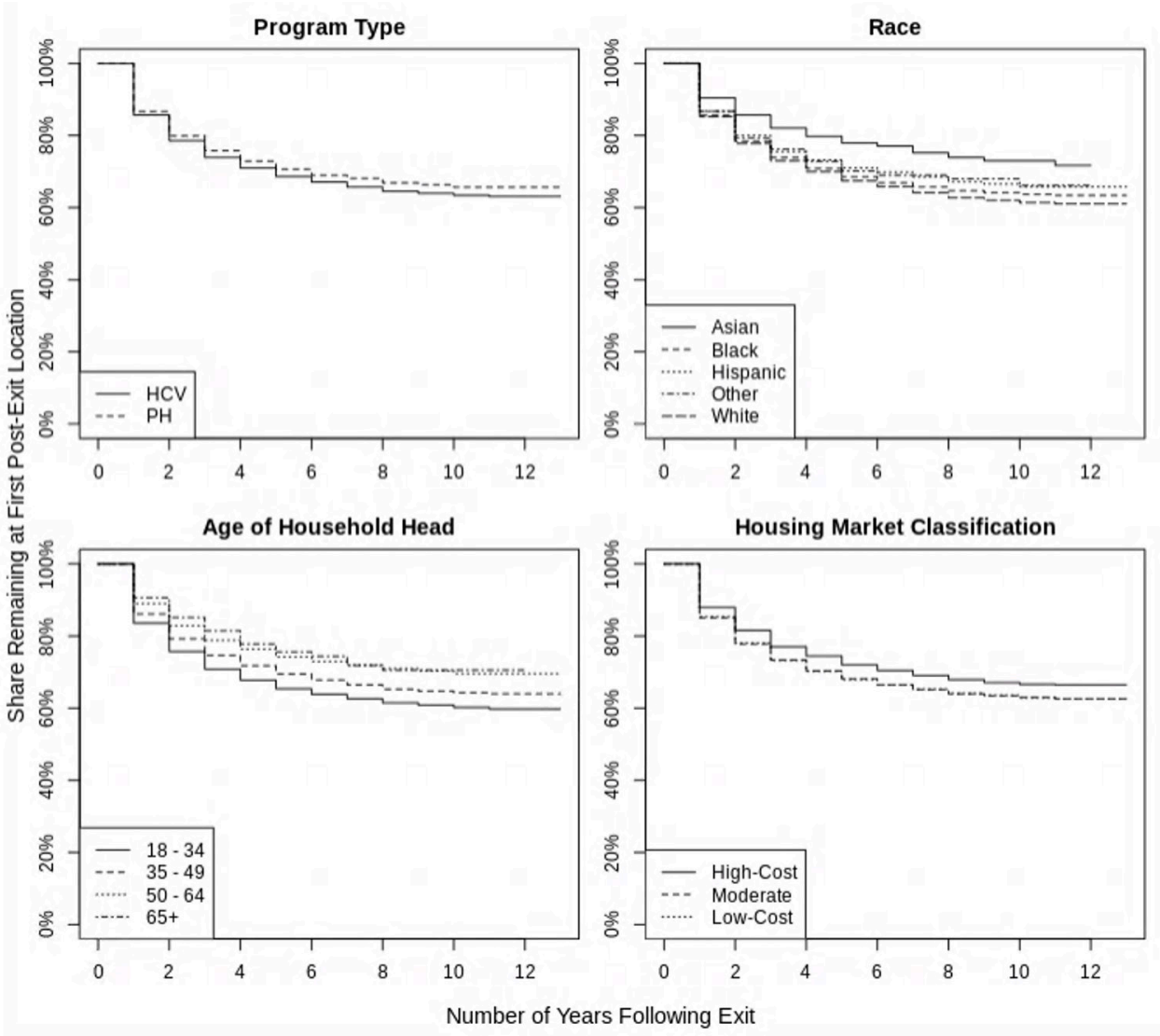
To understand the characteristics that lead to a higher number of moves post-exit, the analysis employs a survival analysis approach, using a Cox proportional hazards model to assess residential stability in a household's first post-exit location. The proportional hazards model is formulated as—

$$h_i(t) = h_0(t) + e^{\Sigma(\beta_{ij}X_{ij} + Metro_i)}$$

where $h_i(t)$ represents the hazard that a household will move from its post-exit location, $h_0(t)$ represents the baseline hazard, and $e^{\Sigma(\beta_i X_i + Metro_i)}$ represents the standard vector of household-level covariates and metropolitan-level fixed effects. The research team additionally tested a model that includes *all* subsequent moves, clustering standard errors at the individual level to account for repeated events.

Kaplan-Meier survival plots indicate that the length of tenure in post-exit locations varies by program type, with HCV recipients slightly more likely to move frequently relative to public housing residents after exiting housing assistance. Asian-headed households are somewhat less likely to be observed moving following their exit relative to other households (exhibit 25).

Exhibit 20. Kaplan-Meier Survival Plots Measuring Share of Households Remaining in First Post-Exit Location by Key Household Characteristics



HCV = Housing Choice Voucher. PH = public housing.
Notes: Survival plots indicate length of time observed before moving from their first post-exit location.
Source: HUD/Data Axle Matched Sample of Movers

Regression Analysis

Exhibit 26 shows the results of the proportional hazards model displaying the probability of a subsequent move. Public housing residents were less likely to move following their exit relative to HCV recipients. Households with higher incomes and longer previous tenures in HUD programs were also slightly less likely to experience subsequent moves. When stratified by program type, post-exit stability increased with age for households exiting public housing, and it was lower for older households exiting from the HCV program.

Exhibit 21. Proportional Hazards Model, Probability of Moving Again Post-Exit

Variable	Full	PH	HCV
Program (PH)	0.992	–	–
Age (18–34)	–	–	–
Age (35–49)	0.959*	0.974	0.967
Age (50–64)	0.858***	0.836*	0.878***
Age (65+)	0.797***	0.707	0.839**
Income (<$5,000)	–	–	–
Income ($5,001–$15,000)	1.049	1.045	1.052
Income ($15,001–$25,000)	1.071*	1.085	1.08*
Income ($25,000+)	1.028	0.965	1.066
HUD Tenure (1 Year)	–	–	–
HUD Tenure (2–5 Years)	0.874***	0.996	0.875***
HUD Tenure (5–10 Years)	0.681***	0.745***	0.701***
HUD Tenure (11+ Years)	0.25***	0.338***	0.261***
Child (< 5)	1.028	1.141**	1.003
Child (5–12)	0.961	0.999	0.963
Child (12–18)	1.008	1.089	0.997
Rent Paid	1.06	0.848	1.059
White	–	–	–
Asian	0.818***	0.72**	0.87*
Black	1.034	0.968	1.042
Hispanic	0.965	0.908	0.977
Other	0.958	0.91	0.959
Female Head	1.065*	1.175*	1.026
Disability	0.988	1.005	0.987
Wage Earner	0.993	1.007	0.991
Number Kids	1.022**	0.984	1.027***
Out Metro	1.758***	1.722***	1.693***
Metro FE	Yes	Yes	Yes
N	62,749	11,241	51,508

*p < .05. **p < .01. ***p < .001.
FE = fixed effects. HCV = Housing Choice Voucher. PH = public housing.
Source: HUD/Data Axle Matched Sample of Movers

Conclusion

This study examines the relationship between exits from HUD assistance and various household-level outcomes for households with children. The study seeks to contribute to the literature by documenting the long-term trajectories of those who leave HUD-assisted housing and the factors that contribute to either upward mobility or greater instability. The study relies on a unique dataset that matches records collected between 2006 and 2019 from two data sources: (1) HUD administrative data on households in public housing and the tenant-based Housing Choice Voucher (HCV) programs and (2) a large longitudinal sample of household residential address locations from consumer data provider Data Axle (2020).

This study explores three questions.

- How do the neighborhood attainment trajectories compare for households that remained in HUD-assisted housing relative to those that exited?
- What is the probability that a household will transition to homeownership upon exiting HUD-assisted housing, and what influences that probability?
- Which household characteristics are associated with increased housing stability for households that exit HUD-assisted housing?

With respect to the first question on neighborhood attainment, households leaving HUD assistance experience substantial decreases in tract poverty, particularly among public housing residents. Households that exited public housing during the study period experienced decreases in poverty that outpaced the decreases in poverty experienced by those that remained in public housing. These reductions in neighborhood poverty were meaningful. On average, households that exited public housing moved to neighborhoods with a poverty rate that was 6 percentage points less than those who stayed in the public housing program.

In contrast, although households that exited the HCV program *also* experienced decreases in poverty, those decreases were actually smaller in magnitude than the decreases experienced by households that continued to receive HUD assistance. In other words, households with children that maintained their housing subsidy had overall better outcomes in terms of neighborhood poverty than those observed ending the program. However, overall differences in neighborhood poverty rates among HCV stayers and exiters were relatively small (2–3 percentage points), suggesting that rental housing availability and affordability play a significant role in shaping neighborhood outcomes in the private rental market (with and without vouchers).

Models that treated neighborhood poverty using a "threshold" approach had somewhat different results. For public housing residents, the results were consistent, with households exiting public housing 23 percent more likely than stayers to transition from a high poverty (more than 30 percent) to lower poverty (less than 25 percent) tract. However, among HCV households, exiting assistance did lead to a higher probability of moving to a lower poverty tract by about 7 percent.

These findings reflect the continued legacy of housing assistance programs in U.S. housing policy and the extent to which traditional public housing is still linked with higher concentrations of neighborhood disadvantage. Public housing residents in the study sample lived in neighborhoods with extremely high levels of poverty, with more than 10 percent experiencing poverty rates in excess of 60 percent (compared with less than 1 percent of HCV recipients). Consequently, exiting traditional public housing was beneficial in terms of reducing household exposure to contexts of concentrated poverty simply by virtue of providing greater flexibility and a broader range of neighborhoods to which those households were able to move.

The persistence of highly concentrated poverty surrounding public housing units speaks to the need for continued place-based investment in the neighborhoods where public housing projects are located, as well as ensuring that those investments do not lead to the displacement of existing residents (Chaskin and Joseph, 2015; Coley et al., 2022; Goetz, 2011a, 2011b). A significant share of the public housing stock remains in higher poverty neighborhoods and also provides much-needed affordable housing. Although emphasis on mobility strategies has increased within HUD's housing assistance programs, it is not realistic to assume that mobility strategies are feasible for every resident in a disinvested neighborhood, nor is it necessarily preferable for low-income people to move out of neighborhoods where they have long-term cultural connections and social ties (Pendall et al., 2016; Reid, 2019). As such, it is critical that funding for housing and community development continues to be directed to address the complex and interwoven challenges facing disinvested neighborhoods and for programs such as the Rental Assistance Demonstration to improve the physical conditions of the housing stock (Turner et al., 2021).

The lower initial neighborhood poverty rate for households in the HCV program vis-à-vis public housing residents speaks to the relative success of vouchers in limiting exposure to extreme poverty, even if the program has not been wholly successful in facilitating access to *low*-poverty areas (McClure and Johnson, 2015). Although vouchers do not necessarily enable households to access lower-poverty neighborhoods, they likely do provide low-income households with greater financial stability by reducing direct exposure to housing cost burdens. Indeed, the financial support that housing vouchers provided may actually facilitate access to slightly lower-poverty tracts than would otherwise be accessible to low-income households, as indicated by the fact that households exiting the voucher program experienced less substantial poverty decreases than those that remained.

These findings point to the importance of vouchers as a form of housing assistance, but they also indicate a need for additional efforts to expand support for HCV recipients and those exiting the program to find housing in higher-opportunity areas. Doing so could help improve outcomes for both groups. For example, in Seattle, providing families with emotional and financial support, help with preparing rental applications, direct brokerage services, and representation with landlords, increased the likelihood that families moved to and remained in higher-opportunity areas (Bergman et al., 2019). Efforts to expand the supply of lower-cost housing in higher-

opportunity neighborhoods—for example, by reducing zoning constraints and affirmatively furthering fair housing—could also improve residential outcomes for lower-income households with and without a housing subsidy.

In terms of homeownership, approximately one in five households leaving housing assistance moved into a home that either they or a family or household member owned. This outcome was more significantly likely for Asian and higher income households. The analysis also found a significant, positive effect of participating in the Family Self-Sufficiency (FSS) program on the probability of transitioning into homeownership, suggesting that HUD policies that promote employment and provide financial incentives (allowing households to potentially save enough for a down-payment) can assist households in successfully exiting housing assistance and buying a home.

The fact that the researchers observed multiple moves for only a small sample of households limited the examination of post-exit residential stability. Most households that exited housing assistance (75 percent) were observed moving only once—during the initial exit from their subsidized unit. Only 25 percent of households that exited subsidy programs were observed living in at least two locations in the Data Axle data. For those households with subsequent moves, public housing residents were less likely to move following their exit relative to HCV recipients. Households with higher incomes and longer previous tenures in HUD programs were also slightly less likely to experience subsequent moves. When stratified by program type, post-exit stability increased with age for households exiting public housing, and it was lower for older households exiting from the HCV program.

Finally, the data and models presented here reveal consistent and significant disparities in housing outcomes by race and ethnicity, as well as for female-headed households and households that included a member with a disability. Although discrimination in the housing market is not a new phenomenon, and these results are not particularly surprising, they nevertheless show that the need is ongoing for stronger enforcement of fair housing laws, as well as research that can help to tease out what forms of government action lead to less discrimination in the rental housing market (Fang et al., 2019).

Limitations and Suggestions for Future Research

This study is the first to use consumer reference data to study post-exit outcomes for households that formerly received HUD assistance. As Phillips (2020) argued, consumer reference data provide a much-needed source of information that can be leveraged to understand patterns of residential mobility, even among very low-income households. This study took advantage of Data Axle records to track households that exited HUD assistance over time, providing rich data on neighborhood attainment post-exit and suggestive evidence for transitions into homeownership and subsequent housing instability. Initial match rates on name and address were also quite high and comparable with the matching of administrative datasets, suggesting that consumer reference data can provide useful insights into residential mobility patterns.

This research project also raised important limitations to consumer reference data that are worth highlighting, particularly as more researchers turn to these forms of proprietary data for analysis.

First, and perhaps most importantly for studies of residential mobility, addresses in Data Axle are quite "sticky," meaning that moves are not necessarily recorded in the year that an actual move is made. Linking with the HUD administrative data showed that a significant share of households that are recorded as "moving out" of HUD-assisted housing remain at the same observed location in the Data Axle records for multiple years. The lack of recorded moves suggests that research using datasets like Data Axle may be underreporting levels of residential instability, especially among lower-income households that may be less present in source datasets (like post office change-of-address forms).

Second, proprietary algorithms generate derived variables in these datasets—including tenure, race, ethnicity, income, and wealth. One of the biggest limitations of this study is that it was not possible to observe non*derived* household composition or income changes post-exit; changing household circumstances post-exit are likely to be significant factors in post-exit outcomes. Although these results on tenure are plausible (with African-American and Black households the least likely to transition into homeownership, higher incomes and participation in FSS increased the likelihood of homeownership transitions), they also could be reflective of the fact that race is a factor that Data Axle uses to derive its tenure score. Further research is needed to understand when these proprietary datasets should be used and for what types of research questions.

Third, the research team faced significant obstacles matching short Asian names, which is true for other studies that match based on name criteria. The combination of few letters, similar spellings, and a tendency for swapping the order of given and family names increased the risk of false positives, particularly in fuzzy or pattern matching. In certain housing markets, Asian households make up a greater share of the population (and assisted housing population), requiring data and methods that can accurately represent this population and others who might be poorly matched by names and addresses.

Given these concerns, the research team recommends that future studies seeking to understand post-exit outcomes focus more on establishing administrative data linkages rather than using proprietary consumer reference data and using stronger matching fields such as social security numbers. HUD has already moved in this direction, linking its administrative data with surveys such as the Panel Study of Income Dynamics, the National Health and Nutrition Examination Survey, and the National Health Interview Survey. Ongoing research suggests that additional linkages with data from the Internal Revenue Service or Medicaid may allow researchers to similarly track residents over time and observe changes in income or household composition that could help to better explain household trajectories.

It is also worth noting that the HUD administrative data posed its own challenges to the analysis. In particular, the lack of consistent and accurate reporting on household exits from

assistance required filtering the sample to ensure capturing actual exits and moves and not administrative errors. Moreover, HUD does not require local housing authorities to indicate the reason that a household is leaving the program. As such, it was not possible to ascertain whether a household was moving for voluntary or involuntary reasons. The research team undertook a number of analyses to assess whether it was possible to distinguish differences in outcomes for different types of moves. For example, researchers tested to see if results varied if the public housing agency (PHA) had indicated the reason for moving out and whether increasing or decreasing household income prior to moving out influenced subsequent outcomes. However, the analysis did not produce meaningful differences in either the descriptive statistics or models. HUD should consider implementing changes to its data fields, requiring that PHAs report the reasons for program exit. Even a pared-down list of categorical responses—including eviction or lease violation, death or move to a nursing facility, moving to live with family or friends, leaving geographic service area, or no longer in need of housing subsidy—would make a significant difference in researchers' ability to assess reasons for program exit and the effect of voluntary or involuntary moves on subsequent outcomes (Geyer, Dastrup, and Finkel, 2019).

Indeed, the research presented here should only be taken as an initial exploration of outcomes post-HUD assistance, and the study opens up many new, potential avenues for research. For instance, despite its limitations, opportunities exist to further leverage the Data Axle dataset to understand residential mobility and neighborhood attainment. One potentially fruitful area is to explore the spatial distance of a household's moves on exiting assistance. Although this analysis documents changes in neighborhood conditions on exit, it does not explore whether these results were a function of nearby tracts having lower poverty rates—for example, greater income integration within the metropolitan statistical area (MSA), which would allow for even a short move to have measurable changes in neighborhood conditions—or whether households were moving longer distances to access different neighborhoods entirely. In addition, the statistically significant findings related to out-of-MSA moves also deserve further research. Is one reason for exiting the desire to move to another MSA? Are those who exit pursuing better labor market opportunities in other areas or lower-cost housing markets? Research in this vein could provide insights into the portability of vouchers or assistance across PHAs, giving households more flexibility in where they choose to live. Another next step would be to explore additional neighborhood outcomes beyond poverty rate, such as racial segregation, school quality, access to employment or other amenities, and a longer-term evaluation to see how the neighborhoods to which families move are also changing.

Additional research into why households choose to exit housing assistance and how they choose where to subsequently live is also needed (Smith et al., 2014). Qualitative research has provided rich insights into the locational decisions of households using housing assistance (Briggs, Popkin, and Goering, 2010; Rosenblatt and DeLuca, 2012). However, a complete understanding of the relative importance of neighborhood, housing, and social factors that influence neighborhood choice among low-income families is still lacking. Working with a select group of PHAs to collect survey data on exiting assistance alongside a 2-year follow-up survey could allow

for an analysis of how voluntary versus involuntary exits shape subsequent outcomes and provide richer insights into the role that household decisions play in shaping neighborhood attainment, homeownership, and residential stability.

Finally, opportunities exist to better understand how housing market contexts and policies influence outcomes post-exit. With the exception of FSS, the analysis did not reveal meaningful effects of other HUD programs, such as Moving to Work (MTW), on observable outcomes, but a more detailed investigation into PHA policies and their impacts is warranted. For example, the study did not attempt to analyze variation in MTW policies across PHAs. It also did not examine the role that local policies, such as renter protections or source of income discrimination laws, play in shaping post-exit housing outcomes.

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