Public Housing and the Spatial Concentration of Poverty: A Simulation Approach

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Abstract

This paper provides new estimates of the role of public housing in concentrating poverty spatially in American cities. This paper expands on prior work in this tradition in three ways. First, it uses national data, rather than focusing on just one or two particular cities. Second, it uses a simulation relocation methodology which allows for better conclusions about the impact of public housing on spatial concentration of poverty overall than past studies, which have implicitly not allowed for the fact that the residents of public housing would be living elsewhere if not in projects. Third it provides estimates of changes in the amount of public housing from 1997 to 2012 on levels of concentrated poverty, a period during which a significant share of the most distressed public housing was demolished under the federal Hope VI program. The results show that relocation has small impacts on the spatial concentration of poverty evaluated nationally because public housing is too small a share of all housing, and because former public housing residents increase the poverty tracts in their destination tracts of residence with relocation. Relocation does substantially decrease the tract poverty contact on average of (former) public housing residents.

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Public Housing and the Spatial Concentration of Poverty

In both the popular press and in academic circles, public housing projects have come to symbolize the problems of urban high-poverty neighborhoods. Many of the most prominent ethnographic descriptions of urban poverty—Kotlowitz's *There Are No Children Here* (1991), Stack's *All Our Kin* (1983), Venkatesh's *American Project* (2000)--are studies of public housing residents. In contrast to the earlier generation of research on urban slums (e.g. Suttles 1970), it is often hard to separate the problems of high-poverty neighborhoods from the problems of public housing projects, and descriptions of one tend to also be descriptions of the other.

In the demographic literature on neighborhood poverty, by contrast, public housing projects are conspicuous mostly for their absence. The statistical analyses of neighborhoods presented in Wilson's *The Truly Disadvantaged* (1987), the book that initiated the modern era of statistical studies of urban poverty, never distinguish tracts with public housing projects and other tracts. The most comprehensive statistical analysis of the problems of urban poverty, Jargowsky's *Poverty and Place* (1998), says almost nothing about the role of public housing or housing assistance in high-poverty neighborhoods. Although these sources refer to ethnographies of public housing in discussing their analyses, the statistical analyses that are at the heart of the work never distinguish public from private housing.

The reason for this odd disconnect not difficult to discern: the standard source of data on neighborhood poverty, the decennial census, does not include any data in its aggregate tabulations to distinguish public from private housing. The result that there are few broad based answers to basic demographic questions about the importance of public housing in forming high-poverty neighborhoods. It is difficult to say whether or not the focus on public housing projects in the ethnographic literature merely presents the accurate fact that most high-poverty neighborhoods include projects, or whether these ethnographic accounts focus instead on a distinct subpopulation that exists within the class of high-poverty neighborhoods.

This paper addresses a series of basic questions about the role of public housing projects in the formation of high-poverty tracts. We combine data from the U.S. Census and the American Community Survey with data from the U.S. Department and Urban Development. We present basic descriptive statistics basic to understanding the role of public housing in forming high-poverty neighborhoods at two points in time, 1997 and 2012. We then use a set of relocation simulations to understand the influence of public housing on forming immediate neighborhood environments for the residents of high-poverty tracts overall and the residents of a variety of different neighborhood environments.

PAST LITERATURE

Public housing in the United States began during the great depression as a housing assistance program for the struggling middle and working class. During this early period, a combination of market-rate rents and screening procedures excluded the truly poor from most public housing projects (Stoloff 2004). Effectively, public housing was a form of subsidized housing for the working class. Following World War II, pressure by housing developers who did not want to compete with the government for paying clients and increasing targeting toward those with the greatest housing need gradually resulted in changes in the eligibility criteria for public housing, including limits on rents housing agencies could charge, strict means-testing requirements for residency, and priorities on waiting lists for homeless and displaced persons. At the same time, after World War II the falling cost of housing relative to income and changes in mortgage financing improved the private housing options of the working class. As a result of these changes in eligibility and practice, public housing gradually shifted in its residents away from the working class and toward a form of housing serving the poor almost exclusively.

Since about 1970, public housing provides housing to some of the most economically disadvantaged segments of American society. In 1998, HUD administrative data show that only 6% of households receiving public housing had incomes of above $20,000 (http://www.huduser.org/datasets/assthsg/statedata98). Among households in the 1997 American Housing Survey, 64.6% of public housing residents were in families with income below the federal poverty threshold (ADD CITE). The AHS also shows that most of the households with income above the federal poverty threshold were only slightly above. While these statistics may somewhat underestimate the incomes of public housing residents, almost all sources suggest that public housing tends to house the poorest, and almost no middle-class families reside in public housing.

As we would expect from these figures, there is a strong connection between spatially concentrated poverty and public housing. Analysis of HUD administrative data matched to census data showed that in the early 1990s nearly 40% of the residents of public housing were living in what the census bureau has termed an “extreme poverty area” (CITE), with poverty rates of 40% or more (Newman and Schnare 1997). By contrast, only about 4% of the metropolitan population overall resided in census tracts with poverty rates 40% or more. Residents of public housing projects experience much higher rates of local area poverty contact than the recipients of the other major federal assisted housing program, certificates and vouchers. The combination of the large, high-density projects constructed in many cities in the 1950s and 1960s with eligibility rules limiting residence to poor or near-poor households created a perfect recipe for high rates of poverty in projects.

Concerns that public housing concentrates poverty, together with the high crime in projects and poor housing conditions, resulted in the retreat from public housing as a form of housing assistance. The federal Hope VI program, begun in 1992, awarded grants to local housing agencies to redeveloped distressed public housing into mixed-

income developments. From 1993 to 2010, roughly $6.2 billion in grants was allocated to demolish distressed public housing and construct new housing in its place, often mixed-income housing. Because the mixed-income developments tended to be smaller and included units for families with incomes too high to receive traditional housing assistance, the number of units of public housing declined as part of the redevelopment process.

Public Housing and the Structural Concentration of Poverty

The access rules that strongly slant public housing access toward the lowest income households together with the fact that a high percentage of public housing stock are large developments built before 1970 suggest that public housing almost surely has contributed to the spatial concentration of poverty in American cities. The major questions that remain to be answered are ones of quality and importance: How important is public housing in creating concentrated poverty on a national scale? How many high-poverty neighborhoods are the direct result of public housing policies? As Massey and Kanaiaupuni point out, "[f]rom a policy viewpoint the steps required to ameliorate concentrated poverty are surely different if it was caused by political decisions about the location of project rather than by economic dislocations, middle-class out-migration, or racially segmented housing markets" (1993, pp. 110-111). In fact, these results suggest that spatially concentrated poverty might be significantly reduced by a direct shift from fixed-site public housing to other forms of housing assistance, including portable (certificate and voucher) forms and more scattered-site public housing.

Despite the shift in emphasis in federal housing assistance programs away from traditional public housing projects—with practically no construction of new units of traditional public housing since 1980--enough public housing units remain to potentially have a large impact in creating high-poverty neighborhoods. In 1998, the most recent year for which data is available, more than 2.8 million persons were living in traditional public housing projects in the United States. This is enough to have a substantial impact on the small share of urban tracts that constitute "extreme poverty areas" with greater than 40% rates of poverty among residents.

Interest in the role played by housing assistance programs in concentrating poverty culminated in several studies that have attempted to assess the role of public housing in concentrating poverty. The first study we know of is Massey and Kanaiaupuni's study of public housing and the concentration of poverty in Chicago (1993). Massey and Kanaiaupuni use data from the Chicago Housing Authority on the location of projects built between 1950 and 1970 on tract poverty rates in 1970 and 1980, controlling for tract poverty rates at earlier points in time. They find that a project constructed in a tract from 1950-1970 is associated with about a 11% increase in the tract's poverty rate in 1980, controlling for tract characteristics around the time of construction of the project.

Massey and Kanaiaupuni's paper has been widely influential, especially in setting a base method for evaluating the impact of public housing on the concentration of poverty that

has been used by later investigations. Several subsequent studies in this literature adopt their regression-based methods for examining poverty concentration, but using data from other cities. Holloway, Bryan, Chabot, Rogers, and Rulli (1998) perform an analysis similar to Massey and Kanaiaupuni's for changes in poverty rates between 1980 and 1990 in Columbus, Ohio. The found, like Massey and Kanaiaupuni, that tracts was associated with a 10% to 12% increase in a tract's poverty rate. Carter, Schill, and Wachter (1998) examine public housing and the spatial concentration of poverty for Boston, Ceveland, Detroit, and Philadelphia from 1950 to 1990. Carter et. al. found that the poverty rate of tracts with extensive public housing had rates of poverty that were 8% to 20% higher, depending on the city and controlling for other factors.

A few other studies have examined effects of assisted housing as a broader category. This includes traditional public housing, but also units built through housing and tax credit programs, and voucher holders. In particular, Kucheva (2013) considers how changes in forms of housing assistance are associated with change in rates of poverty from 1980 to 2000 and from 2000 to 2008. She finds, surprisingly, inconsistent and frequently negative associations between change in housing assistance and change in poverty rates. Because she considers all forms of housing assistance, her results reach well beyond public housing and are beyond the main analysis of this paper.[1]

Studies of effects of public housing all suggest that tracts in which projects are constructed see substantial increases in their subsequent rates of neighborhood poverty, at least in the handful of older, industrial cities that have been included in past analyses. This is consistent with the conclusion that public housing had an important role in spatially concentrating poverty.

The Limits of Prior Analyses

Within this literature, all of the studies we know of have interpreted their results as consistent with Massey and Kanaiaupuni's original conclusion, that public housing "must be considered an important structural cause of concentrated poverty in U.S. cities" (Massey and Kanaiaupuni 1993, p. 120). Most later studies in this traditional conclude that they find at least as much evidence for the poverty-concentrating effects of public housing as do Massey and Kanaiupuni (1993), and in addition demonstrate the importance of public housing in concentrating poverty in cities other than Chicago.

At the same time, some limitations restrict the extent to which we can draw strong conclusions from these studies. One obvious limitation is that these studies are focused on only a few older metropolitan areas in the East and Midwest. Past studies have considered Chicago, Columbus, Boston, Cleveland, Detroit, and Philadelphia (Massey and Kanaiaupuni 1993; Holloway, Bryan, Chabot, Rogers, and Rulli 1998; Carter, Schill, and Wachter 1998). In other words, we have no basis to draw conclusions about the role of public housing outside of older cities in the East and Midwest. Yet it seems very

[1] In addition, as she acknowledges, direction of causality is unclear in her study, because project citing is likely influenced by neighborhood poverty rates and change in poverty rates, in addition to project citing influencing poverty rates.

likely that in other regions the influence of public housing on poverty concentration may be different, especially given the different history of public housing, different racial composition, and difference spatial organization between Eastern and Midwestern cities and those in the Mountain and Western regions.

In addition, a critical methodological limitation of these studies almost limits their usefulness in assessing the overall increase in spatially concentrated poverty with public housing. The basic method used in all of these studies has been to estimate regression models with census tracts as units. Percent of the population poor is the dependent variable and the presence of a public housing project and controls are included as the independent variable. The resulting coefficient for the presence of public housing has been interpreted as measuring the increased concentration of poverty as a result of public housing, or the effect of public housing on concentrating poverty.

A related technique introduced by these studies has been to examine how the concentration of poverty increases or decreases between decennial censuses in tracts in which public housing projects are constructed or present. Especially useful when the project is constructed between censuses, this method has the advantage that it can control for tract conditions before the project was built in evaluating the impact of the project on the tract. Again, the resulting coefficient from a dummy variable or other measure of the presence of a public housing project in the tract has been taken to indicate that prior housing increased the spatial concentration of poverty.

While useful for assessing the impact of public housing on the tract in which the project is constructed, this technique has a major limitation: the coefficients do not allow for the fact that the residents of public housing would be living somewhere else if they were not living in public housing. Because public housing recipients are very low income, in so doing they would be increasing the poverty rate of their destination tracts. In fact, it is even possible that the residents of public housing might end up moving to tracts that were a little less poor than their tracts of origin, possibly even resulting in no net reduction in poverty concentration. The increase in average poverty concentration in poor tracts with the construction of a project will reduce the level of poverty in other areas—thus some of what appears as the apparent increase in poverty concentration from public housing represents simple spatial rearrangement.

Because much of the increase in poverty in tracts with projects represents relocation of poor households from other tracts—thus decreasing those tracts poverty rates—estimates from this method will overstate the role of public housing in increasing poverty concentration overall. The extent of overstatement depends to a large extent on the types of tracts that public housing residents would be living if not in public housing.

A Simulation Approach

To overcome the shortcomings of the tract-regression method, my estimates instead rely upon a set of simulations that reassign the population living in subsidized housing to

other tracts within their metropolitan area. This provides a rough simulation of what might happen if residents of public housing were to relocate on the private market, including possibly with the assistance of another form of housing. The simulations use a variety of rules as the basis of this relocation to assess the sensitivity of the results to different possible scenarios of how the residents of public housing might be distributed if not in projects. Following the reassignment of project residents in each simulation, summary statistics of the degree of change in the spatial concentration of poverty are computed.

The exact rules that would best govern the reallocation of public housing residents are debatable; it is for this reason that we use a variety of different possible reallocation rules. For almost of the reallocation rules except for the most unrealistic, however, the results are more reasonable than assuming that the residents of poor neighborhoods vanish from the urban landscape, the implicit assumption in tract-level regression studies.

The basic simulation model takes the population of public housing projects and then reallocates those persons to other census tracts within the same metropolitan area proportionally to a characteristic of the tract housing or population. For instance, one characteristic that we use to reallocate is the share of low-income rental housing in the metropolitan area. If a tract contains 1% of the low-income rental housing within a metropolitan area, then the simulations assume that 1% of the former public housing residents will end up in that sort of tract. Implicitly, then, the reallocation assumes (1) within-metropolitan reallocation only and (2) reallocation proportionately to some other characteristic of the housing or population of potential destination tracts.

Because we are interested in the spatial concentration of poverty following reallocation, all simulations take account of the poverty rate of the person moving. Some reallocations use the same rule for both poor and nonpoor public housing residents, while others use different rules of reallocation for these two groups.

For poor residents, for instance, the reallocation rule is:

$$newpoor_{tm} = oldpoor_{tm} - poorpub_{tm} + poorpub_{m}\left(\frac{criteria_{tm}}{criteria_{m}}\right)$$

Where $newpoor_{tm}$ = number of poor residents of tract t in metropolitan area m after reallocation
$oldpoor_{tm}$ = number of poor residents of tract t in metropolitan area m before reallocation
$poorpub_{tm}$ = number of poor residents of public housing in tract t in metropolitan area m before reallocation
$criteria_{tm}$ = a criteria variable representing a characteristic of tract t in metropolitan area m used for relocation, excluding public housing residents in its calculation
$criteria_{m}$ = criteria variable representing a the sum of a tract characteristic for metropolitan area m used for reallocation, excluding public housing residents

An identical equation is used for nonpoor residents of public housing:

$$newnonpoor_{tm} = oldnonpoor_{tm} - nonpoorpub_{tm} + nonpoorpub_{m}\left(\frac{criteria_{tm}}{criteria_{m}}\right)$$

With the variables defined for the nonpoor population, but otherwise identically to the poor variables. For most scenarios, the criteria variable is the same for poor and nonpoor public housing residents, although one scenario has them moving differently. Even nonpoor public housing residents tend to be just slightly above the poverty line, so it is likely they would move in patterns similar to poor residents.

The Relocation Scenarios

The criteria variable used in the relocation scenarios are shown in table 1. Six counterfactual scenarios are employed. The table gives a description and indicates the criterion variable that guides relation for persons moving out of public housing.

In addition, we also perform each of the relocation scenarios twice, once with no modification, and a second scenario building in racial segregation in migration. Racial segregation is added by categorizing tracts into three categories within metropolitan areas: mostly black tracts (50% or more black), mostly Hispanic tracts (50% or more Hispanic), and all other tracts. Residents are then proportionally reallocated by the criteria variable within their metropolitan area *and* race/ethnic tract type, restricting the residents of mostly black tracts to stay within that type, and of mostly Hispanic tracts to stay within that type.

Some of these simulations are clearly quite unrealistic, especially the population-proportional scenario, by which movers relocate to tracts purely in proportion to the existing population of the tracts, regardless of housing costs, availability, or tenure of the housing stock in the tract. Nevertheless, this extreme scenario is useful. This allows an assessment of the consequences of a truly extreme form of deconcentration.

The more realistic scenarios account for class and race segregation in housing markets. If public housing were to suddenly disappear, former public housing residents would likely end up in a mix of arrangements: inexpensive private rental housing, doubled-up living with relatives, in shelters and receiving other forms of emergency housing assistance, and living on the street. The scenarios we use assume movement either into types of housing that are available and likely to be within the limited means of public housing recipients, or in other scenarios assume that they will end up in tracts with persons with characteristics similar to their own characteristics.

A final important issue in relocation is the possibility of cascade migration. Suppose that the movement of some public housing residents into an area leads to more affluent residents to migrate out in response, and more affluent persons move into areas that public housing residents move out of. This cascade migration, if it works as described,

will result on smaller impacts on neighborhood poverty rates from public housing as those reported here. This manuscript assumes no cascade migration.

Several studies have attempted to examine if there tends to be significant effects due to migration away from public housing by persons living near projects. Somewhat surprisingly, studies have generally found no significant migration, once other features of the ecology and demography of areas are taken into account. Both Massey and Kanaiaupuni (1993) and Freeman (2003), for instance, find no evidence of significant out-migration by persons living near public housing as a result of public housing construction. This evidence suggests the simplifying assumption of no significant cascade migration is reasonable.

DATA

The basic data I used to perform the analysis came from the 2012 HUD data from the Picture of Subsidized Households database. My estimates use only the "complete" data from the picture of subsidized households, to avoid the problems of high levels of missing data for items not derived from HUD administrative records. This data was matched to data on census tracts from the U.S. Bureau of the Census year 2010 Census and 2007-2011 sample of the American Community Survey.

Following most other studies of neighborhood poverty, this study uses census tracts as the best available approximation for the local neighborhood environment. Census tracts are small areas with average population 4000 drawn by the Census Bureau to account for local natural boundaries. The 2012 HUD data comes matched to 2010 census geocodes.

The HUD data provide information based on administrative records on all public housing projects in the United States. The data available from HUD comes from two sources. Basic data on the location, number of units, and program is available for all assisted housing units in the United States. Based on surveys filled out by local housing agencies, data is also available on the residents including percentage of residents in each project in income ranges and detailed demographic data.

Unfortunately, one important variable for the analysis not provided directly by the HUD data is the poverty rate of families living in public housing. The HUD data does report the income level of the residents of public housing in ranges, but it does not provide the crosstabulation of family size and income levels that would be necessary to directly determine poverty rates for the residents of public housing.

We use a combination of the tract poverty rate and the national poverty of public housing residents to estimate the poverty rate of tract public housing residents. If $ppoor_{tm}$ is the poverty rate of all residents of tract t in metropolitan area m, and $ppub_{tm}$ is the percentage

of residents in tract t and metropolitan area m who are resident in public housing, then we estimate the poverty rate of public housing residents ($ppoorpub_{tm}$) with:

$ppub_{tm} = .646 * (1-ppub_{tm}) + ppoor_{tm}*ppub_{tm}$

The figure .646 was chosen as the poverty rate of families in public housing in the American Housing Survey. This estimate weights the tract poverty rate increasingly heavily as the share in the tract in public housing increases.

Measures of concentrated poverty

We use three analytically distinct sets of measures to describe the concentration of poverty nationwide.

First, we provide measures of the share of the metropolitan population nation-wide resident in tracts with poverty rates in five ranges: 0-10% poor, 10-20% poor, 20-30% poor, 30-40% poor, and 40% or more poor. This is an extended version of the categorization widely used by Jargowsky (1998) in his detailed look at the extent of high-poverty tracts and by the Census Bureau in its publication on poverty areas. We refer to tracts that are more than 40% poor as extreme poverty areas, following the Census Bureau.

Second, we provide a measures of the contact of poor persons with other poor, using the widely-used P* measure. Our P* measure assess the spatial isolation of the poor.

Third, we provide measures of the segregation of poor and nonpoor. We provide both the traditional index of dissimilarity (D) and the entropy index of segregation (H) calculated between the poor and nonpoor.

PLANNED ADDITIONS TO THIS MANUSCRIPT BEFORE PAA 2015

The version we are submitting has a number of results, but is incomplete. We plan to add two significant additional analyses to the final version:

1. We plan to add a relocation scenarios that adds in geographic distance, reallocating population to areas near existing housing projects as a declining function of distance. We have used data from the Panel Study of Income Dynamics to estimate a distance function and are in the process of implementing this.
2. We plan to perform a similar analysis using Picture of Subsidized Household data from 1997 and 2000 Census data. We will present some summary of how the effect of public housing on poverty concentration has changed between these two years, which will provide significant insights about the effects of Hope VI, the law that demolished and rebuilt a significant share of the country's public housing.

In addition, I am sure we will think of ways to clean up and improve the manuscript and analysis.

RESULTS

Table 2 provides some basic statistics about the neighborhood environments of public housing residents. Consistent with prior studies (e.g. Newman and Schnare 1997), the residents of public housing are subject to extremely high-poverty neighborhood environments, far higher than the general population or even the population in metropolitan areas with below poverty incomes. Although public housing residents make up less than 1% of the population of metropolitan areas in the United States, they make up more than 7% of the residents of tracts with poverty rates of more than 40%. On its face, this suggests a plausible case for the importance of public housing in creating poor neighborhoods on a large scale. Table 3 gives further descriptive information by region and metropolitan size. Public housing is especially a large share of the total population in the Northeast region of the U.S., reflecting mostly the large amount of public housing in New York City. The average tract percentage poor of public housing residents in large Northeastern cities is 32.7%, which is the highest. Public housing residents in small and medium-sized cities in the South also live in especially poor tracts compared to public housing residents elsewhere.

Table 4 provides results about changes in the spatial distribution of poverty overall with different relocation scenarios. The top panel (panel A) shows the distribution under different scenarios of relocation. The top panel reallocates public housing residents across tracts in proportion to the criteria variable, without regard to the racial composition of the destination tract. The bottom panel restricts relocation of individuals to tracts with racial composition similar to their own census tract. The rows show the percentage of population residing in poverty rates of each tract type. The three right columns show three summary measures of the spatial isolation (P*) and segregation (D, H) of poor and nonpoor persons using each relocation scenario.

One result is immediately apparent from the results: the distribution of persons over tract type does not change much from the baseline situation under any of the relocation scenarios. Even under the most-poverty deconcentrating (and least realistic) scenario, population proportional relocation without segregation, the relocation of public housing residents only slightly decreases the overall summary measures of concentration of poverty. The effects of movement are somewhat larger on the share of tracts in the extreme poverty rate category of 40% or more poor. Under the most poverty-deconcentrating scenario, the share in the extreme category drops just slightly.

The poverty-deconcentrating effects are smaller under the scenarios that account more accurately for the class and race segregation in living patterns of the housing market.

Overall, these results suggest that public housing has contributed to the average spatial concentration of poverty overall, but only slightly. Relocating residents to other tracts results in only small reductions in spatially concentrated poverty. The small impacts of ending public housing occur for two reasons: (1) public housing provides residence for less than 1% of the total population of the United States, a small enough share to not have much impact on the overall spatial distribution; and (2) given the low income means of residents, their relocation is likely to tracts that are still moderately poor, in the process increasing the poverty rates of their destination census tracts. Thus we tend to see a small decrease in the overall percentage of tracts that are extremely poor, but there are corresponding increases in moderately poor tracts.

The results of relocation are much more profound for the neighborhood environments of former public housing residents. Table 5 tabulates the results of the relocation scenarios for the population of former public housing residents, rather than for the entire population.

The initial (baseline) condition shows the very high level of poverty contact of public housing residents. The summary measures in the right-hand columns show the degree of contact of public housing residents with tract-level poverty (P*) and the segregation of public housing residents from the nonpoor (D and H). This latter statistic at baseline is at a strikingly high level, showing how extreme separated from the bulk of the nonpoor population the residents of public housing are.

The relocation scenarios all show that the poverty environments experienced by former public housing project residents are considerably less poor after ending public housing. This is true even under the scenarios which redistribute former public housing residents in the most class and race segregated scenarios—the smallest increase involves a decline in poverty contact (P*) of more than one-third and of entropy segregation (H) of more than 50%. Public housing does create a uniquely high-poverty environments for its residents.

At the same time, the relocation scenarios that incorporate race and class segregation result in public housing having a fairly high level of neighborhood poverty contact. This is true both for scenarios that reallocate public housing residents in proportion to poor persons, other assisted housing recipients, and low-rent areas. Racial segregation is crucial in this process, with public housing residents experiencing far higher rates of poverty contact in the scenarios with racial segregation than without them. Again, this demonstrates the crucial role of racial segregation in concentrating poverty spatially.

Finally, table 5 gives changes with relocation scenarios broken down by region and city size. A pattern that emerges in this table is that the poverty-concentrating effect of public housing for public housing residents is greater in larger metropolitan areas (of 500,000 persons or more), and weaker in smaller metropolitan areas.

CONCLUSION

Following Massey and Kanaiaupuni's (1993) influential study, several later analyses have improved and extended their approach to investigate the role of public housing in the spatial concentration of poverty. These studies have generally agreed with Massey and Kanaiaupuni's original conclusion that public housing "must be considered an important structural cause of concentrated poverty in U.S. cities" (Massey and Kanaiaupuni 1993, p. 120). The shortcoming of this line of work is that in adopting Massey and Kanaiaupuni's tract-regression approach, these studies are subject to a similar weakness: they fail to account for the changes in the spatial distribution of poverty that would result if the residents of public housing were to be living elsewhere.

This study has used simulations to account for this defect, and has examined the truth of this proposition using a much more broad-based dataset that covers all metropolitan areas. We consistently find that public housing has contributed to the spatial concentration of poverty, but on a national scale the contribution of public housing has been very small. This is the results of two factors. First, public housing constitutes about 10% of housing the extremely poor census tracts, and less than 1% of housing overall, thus constituting too small a share of housing to have a terribly large impact. Second, because of race and class segregation in private housing, most public housing residents would be living in fairly poor neighborhoods were they not resident in public housing. In the process, their presence would increase the poverty rate of their tract of destination, thus increasing the number of residents living in in poor tracts.

On the other hand, the results in this paper clearly support the case that public housing has created a small number of homogeneously poor tracts, which are very uncommon among tracts outside of public housing projects. The residents of public housing are subject to higher rates of neighborhood poverty contact than any other identifiable population group, including recipients of other forms of government housing assistance. Clearly, the government has created uniquely high-poverty projects in building projects. In this sense, public housing is reasonably considered one element—along with interstate highways and mortgage underwriting programs—that has furthered suburban affluence and central city decline. The fact that projects have been a fairly unimportant element in the total story largely reflects the fact that they house less than 1% of the urban population.

The results are also relevant for understanding the long-term trend in federal policy away from fixed-site housing assistance and toward portable forms, such as certificates and vouchers. The results here suggest that this is a movement that will help to break up the uniquely concentrated poverty of urban housing projects. On the other hand, the results indicate that elimination of public housing is likely to reduce highly concentrated poverty only modestly. This is because of the class and race segregated patterns that would dominate the relocation patterns of the residents of public housing if they were not to live there. To take larger steps in reducing the spatial concentration of poverty and corresponding problems, we must take active steps to counteract the race and class segregation that characterizes the private housing market. Replacing homogeneously

poor projects will only be one small step in combating spatially concentrated poverty on a national scale.

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Table 1: Public Housing Simulation Relocation Scenarios

Relocation Scenario	Description	Relocation Criterion Variable
1. Baseline (no relocation)	Current situation	none
2. Poverty proportional	Residents move into tracts in proportion to the share of the metropolitan below-poverty population in the tract.	# of poor in tract
3. CV proportional	Residents move into tracts in proportion to the share of receipients of certificate and voucher forms of housing assistance already in the tract.	# of housing certificate and voucher holders in tract
4. Vacant rental housing proportional	Residents move into tracts in proportion to the share of the metropolitan vacant rental housing in tract.	# of vacant rental housing units
5. Low-rent rental housing	Residents move into tracts in proportion to share of rental housing with rents in lowest 20% of rental housing in metropolitan area. Quintiles are calculated within rental housing classes determined by the number of bedrooms.	# of rental housing units in lowest 20% of rents in the metropolitan area (# bedrooms adjusted)
6. Rental housing proportional	Residents move into tracts in proportion to the share of the metropolitan vacant rental housing in tract.	# of rental housing units
7. Population proportional	Residents move into tracts in proportion to the share of all residents in the tract type.	# of persons in tract

Table 2: Total Metropolitan Population and Public Housing Population by Tract Poverty Rate

Tract Percentage Poor	Total Population		Public Housing Population		Public Housing as Percentage of Total
	Population	*Percentage*	*Population*	*Percentage*	
0%-10%	140,597,992	48.7%	117,659	5.8%	0.08%
10%-20%	88,643,815	30.7%	368,156	18.2%	0.42%
20%-30%	35,403,829	12.3%	447,081	22.1%	1.26%
30%-40%	15,323,407	5.3%	467,339	23.1%	3.05%
40%+	8,879,344	3.1%	626,984	30.9%	7.06%
Total	288,848,386	100.0%	2,027,218	100.0%	0.70%

Table 3: Public Housing Prevalence and Poverty Contact by Region and City Size

A. Public Housing Population as a Percentage of Total Population

	Metropolitan Area Population		
Region	*Under 500,000*	*500,000 to 3 million*	*3 millon or more*
Northeast	0.85%	1.27%	2.15%
Midwest	0.90%	1.26%	1.17%
South	1.05%	1.07%	0.48%
West	0.44%	0.60%	0.47%

B. Contact (P*) of Public Housing Residents with Tract Poverty

	Metropolitan Area Population		
Region	*Under 500,000*	*500,000 to 3 million*	*3 millon or more*
Northeast	0.243	0.267	0.327
Midwest	0.240	0.287	0.239
South	0.304	0.300	0.250
West	0.208	0.227	0.247

Table 4: Change in Overall Tract Poverty Rates with Relocation of Public Housing Residents

A. No Racial Segreagation in Relocation

	Population Distribution by Tract Poverty Rate							
Relocation Scenario	**0%-9.9%**	**10%-19.9%**	**20%-29.9%**	**30%-39.9%**	**40%+**	**Isolation of Poor (P*)**	**Dissimilarity Poor/Nonpoor (D)**	**Entropy Segregation Poor/Nonpoor (H)**
1. Baseline (no relocation)	48.7%	30.7%	12.3%	5.3%	3.1%	0.213	0.334	0.108
2. Poverty proportional	48.5%	31.0%	12.4%	5.2%	3.0%	0.213	0.332	0.107
3. CV proportional	48.5%	30.9%	12.4%	5.2%	3.0%	0.213	0.332	0.107
4. Vacant rental housing prop.	48.4%	31.1%	12.4%	5.2%	3.0%	0.213	0.330	0.106
5. Low-rent rental housing	48.5%	30.9%	12.4%	5.2%	3.0%	0.213	0.332	0.107
6. Rental housing proportional	48.4%	31.1%	12.4%	5.1%	3.0%	0.213	0.330	0.106
7. Population proportional	48.5%	31.1%	12.3%	5.1%	3.0%	0.212	0.329	0.105

B. With Racial Segregation in Relocation

	Population Distribution by Tract Poverty Rate							
Relocation Scenario	**0%-9.9%**	**10%-19.9%**	**20%-29.9%**	**30%-39.9%**	**40%+**	**Isolation of Poor (P*)**	**Dissimilarity Poor/Nonpoor (D)**	**Entropy Segregation Poor/Nonpoor (H)**
1. Baseline (no relocation)	48.7%	30.7%	12.3%	5.3%	3.1%	0.213	0.334	0.108
2. Poverty proportional	48.6%	30.8%	12.4%	5.3%	3.0%	0.213	0.333	0.107
3. CV proportional	48.5%	30.8%	12.4%	5.2%	3.0%	0.213	0.333	0.108
4. Vacant rental housing prop.	48.6%	30.9%	12.4%	5.2%	3.0%	0.213	0.332	0.107
5. Low-rent rental housing	48.5%	30.8%	12.4%	5.2%	3.0%	0.213	0.333	0.107
6. Rental housing proportional	48.5%	30.9%	12.4%	5.2%	3.0%	0.213	0.332	0.107
7. Population proportional	48.8%	30.9%	12.2%	5.1%	3.0%	0.213	0.331	0.107

Note: percentages in panel B may have an error and are being re-checked.

Table 5: Change in Residential Tract Poverty of (Former) Public Housing Residents with Relocation

A. No Racial Segreagation in Relocation

	Former Public Housing Resident Distribution by Tract Poverty Rate							
Relocation Scenario	**0%-9.9%**	**10%-19.9%**	**20%-29.9%**	**30%-39.9%**	**40%+**	**Public Housing Resident Contact with Poor Neighbors (P*)**	**Dissimilarity Public Housing Residents / Nonpoor (D)**	**Entropy Segregation Public Housing Residents / Nonpoor (H)**
1. Baseline (no relocation)	13.4%	22.5%	21.4%	19.4%	23.3%	0.281	0.799	0.404
2. Poverty proportional	21.2%	31.2%	22.0%	14.0%	11.6%	0.223	0.344	0.075
3. CV proportional	16.9%	31.2%	25.7%	15.5%	10.7%	0.226	0.533	0.162
4. Vacant rental housing proportio	29.2%	33.1%	20.2%	10.7%	6.8%	0.186	0.375	0.084
5. Low-rent rental housing	16.1%	29.7%	24.0%	15.3%	14.8%	0.245	0.515	0.169
6. Rental housing proportional	30.5%	33.8%	18.9%	9.8%	7.0%	0.184	0.330	0.063
7. Population proportional	47.9%	29.5%	12.9%	5.9%	3.8%	0.139	0.051	0.003

B. With Racial Segregation in Relocation

	Former Public Housing Resident Distribution by Tract Poverty Rate							
Relocation Scenario	**0%-9.9%**	**10%-19.9%**	**20%-29.9%**	**30%-39.9%**	**40%+**	**Public Housing Resident Contact with Poor Neighbors (P*)**	**Dissimilarity Public Housing Residents / Nonpoor (D)**	**Entropy Segregation Public Housing Residents / Nonpoor (H)**
1. Baseline (no relocation)	5.8%	18.2%	22.1%	23.0%	30.9%	0.325	0.844	0.467
2. Poverty proportional	15.4%	26.8%	24.2%	18.1%	15.5%	0.254	0.450	0.134
3. CV proportional	13.6%	28.7%	26.9%	17.6%	13.2%	0.243	0.568	0.192
4. Vacant rental housing proportio	20.3%	28.9%	24.3%	15.4%	11.1%	0.224	0.474	0.144
5. Low-rent rental housing	12.3%	25.4%	24.3%	18.7%	19.3%	0.272	0.565	0.214
6. Rental housing proportional	20.6%	29.3%	23.4%	14.9%	11.8%	0.226	0.447	0.129
7. Population proportional	44.3%	29.2%	14.4%	7.2%	4.9%	0.151	0.124	0.017

Table 6: Change in Contact of Former Public Housing Residents with Tract Poverty (P*) with Relocation by Region and City Size

A. Change in Contact with Tract Poverty from Baseline, Population Proportional Reallocation with Racial Segregation

	Metropolitan Area Population		
Region	*Under 500,000*	*500,000 to 3 million*	*3 millon or more*
Northeast	0.1152	0.1821	0.2222
Midwest	0.1184	0.2287	0.2213
South	0.1170	0.2000	0.1850
West	0.0489	0.1489	0.1702

B. Change in Contact with Tract Poverty from Baseline, Low-Income Rental Housing Proportional with Racial Segregation

	Metropolitan Area Population		
Region	*Under 500,000*	*500,000 to 3 million*	*3 millon or more*
Northeast	0.0218	0.0415	0.0713
Midwest	0.0182	0.0620	0.0762
South	0.0338	0.0615	0.0695
West	-0.0035	0.0571	0.0813