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Blowing it Up and Knocking it Down: The Effect of Demolishing High-Concentration Public Housing on Crime

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Despite popular accounts that link public housing demolitions to spatial redistribution of crime and possible increases in crime, little systematic research has analyzed the neighborhood or citywide impact of demolitions on crime. In Chicago, which has conducted the largest public-housing demolition program in the United States, I find that public housing demolitions are associated with a 10 percent to 20 percent reduction in murder, assault, and robbery in neighborhoods where the demolitions occurred. Furthermore, violent crime rates fell by about the same amount in neighborhoods that received the most displaced public-housing households relative to neighborhoods that received fewer displaced public-housing households, during the period when these developments were being demolished. This suggests violent crime was not simply displaced from the neighborhoods where demolitions occurred to neighborhoods that received the former public-housing residents. However, it is impossible to know what would have happened to violent crime in the receiving neighborhoods had the demolitions not occurred. Finally, using a panel of cities that demolished public housing, I find that the mean public-housing demolition is associated with a drop of about 3 percent in a city's murder rate and about 2 percent in a city's assault rate. I interpret these findings as evidence that while public-housing demolitions may push crime into other parts of a city, crime reductions in neighborhoods where public housing is demolished are larger than crime increases in other neighborhoods. A caveat is that while the citywide reduction in the assault rate appears to be permanent, the citywide reduction in the murder rate seems to last for only a few years.

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1 Introduction

Large public housing developments, particularly those with high-rise buildings, have had a reputation as epicenters of crime and gang activity. Beginning in October 1992, the United States Department of Housing and Urban Development (HUD) began to award grants to local public housing authorities that could be used for demolition and revitalization of public housing through a program that has come to be known as HOPE VI.[1] By 2003, HUD had awarded over $390M in demolition grants to local public housing authorities. In addition, HUD awarded more than $5.8B in revitalization grants from 1993 through 2006. Under HOPE VI, more than 50,000 units of distressed public housing will be demolished and about the same number of units will be developed. One of the objectives of the HOPE VI program is to "provide housing that will avoid or decrease the concentration of very-low-income families."[2] To that end, public housing in the United States is moving away from the old model of large developments including high-rise buildings and moving toward more low-rise, scattered-site, and mixed-income developments.[3] How has the HOPE VI program affected crime near the demolition sites and in the rest of the city?

This paper evaluates the impact of HOPE VI on crime.[4] Economic theory does not provide a clear prediction about the expected impact of this program on crime. On one hand, if there are peer effects in crime, then one might expect demolishing high-rise public housing to reduce city-wide crime by decreasing the density of poverty in neighborhoods where poverty is most concentrated.[5] By similar reasoning, public housing demolition could lead to a reduction in city-wide crime if dispersing subsidized housing more evenly throughout the city results in fewer areas where informal social controls have broken down.[6] One might

[1] HOPE VI program information is available at: http://www.hud.gov/offices/pih/programs/ph/hope6/about/

[2] Popkin et al. (2002)

[3] Goetz (2003) points out that HOPE VI can be viewed as the second generation of subsidized housing dispersal programs. The first being the fair housing movement in the late 1960's and early 1970's. Erickson (2009) refers to HOPE VI as "one of the most important new HUD programs in the 1990s" and notes the involvement of numerous organizations such as community development corporations and state and local governments in the design and rebuilding of new development in sites where public housing was demolished.

[4] Another recent study of the local impact of a large federal program is Busso and Kline (2007). The authors find that the federal Empowerment Zone program had significant positive effects on local labor and housing markets.

[5] Bayer, Hjalmarsson, and Pozen (2008) show evidence of the existence of criminal peer effects in juvenile correctional facilities in Florida. Case and Katz (1991) find evidence that residence in a neighborhood where peers are involved in crime increases the probability that an individual is involved in crime. Glaeser, Sacerdote, and Scheinkman (1996) analyze a social interaction model with multiple equilibria to explain spatial variation in crime rates. Freeman, Grogger, and Sonstelie (1996) propose a different model, also featuring multiple equilibria, in which spatial variation in crime rates is driven by the assumption that a criminal's chance of being caught is a decreasing function of the number of other criminals operating in the same area. Card, Mas, and Rothstein (2008) document evidence of thresholds in the minority share of a neighborhood beyond which the neighborhood may move toward an equilibrium with either 0% or 100% minority share. These non-linearities are consistent with the existence of multiple equilibria predicted by social interaction models.

[6] Geographic concentration of poor households may lead to breakdowns in informal social controls, exacerbating crime

also expect public housing demolition to decrease city-wide crime if the physical structure of high-rise public housing buildings provides a unique environment which is hard to police, and thus particularly suited to gang activity.[7] On the other hand, the level of city-wide crime could remain the same if crime is simply displaced from neighborhoods that are being revitalized to other poor neighborhoods.[8] Finally, net crime might even be expected to increase if displaced residents have a hard time adapting to their new neighborhoods, rival gangs are pushed into each other's territory, or police find it hard to adapt to new spatial patterns of criminal activity.[9]

I split my analysis into two parts. In the first part, I examine the local effect of public housing demolition on neighborhoods where high-rise public housing was demolished in Chicago. I find that public housing demolitions are associated with large reductions in neighborhood violent crime. In the second part, I assess the degree to which crime was displaced by public housing demolitions. I begin by estimating the change in crime associated with an influx of displaced public housing residents to a neighborhood. While violent crime tends to fall in neighborhoods that received a large share of displaced public housing residents, it is impossible to know how it would have changed had they not moved in. For a more definitive answer, I estimate the effect of public housing demolitions on crime rates for a panel of 121 cities that received HOPE VI demolition grants. I find that demolitions are associated with about a 3% reduction in city-wide murder rates and about a 2% reduction in city-wide assault rates, implying that any increase in these crimes due to displacement is smaller in total than decreases in neighborhoods that are directly affected by public housing demolitions. One caveat is that the reduction in the murder rate lasts only a few years, while the reduction in the assault rate appears to be permanent.

The degree to which the demolition of high-rise public housing can reduce crime, and thereby increase neighborhood and city-wide amenity values is interesting from both an

problems. See Skogan (1990). Sampson and Raudenbush (1999) and Morenoff, Sampson, and Raudenbush (2001) find that the degree of "collective efficacy", social control of public space, is associated with the level of violent crime. Hirschfield and Bowers (1997) study the connection between crime and "social cohesion". See Sampson, Morenoff, and Gannon-Rowley (2002) for an overview of "neighborhood effects" in the sociology literature. Joseph, Chaskin, and Webber (2007) discuss the theoretical justifications for mixed-income development as a means to address poverty.

[7] This explanation is related to the theory of defensible space as popularized by Newman (1972).

[8] Evidence of crime displacement due to weather shocks has been shown by Jacob, Lefgren, and Moretti (2007).

[9] Kling, Ludwig, and Katz (2005) find that male youths randomly selected to relocate to lower-poverty areas have lower probabilities of arrest for violent crime, but higher probabilities of arrest for property crime. Hagedorn and Rauch (2007) suggest that the fall in Chicago's homicide rate may have been delayed by conflicts created when gang members displaced by public housing closures relocated to rival gang territory. Rosin (2008) argues that police were not prepared for the new spatial distribution of crime caused by public housing demolition and resident relocation.

urban economics perspective and a public policy perspective. From the viewpoint of urban economics, the fact that total crime might decrease by dismantling concentrated public housing developments and relocating residents to low-rise and scattered-site developments is consistent with economic theories of criminal peer effects, urban planning theories of defensible space, and sociological theories of crime and disorder. From a public policy perspective, the extent to which concentrated public housing imposes a larger externality, through its impact on crime and property values, than would be imposed by scattered-site public housing is important for policy makers and urban planners when weighing the costs and benefits of where and how to offer subsidized housing.[10]

Estimating the impact of public housing demolition on crime is complicated by a number of issues. Estimates that simply compare the level of crime before demolition to the level of crime after demolition will reveal the change in crime that is correlated with public housing demolition, but, in general, will not reveal the change in crime that is caused by public housing demolition in the presence of other time-varying factors that influence crime, such as changes in the number of police or rising prison populations.[11] Naive comparisons of the change in crime levels in neighborhoods where public housing is demolished to the change in crime levels in neighborhoods where public housing is not demolished may be confounded by differences in pre-existing trends. To overcome these empirical problems, I compare neighborhoods where public housing has been demolished to other neighborhoods where public housing will be demolished or is in the process of being demolished. To estimate the effect of public housing demolition on neighborhood-level crime in Chicago neighborhoods, I exploit variation in both the timing and number of high-rise public housing buildings or units closed per year. To estimate the city-wide effect of public housing demolition on crime, I employ an empirical strategy in which identification comes from variation in the timing and size of demolition grants awarded by HUD across cities. In both cases, the sample contains only the affected geographic units: the eight Chicago neighborhoods that contained high-rise family public housing in 1990 or the set of cities that received demolition grants. In

[10] While other studies have investigated the impact of public housing on public housing residents, none have looked at its impact on crime in surrounding neighborhoods and the city as a whole. Using data from Chicago, Jacob (2004) compares the educational outcomes of children who moved out of public housing because their buildings were closed for demolitions to outcomes of those who remained. He finds no significant difference in outcomes between the two groups. Currie and Yelowitz (2000) and Oreopoulos (2003) also study educational and future labor market outcomes of children in public housing and do not find negative impacts of public housing when compared to other low-income households.

[11] Levitt (2004) names these among possible factors that contributed to falling crime rates in the 1990's.

practice, specifications for both sets of estimates include fixed-effects and year-effects. For the neighborhood level analysis, fixed-effects control for persistent differences in crime, housing, or construction levels between neighborhoods. Year-effects control for any transitory shocks that affect outcomes in all eight neighborhoods where public housing is demolished. Thus, identification relies on the assumption that there are no other factors that affect crime or housing outcomes that are correlated with public housing closures, and cannot be controlled for by neighborhood- and year-effects. A parallel identification assumption is required for the city-level analysis.

In Chicago, I find that demolition of high-rise public housing led to large decreases in violent crime in the neighborhoods where demolitions occurred. I estimate a decrease of about 0.5 murders per 100,000 people per year per 100 high-rise public housing units closed. For the eight neighborhoods that contained high-rise public housing, this represents a decrease of about 11 murders per 100,000 people per year from a pre-demolition average of 99 murders per 100,000 people per year, roughly an 11% drop. The estimates for assault translate to about 470 fewer assaults per 100,000 people per year, or a 14% decrease from the pre-demolition average of 3,300 assaults per 100,000 people per year. Estimates for robbery indicate a fall of about 830 per 100,000 people per year, or 21% due to demolitions. Burglaries fall by about 280 per 100,000 people (11%). Finally, using a panel of cities that received HOPE VI demolition grants, I find evidence that public housing demolitions reduced city-wide murder, assault, and auto-theft rates by about 1% to 3%. These results suggest that, within cities, the direct benefit of public housing demolition in reducing crime within a neighborhood is larger than any possible displacement effects which might increase crime in other parts of the city.[12]

These results have several implications for policy makers. First, my findings are consistent with the existence of criminal peer effects and other theories from the social sciences which predict that total crime production increases as the spatial concentration of poverty increases. An optimal strategy for local public housing authorities and policy makers whose objective is to minimize crime may be to distribute low-income housing more evenly throughout the

[12] An overview and assessment of the literature concerning the unexpected decrease in crime during the 1990's is provided by Levitt (2004). While public housing demolitions are not mentioned as a possible explanation, one of the factors that is mentioned is the receding crack epidemic. In as far as demolition of high-rise public housing denied gangs a place to sell crack in which there was less risk of being caught by police than on the street or in smaller public housing developments, the receding crack epidemic may be related to changes brought about by the HOPE VI program.

city. However, there is no guarantee that this policy would maximize welfare. Consider a scenario in which households have heterogeneous preferences with respect to crime and have sorted into neighborhoods based upon these preferences. The value of decreasing crime to a household that decided to live near a high-rise public housing development may be less than the cost of increasing crime for a household that chose to live far from public housing developments. However, the fact that city-wide crime decreases substantially indicates that the cost of increasing crime in neighborhoods far from public housing would have to be very large for the demolition of public housing to have a negative impact on social welfare through its effect on crime.[13]

2 Background on Public Housing and HOPE VI

2.1 A Brief History of Public Housing

In the United States, federally provided public housing dates back to 1918, when 16,000 units were built for workers during World War I. The passage of the 1937 National Housing Act established the current system of local, independent housing authorities that receive federal money and perform the tasks of building and managing public housing. Under this program, and continuing through World War II, the Federal government financed the construction of 365,000 permanent housing units and an even greater number of temporary units. As World War II veterans returned, and African-American migration from the rural south to northern cities continued, urban housing was in short supply. In 1949, a new Housing Act was passed, providing loans and subsidies for the construction of about 810,000 units of low-rent housing.[14] While the pace of building and the uptake rate of federal funds varied from city to city, a large number of federally subsidized, low-rent housing units were built over the next fifteen years. However, from the mid-1970's through the early 1990's, conditions in public housing deteriorated significantly. Problems associated with public housing included high crime and low educational and employment outcomes of residents. Furthermore, much of the stock of public housing was in disrepair. Funding had been cut during the 1980's, resulting

[13] Of course, households may re-sort after crime drops near the demolition sites. The drop in crime may increase the amenity value of land near the demolition sites by increasing demand for housing from people that place a high value on low crime. Other studies have found that crime or perceived possibility of crime may have an impact on property values. Linden and Rockoff (2008) find that the arrival of a sex offender leads to a drop in nearby home prices of about $5,500. Similarly, Pope (2006) estimates that sex offenders lead to about a $3,500 drop in home prices. Gibbons (2004) finds an increase in property value of a slightly smaller magnitude is associated with a tenth of a standard deviation reduction in incidents of criminal damage in inner London.

[14] Meyerson and Banfield (1955).

in deferred maintenance, and contributing to the large and growing costs of rehabilitation.[15]

In Chicago, site selection for new public housing units to be constructed during the 1950's was a contentious issue.[16] The CHA initially proposed some sites on vacant land in outlying neighborhoods that were predominantly White and other sites in poor African-American neighborhoods closer to the center of the city, which were not vacant but were deemed to be "blighted slums". This classification was meant to indicate areas where housing was not structurally sound, and living conditions were deemed to be unsanitary. Many of the city council members whose wards contained the sites that were proposed in the outlying areas organized an opposition which threatened to derail the entire plan of building up to 40,000 new units of housing over a six-year period. In the end, the CHA was denied the use of most of the vacant land sites. Construction of public housing that took place from 1950 to 1964 was either as an extension of an existing development, or on a site that was in a poor African-American neighborhood. The public housing buildings built in Chicago during this time were almost all high-rises.[17]

2.2 The HOPE VI Program

From the mid-1970's through 1992, laws requiring one-for-one replacement of demolished units in order to qualify for HUD funding made demolition of public housing a prohibitively expensive option for local public housing authorities. However, after severe funding cuts during the 1980's, much of the public housing stock was in need of repair. In October 1992, a new housing bill and HUD appropriations bill changed the law to make funding available for demolition and redevelopment of distressed public housing developments. The program created by the law eventually became known as HOPE VI (the sixth iteration of a program identified by an acronym which stood for "Housing Opportunities for People Everywhere").[18]

During the period from 1993 through 2006, the HOPE VI program awarded the CHA $258M in revitalization grants representing 4.4% of the total $5.8B awarded to local housing agencies. Of the 127 housing authorities that were awarded HOPE VI demolition grants from 1996 through 2003, the CHA received $83.4M of grant money for the demolition of 12,500 units of public housing, representing about 21% of the total HOPE VI demolition

[15] Polikoff (2006).
[16] Hunt (2009) provides an excellent history of public housing in Chicago from the 1937 Housing Act through the CHA's Plan for Transformation.
[17] Bowly, Jr. (1978).
[18] Polikoff (2006).

grants awarded in terms of dollars or numbers of units.

The only other cities that were awarded more than $10M in demolition grants were New Orleans with $25.2M, Philadelphia with $23.0M, Pittsburgh with $16.5M, Detroit with $15.1M, Atlanta with $14.2M, and Buffalo and Memphis both with $10.4M. The two largest cities, New York and Los Angeles, were awarded only $0.7M and $6.0M, respectively.

The scope of the HOPE VI program was broadened when, in 1996, the United States Congress passed the Omnibus Consolidated Rescissions and Appropriations Act. Section 202 of this law required local housing authorities to remove any units from their stock that cost more to maintain than the combined cost of demolition and provision of voucher-based private sector rental assistance (known as Section 8 Vouchers or Housing Choice Vouchers). As a result, in 1998, the CHA announced that all Chicago's gallery-style high-rise public housing developments had failed the viability test and were slated for demolition. In February 2000, the Chicago Housing Authority's Plan for Transformation was approved by HUD. The plan called for the demolition of roughly 22,000 units of public housing out of an existing stock of about 40,000 units. The remaining units were to be rehabilitated and an additional 8,000 units were to be constructed, leaving the city with approximately 25,000 new or revitalized units by the end of the ten-year plan, equivalent to the number of units that were occupied at the time the plan was drawn up. The proposed redevelopments focused on mixed-income housing employing private developers and management companies.[19]

3 Local Effect of Public Housing Demolition

In this section, I estimate the local effect of public housing demolition on crime for neighborhoods in Chicago where high-rise public housing was demolished.

3.1 Data Sources and Descriptive Statistics

For this analysis, I use data on public housing and crime for the City of Chicago.

3.1.1 CHA Building Occupancy, Closure, and Demolition Data

I use data on the stock of public housing units from the early 1990's (42,681 units) and monthly occupancy rates and building closures for a subset of buildings comprising 23,347

[19] More information on the CHA's Plan for Transformation can be found at `http://www.thecha.org/transformplan/files/plan_for_transformation_brochure.pdf`. Rosenbaum, Stroh, and Flynn (1998) study Lake Parc Place, one of the first low-income public housing developments in Chicago that was converted to mixed-income housing.

units. These building-level detail data sets are from the Chicago Housing Authority and were provided to me by Brian Jacob.[20] These data cover the years from 1990 through 2000. Figure 1 shows which community areas contained high-rise family public housing developments.[21] I also use building level data on the number of housing units demolished from 2000 through 2007 from the Chicago Housing Authority's annual plans and reports. Table 1 lists all family CHA developments, indicates whether the development contains high-rise buildings, the year of construction, and the number of units the development has, broken down by the community area in which the units are located.

Building occupancy and closure data come from two sources. Occupancy and closure data for the years 1990 through 2000 were provided to me by Brian Jacob. Jacob's data come from a comprehensive building list provided by the Chicago Housing Authority detailing the stock of public housing in Chicago in the early 1990's at the address level and the number of units at each address. A separate file contains monthly observations (from 1990 - 2000) of the number of units that were occupied for a subset of the buildings on the list. The building list provides the addresses of 42,681 units of public housing. Of these, 32,707 are family housing and 9,974 are senior housing. I focus on the family housing buildings. The occupancy file covers 27,874 of the 32,707 family units. Of the 4,833 family units which are not covered in the occupancy data, 2,939 units are in scattered-site buildings, and 955 units are in City-State housing developments (leaving only 939 family units which are not scattered-site or City-State that are missing from the occupancy data). Furthermore, all 19,237 family units that are not City-State, and are not scattered-site and are in buildings with more than 35 units, are included in the occupancy data set.

I compile occupancy and building closure data from CHA annual reports from 2001 through 2007. Building closure lists in the annual reports give the address of the building, allowing me to link these later closures to the CHA building list. However, the occupancy data are by development. To determine occupancy by community area, I assign each development to one or multiple community areas based upon the fraction of units located in each community area for the old developments as documented in the building list.

The data contain a total of 107 high-rise building closures from the period 1990 - 2007.

[20] Brian Jacob is the Walter H. Annenberg Professor of Education Policy in the Gerald R. Ford School of Public Policy at the University of Michigan.

[21] I use the terms neighborhood and community area interchangeably throughout this paper. For more information on Chicago community areas see `http://en.wikipedia.org/wiki/Community_areas_of_Chicago`.

The number of units in the buildings affected by closures ranges from 48 to 230 with a mean of 130. The buildings are spread across eight community areas. Of the buildings that were closed, 86 were in the Near West Side, Grand Boulevard, Douglas, and the Near North Side community areas. Figure 2 shows the annual number of high-rise building units closed. I compile building demolitions by address from CHA annual plans and reports for the years 2000 through 2007. I rely on newspaper articles and online publications to identify demolitions that occurred before 2000. Table 2 provides summary statistics from the 1990 census and 2000 census regarding the eight community areas where high-rise public housing was demolished and the City of Chicago as a whole.

3.1.2 Chicago Neighborhood Crime Data

I use crime data drawn from Chicago Police Department annual reports, which provide detailed counts of major crime types for each of the city's 77 community areas. These data cover the period from 1991 through 2007. I also use data on murders in Chicago from 1965 to 1995 that provide census tract level geographic details from Block, Block, and the Illinois Criminal Justice Information Authority (1998). Both data sets use crime definitions that conform to those of the FBI's Uniform Crime Reporting Program. I use the terms murder and homicide interchangeably throughout this paper. Whenever I use either word, I am referring to "the willful killing of one human being by another," which includes murder and non-negligent manslaughter, but does not include justifiable homicide.[22] In order to calculate annual crime rates by community area it is necessary estimate annual population by community area. I use decennial census data to calculate community area populations in 1970, 1980, 1990, and 2000. Between these years I use linear interpolation to estimate annual community area populations. I estimate community area populations after 2000 by extrapolating based on the linear trend between 1990 and 2000. Columns (1) through (3) of Table 3 show population counts for the eight neighborhoods with high-rise public housing for 1980, 1990, and 2000.

[22] More information regarding the FBI's definition of crimes under the Uniform Crime Reporting Program can be found here: http://www.fbi.gov/ucr/cius2007/about/offense_definitions.html.

3.2 Empirical Methodology

My goals are to estimate the local effect of public housing demolition on crime, and to measure the city-wide effect of public housing demolition on crime. Correlation between public housing demolition and crime reduction does not necessarily indicate that public housing demolition is causing crime to fall. Levitt (2004) identifies increases in the number of police, the rising prison population, the receding crack epidemic, and the lagged effect of the legalization of abortion in 1973 as factors contributing to the nationwide decline in crime during the 1990's. All of these factors may contribute to the decrease in crime in Chicago during the period in which public housing was being demolished, and could potentially contribute to a spurious correlation between public housing demolition and crime. In addition, it is likely that other, unobserved, factors also have an influence on crime during this period. For these reasons, identifying the correct counterfactual level of crime had public housing not been demolished is difficult.

One solution could be to use a difference-in-differences estimator: essentially a comparison between the change in crime in neighborhoods where public housing was demolished and the change in crime in similar neighborhoods where public housing was not demolished. However, historical factors indicate that neighborhoods where high-rise public housing was built are not comparable to other neighborhoods. The problems are rooted in the original sites selected for high-rise public housing in the 1950's and 1960's. The site selection process was extremely contentious. In the end, high-rise public housing was built either as an extension to existing low-rise public housing developments or in low-income African-American neighborhoods which had been designated as "blighted".[23] This meant that almost all high-rise public housing in Chicago was built in the neighborhoods closest to the downtown central business district or along a contiguous stretch of land extending directly south of downtown (see Figure 1).

Using neighborhoods where high-rise public housing sites were proposed but rejected as controls is problematic as the sites that were rejected had quite different characteristics than the sites that were eventually built upon. Site selection was a long and contentious process. Initially the CHA investigated sites on the far north side, far south side, and center of the city. It rejected the far north side sites based largely upon high land costs. The remaining

[23] Bowly, Jr. (1978), Meyerson and Banfield (1955), and Polikoff (2006).

sites were then presented to the Mayor and City Council, who eventually rejected the far South Side sites at the behest of the aldermen who represented these neighborhoods and who wanted to prevent African-Americans from moving in. As Table 4 shows, the sites rejected by both the CHA and the City Council were located in neighborhoods that had relatively fewer African-Americans, had higher income, had lower population density, and were further from the central business district than the sites where high-rise public housing was eventually built.[24]

From 1960 through 1990, the neighborhoods containing high-rise public housing remained relatively low-income and predominantly African-American. Selecting suitable neighborhoods for comparison based on 1990 characteristics is difficult, because all other neighborhoods that are situated as close to downtown as the high-rise neighborhoods tend to be predominantly White, Hispanic, or Asian and higher income. There are other low-income African-American neighborhoods in Chicago, but they are much farther from downtown and a number of them contain low-rise family public housing. It is important to exclude the neighborhoods with low-rise public housing from any possible set of comparison neighborhoods because they have been affected by the Plan for Transformation in an unsystematic fashion. Some have been closed and demolished, while others have been filled with relocatees from the high-rises. Attempting to address the differences between neighborhoods where high-rise public housing was demolished and a set of comparison neighborhoods via statistical methods of re-weighting or matching (such as by the propensity score) would yield imprecise estimates due to the lack of common support. Table 5 displays the predicted probability of a neighborhood containing high-rise public housing in 1990 based on a probit using only the percentage of African-American households and the percentage of households below the poverty line as explanatory variables. The estimate is from the sample of 68 neighborhoods which did not contain low-rise public housing. Seven of the eight neighborhoods with high-rise public housing have the highest propensity scores, illustrating the fact that neighborhoods with high-rise public housing have quite different characteristics than those without high-rise public housing.

[24] Meyerson and Banfield (1955) present a detailed case study of the site selection process and the political wrangling that was associated with it.

3.2.1 Estimators That Exploit the Timing of Building Closures

Therefore, my proposed solution is to exploit variation in the timing and number of building closures prior to demolition among the eight neighborhoods which had high-rise public housing. Instead of comparing neighborhoods with high-rise public housing to those without high-rise public housing, I compare neighborhoods with high-rise public housing with themselves before and after building closures.

In the next section, I present least squares estimates of β and θ_j in the following regression models:

$$Y_{i,t} = \alpha_i + \gamma_t + \beta C_{i,t} + \epsilon_{i,t} \tag{1}$$

and

$$Y_{i,t} = \alpha_i + \gamma_t + \sum_{j=a}^{b} \theta_j F_{i,t-j} + \epsilon_{i,t} \tag{2}$$

where $Y_{i,t}$ denotes an outcome in community area i in year t, for example, the number of murders per capita in Grand Boulevard in 1999. $C_{i,t}$ represents the cumulative number of units closed. $F_{i,t-j}$ represent leads and lags of the flow variable: the number of units closed in a particular year. This flow variable can be obtained by taking first differences of the cumulative variable $F_{i,t} = C_{i,t} - C_{i,t-1}$. α_i and γ_t are community area fixed-effects and year-effects, respectively. Finally, $\epsilon_{i,t}$ represents unobservable determinants of outcome $Y_{i,t}$.

The first specification, Equation 1, provides a summary of the mean impact of unit closure from the time of closure through the end of the sample period, while the second specification, Equation 2, is useful for analyzing the dynamics of outcome $Y_{i,t}$ relative to the year of a closure event. Specifically, the first specification assumes that the effect of public housing demolition on crime at time t remains the same, irrespective of how many years prior to t the closure occurred. The second specification allows for the effect of a closure two years ago to differ from the effect of a closure three years ago. Equations 1 and 2 are estimated using a sample consisting only of the eight community areas where high-rise public housing was demolished. It is important to note that inclusion of community area fixed-effects will absorb any unobservable characteristics of community areas which are time-invariant. For example, fixed-effects will control for persistent differences in population density between neighborhoods which may affect crime. Furthermore, the year-effects will

absorb common transitory shocks to the eight high-rise public housing neighborhoods. For example, aggregate changes and trends in crime will be controlled for (it is well known that crime exhibits large trends over time). The β and θ_j parameters are identified by variation in the timing and number of unit closures across the eight affected community areas.

Any time-varying omitted variables which affect the outcome variable and are correlated with the timing and number of closures but not absorbed by the year effects will cause OLS estimates of the β parameter to be biased. One possible scenario in which OLS estimates may be biased is if the order of building closures is determined by the crime level in prior years. If this were the case, then a serially correlated shock to crime in a particular neighborhood would cause crime to rise and might induce building closures. Building closures would occur at the same time that crime is falling back to its mean level; hence, the effect of public housing closures on lowering crime would be overstated. This problem is mitigated by the fact that almost all of the high-rise buildings in the family public housing developments are slated to be demolished eventually. There is anecdotal evidence that indicates that this type of selection may be a problem in the earlier period of the sample.[25] However, beginning in 2000, the Plan for Transformation laid out the timetable for the remaining demolitions, so there was less opportunity to selectively close buildings in response to crime shocks from 2000 on. A check of whether buildings tend to be selected for closure in response to elevated crime in prior years can be implemented by testing whether the θ_j parameters are significantly greater than zero for $j = -1, -2, -3, ...$

3.3 Results

In this section I present evidence about the impact of public housing demolition on crime in Chicago neighborhoods where demolitions occur.

3.3.1 Local Effect of Demolitions on Murder

Figure 3 plots the murder rate from 1970 through 2008 for the 8 community areas that had highrise public housing, the 13 community areas that received the most displace public housing households per capita and the remaining 56 community areas in the City of Chicago. The figure revels that murder rates were fairly constant and high in neighborhoods with

[25] Jacob (2004) and Polikoff (2006) mention incidents such as the shooting of seven-year-old Dantrell Davis prior to demolitions at Cabrini-Green and demolition of three Robert Taylor buildings known as "the hole" due to entrenched gang problems.

highrise public housing until 1990, when the murder rate spiked from 60 to 80 murders per 100,00 people. The vertical line shows the year of the first demolition, 1992. Following 1992, there was a rapid and dramatic decline in the murder rate in the neighborhoods where demolitions were taking place. By 2008, the murder rate in these neighborhoods was below 20 per 100,000 people. The remainder of this section attempts to quantify the fraction of the drop in the murder rate in the highrise neighborhoods that can be attributed to public housing demolition. The next section addresses the question of what whether the high relocation neighborhoods were adversely affected by the demolitions when compared to all other neighborhoods.

Figure 4a plots estimates of the θ_j coefficients from Equation 2. The estimates are obtained by regressing the murder rate (murders per 100,000 people) on the flow of closures (the number of units closed in a particular year as opposed to the cumulative number of closures), twenty leads of the flow of closures, and ten lags of the flow of closures. A large number of leads is possible, as the murder series extends back to 1965. However, it is important to note that with ten lags, the coefficients at the far right of the plot are identified only by the closures that occur toward the beginning of the program. Coefficients can be interpreted as the estimated effect of a the closure of 100 units in the years before and after it occurs.[26] On inspection, it appears that the effect prior to closure is about zero, while the effect after closure is clearly negative. I take this as evidence in support of interpreting my estimates of Equation 1 as causal estimates of the effect of closures on murder.

Table 6 presents OLS estimates of Equation 1 for neighborhood crime rates. Robust standard errors are shown in parentheses. Estimates shown in the top row of Table 6 use the cumulative number of high-rise units (divided by 100) closed prior to demolition as the explanatory variable. The estimate in column (1) implies that each 100 units closed is associated with about 0.5 fewer murders per 100,000 people per high-rise neighborhood. The estimate is statistically different from zero at the 5% confidence level. A mean of 2,118 high-rise units per affected community area were closed during the course of the sample; thus, the estimate implies that building closures led to a decrease of about 11 murders per 100,000 people per year. This translates to approximately an 11% reduction in murders in the neighborhoods where high-rises were demolished. Finally, the bottom row of the top panel

[26] 100 units is near the mean number of units in a high rise building.

shows that the reduction of 11 murders per 100,000 people corresponds to 14% of the total drop in the murder rate from 99 to 22 murders per 100,000 people in these neighborhoods between 1991 and 2008.

3.3.2 Local Effect of Demolitions on Other Crimes

The remaining columns and bottom panel of Table 6 present OLS estimates of the effect of closures on the crime rate per 100,000 people for crimes other than murder. The estimate for rape has a negative point estimate that would translate to similar percentage reduction from the pre-demolition mean as murder, but the estimate is not statistically different from zero. The decrease in the assault rate associated with closures is about 22 per 100,000 people per year, a 14% decrease from the pre-demolition mean. The drop in the robbery rate is about 40 per 100,000 people per year (a 21% drop).

Figures 4b - 4g plots estimates of the θ_j coefficients from Equation 2 where the dependent variable is crime rate per 100,000 people. These plots provide evidence about whether the estimates in the previous paragraph are simply due to continuation of a pre-existing trend or whether there is a clean break from before closure to after closure. In the latter case, a causal interpretation of the estimates is more plausible. For rape, Figure 4b shows that the estimates on leads of building closures tend to be around zero except eight and six years before building closure, and are not significantly different from zero after building closure. Estimates on leads of closures for assault are close to zero. The lags show a clear drop, with estimates for five and six years after closure significantly negative. The estimates on the leads of closure for robbery appear to be zero prior to closure, and significantly negative five years and more after closure. The estimates for burglary, theft, and auto-theft are not significantly different from zero in any period.

In summary, the estimates of Equation 1 and Equation 2 show reductions in crime rates that are statistically different from zero for murder, assault, and robbery. However, there is no discernable effect of closures on rape, burglary, theft, and auto-theft.

4 City-Wide Effect of Public Housing Demolition

In this section, I estimate the degree to which the direct reductions in neighborhood crime associated with public housing demolition, shown in the previous section, are countered by

increases in crime in other parts of the city due to displacement.

4.1 Data Sources and Descriptive Statistics

For this analysis, I use data on the relocation of public housing residents in Chicago who were displaced by public housing demolitions. I also use city-level data on HOPE VI demolition grants and city-level data on crime rates for a panel of cities in the United States.

4.1.1 Data Concerning Relocation of CHA Residents

From a policy evaluation standpoint, I am interested in measuring the effects of the CHA's Plan for Transformation; however, the degree to which I am able to learn about the effects of public housing de-concentration in general depends upon the specifics of the relocation process.

Several possible scenarios would allow the measurement of different effects. In the first scenario, residents who are induced to move by building closures evenly disperse throughout the same neighborhood in which their public housing development was located. In this scenario, neighborhood composition does not change; hence, the local effect measured in the previous section would simply measure the effect of de-concentrating public housing residents within a neighborhood and of demolishing poorly maintained high-rises. In this case, one might not expect any crime displacement to other neighborhoods. A second possible scenario would be that all former public housing residents left their old neighborhoods for other parts of the city or moved out of the city entirely. Of course, the reality is some combination of both scenarios.

The CHA's website describes the relocation process in the following way:

> Every resident who occupied a CHA unit on October 1, 1999 and continues to comply with the terms of their lease during the rebuilding process is entitled to return to a redeveloped or rehabilitated unit. Many of these residents will need to relocate from their existing apartments on at least a temporary basis to accommodate renewal. The CHA, in conjunction with other city departments and social service organizations, manages this complex relocation process, helping residents choose temporary and permanent replacement housing.[27]

[27] `http://www.thecha.org/transformplan/plan_summary.html`.

I use data from two sources to learn about relocation of displaced CHA residents. The first, a study conducted by the National Opinion Research Center (NORC), sheds some light on where public housing residents moved when their buildings were closed. Eight hundred residents whose buildings were closing in 2002 and 2003 were surveyed then and again in 2006. The follow-up survey response rate was 83%. Of those who did respond, 37% were living within one mile of their original building, 38% between one and five miles of their original building, 20% between five and ten miles of their original building, and the remaining 8% were living more than 10 miles from their original building. The residents' original buildings were located in 11 different community areas. In 2006, 46% of those who responded were living in the same 11 community areas (39% of the residents from the eight neighborhoods with high-rise public housing were still living in those eight neighborhoods). Only 3% were no longer living in the city. However, it is likely that the non-response rate was higher for households that left Chicago. As of 2006, 19% of respondents had permanently relocated to a CHA building, 37% had permanently relocated to voucher-based housing (Section 8), 35% were temporarily relocated in a CHA building, 4% were temporarily relocated in voucher-based housing, and the remaining 5% were still in their original unit. Adding the non-respondents and those who reported moving out of Chicago results in an upper bound of 20% for the proportion of households that has left the city. The same assumption results in 38% remaining in the 11 neighborhoods where buildings were closed, and 42% moving to other neighborhoods within the city, primarily on the South Side and West Side.

The second source of information regarding displaced resident relocation is an August 2008 press release issued by the CHA. The press release reveals that 8,000 households who held a lease with the CHA in October 1999 had moved as a result of building closures. Over 4,277 of those households have chosen to receive Housing Choice Vouchers HCV (also known as Section 8 Vouchers), which can be used in the private rental market. The press release shows that only 116 households (or 2.7%) who opted to receive HCV's have moved out of the City of Chicago. The press release also provides a count of the number of these households by the community area in which they currently live as of August 2008. Figure 5 shows the geographic distribution of the households displaced by public housing demolitions as of August 2008. In Figure 5 the high-rise neighborhoods are cross-hatched. The remaining neighborhoods are divided into quintiles based upon the number of displaced public housing

households per capita. Light to dark corresponds to least to most displaced public housing households per capita.

4.1.2 HUD Demolition Grant and FBI Uniform Crime Reporting Data

I use data on HOPE VI demolition grants from HUD's website.[28] The data cover the period from 1996 through 2003, and provide the city, state, and name of the local housing authority that is receiving the grant. The name of the development, number of units to be demolished, dollar amount of the grant, and year are also specified.

Data on city-level crime rates come from the FBI's Uniform Crime Reporting Program. I use annual crime counts and population data reported by municipal police departments from 1960 through 2004 from the National Archive of Criminal Justice Data. For the years 2005 through 2008, I obtain annual crime counts and population for municipal police departments from the FBI's Uniform Crime Reporting website.[29]

4.2 Empirical Methodology

A critical question is whether public housing demolition leads to a net reduction in crime or simply causes it to move from one area to another. I attempt to determine whether public housing demolitions lead to a net reduction in crime in two ways. First, I attempt to estimate the impact of households that were displaced by public housing demolition in Chicago on the neighborhoods to which they moved. For this analysis, I split the 69 community areas that did not contain high-rise public housing into quintiles based on the number of relocated households that had moved to the community area by 2008 divided by the population of the community area. Next, I calculate the mean change in each crime rate for each quintile.[30] While these estimates reveal what happened to crime rates in community areas that received

[28] http://www.hud.gov/offices/pih/programs/ph/hope6/grants/demolition/

[29] http://www.fbi.gov/ucr/ucr.htm

[30] Another possible way to do this analysis is to construct a proxy for the cumulative number of households that have relocated to a particular community area after having been displaced by CHA building closures. Given the data, the only feasible way to do this is to calculate the number of relocatees by assuming that the fraction of households moving from one of the eight community areas where high-rise demolitions occur is always equal to the fraction in the NORC survey. For example, in the NORC survey, 14% of households who relocated from the Near West Side moved to Austin. Thus, for every building closure that occurs in the Near West Side, there is an increase in the Relocatees observation for Austin in the same year by 14% of the number of households affected by the building closure. With this assumption, it is possible to use the specification presented in Equation 1. In this case, $C_{i,t}$ is a measure of the number of public housing residents that were displaced by demolitions and have relocated to community area i in year t. However, the assumption that flows between demolition neighborhoods were also the same as they were between 2003 and 2006 does not seem realistic. Furthermore, I would be wary about assigning a causal interpretation to this type of estimate as it may be biased due to endogeneity of the explanatory variable. If households chose to move to neighborhoods that had experienced a serially correlated downward shock to crime in the previous period, then OLS estimates of the effect of relocatee households on crime will be negatively biased.

a high number of relocatees, it is impossible to know how crime rates in these neighborhoods would have changed had the neighborhoods received no relocatees. For this reason, I consider a second strategy. I estimate the net effect of public housing demolition on the crime rate of a panel of roughly 120 cities which received HOPE VI demolition grants. For this analysis, I use specifications similar to Equations (1) and (2). However, in this case the outcome, $Y_{i,t}$, is the crime rate in city i in year t, α_i are city fixed-effects, γ_t are still year-effects, and $C_{i,t}$ is a variable that is equal to zero in every year before a city receives a HOPE VI demolition grant. In the year that a grant is received and all subsequent years, $C_{i,t}$ is equal to the number of units listed in the demolition grant divided by the mean population of the city during the sample period. This city-level analysis identifies only the net effect on crime. If crime is simply displaced from one neighborhood to another, and there is no net change in crime for the city as a whole, then receiving a HOPE VI demolition grant should have no effect on a city's crime rate.

4.3 Results

In this section, I present evidence concerning the net effect of public housing demolition on crime. First, I consider measures of the amount of crime that follows displaced public housing residents to their new neighborhoods in Chicago. Subsequently, I turn to a panel of the roughly 120 cities which received HOPE VI demolition grants to learn about the effect of receiving a demolition grant on the city's crime rates.

4.3.1 Displacement of Crime in Chicago

Table 7 presents OLS estimates of crime rate growth rate regressed on dummy variables indicating whether the community area is in one of the top four quintiles of how many displaced public housing households they received per capita. The growth rates are computed from 1991 to 2008. The 69 community areas in Chicago that did not have high rise public housing developments are included in the sample. The first row in column (1) shows that in the 14 neighborhoods that received the most displaced public housing tenants per capita murder rates fell on average by about 31% relative to the set of neighborhoods that received the fewest displaced public housing households per capita. The second row in column (2) reveals a similar size drop in the murder rate for the 14 community areas that received the next highest number of displaced public housing tenants per capita. Finally, the murder

rate for quintiles 3 and 4 (shown in rows 3 and 4) did not fall by as much, on average, as the it did for quintile 5, which received the fewest displaced public housing tenants per capita. None of these coefficients are statistically different from zero, but it appears that murder rates shrank by at least as much in the neighborhoods that received a lot of displaced public housing residents as they did in the neighborhoods that received very few displaced public housing residents. Similar conclusions can be drawn with respect to the growth rates in the number of rapes per capita when comparing neighborhoods that received the most and the least displaced public housing residents by examining column (2). Columns (3) and (4) reveal that the growth rates of assault and robbery are slightly higher, on average, in the neighborhoods that received the most displaced public housing households compared to the neighborhoods that received the fewest displaced public housing households, but not significantly so.

Columns (5), (6), and (7) in the bottom panel of Table 7 show a different pattern for the growth rates of property crime. For example, while the constant term indicates burglary rates dropped by about 50% in the neighborhoods that received the fewest displaced public housing residents, the coefficient in the first row shows that the average growth rate of burglaries in the neighborhoods that received the most displaced public housing residents was about 33 percentage point higher, meaning that burglary rates fell in those neighborhoods by only 20%, on average. Columns (6) and (7) reveal similar patterns for theft and auto theft.

In summary, while it is impossible to know what would have happened to crime rates in neighborhoods that received displaced public housing households had they not come, Table 7 shows that violent crime rates did not fall by less in the neighborhoods that received a large number of displaced public housing households per capita, than they did in other neighborhoods. However, the story is different for property crimes. Burglary, theft, and auto-theft rates fell by only about half as much in the 13 neighborhoods that received the most displaced public housing residents per capita as they did in other neighborhoods. Putting these estimates together with the direct effects measured in the previous section it is possible to come up with a rough idea of the net effect of the demolitions on crime rates for the whole city of Chicago. Assuming the demolitions were responsible for no change in the murder rate in non-highrise neighborhoods and that the demolitions were responsible for a drop from 99 to 88 murders per 100,000 people per year in the highrise neighborhoods, then the fact

that the non-highrise neighborhoods had a murder rate of about 27 per 100,000 people and comprised about 92% of the cities population implies that the net reduction in the city's murder rate due to demolitions is about 2.7%. Similar calculations for the net reduction in the city's assault and robbery rates due to public housing demolition yield 3.0% and 4.4%, respectively.

While these results offer some clues about the degree to which public housing demolition displaced crime from neighborhoods where it occurred to other neighborhoods, they are not entirely convincing. In the next sub-section I pursue a more direct approach toward estimating the net effect of public housing demolition on city-wide crime rates.

4.3.2 City-Wide Effect of Demolitions on the Murder Rate

Next, I turn to estimates of the effect of receiving a HOPE VI demolition grant on a city-wide crime rates. Table 8 presents estimates of Equation 1. Estimates in the upper panel are from a sample of all cities which received HOPE VI demolition grants from 1996 through 2003. The explanatory variable labeled "Grant Units / 100K Pop." is a variable which is equal to zero until the year in which a particular city received its first demolition grant and then is equal to the number of units specified in the grant divided by the mean population of the city during the sample period. The coefficient can be interpreted as the change in crime per capita that would result from receiving a HOPE VI grant to demolish a unit of public housing per capita. The mean grant is for about 240 units per 100,000 of city population, so the mean effect of HOPE VI can be found by multiplying the coefficient by 240.

The specification in column (1) shows a reduction of about 0.60 murders per year per 100,000 residents, which translates to a reduction of about 3% from a pre-demolition mean murder rate of 20 murders per year per 100,000 residents for the sample of 121 cities that received demolition grants. The point estimate for this specification is significantly different from zero at the 1% level. It is interesting to note that the 3% reduction in the murder rate is similar to the the net effect of demolitions in Chicago calculated in the previous sub-section.

Figure 6a plots the θ_j coefficients from Equation 2. The left plot is for the full sample of 121 cities which received demolition grants. The coefficients can be interpreted as being relative to the year before receiving a demolition grant (for which the coefficient is normalized to zero). The coefficients appear to be close to zero prior to receiving a demolition grant,

significantly less than zero in the three years after the demolition grant is awarded, but then return to zero four years after the grant is received.

The results suggest that HOPE VI public housing demolition grants are associated with reductions in the murder rate of the city that receives the grant of about 3%. This number is in line with the approximate net reduction in the murder rate due to public housing demolitions calculated in the previous sub-section using more geographically detailed data for Chicago. However, the year-by-year estimates shown in Figure 6a suggests that this reduction may only last for several years.

4.3.3 City-Wide Effect of Demolitions on other Crime Rates

Column (3) reveals that demolition grants are associated with a statistically significant drop in a city's assault rate of about half an assault per capita for each grant unit per capita. For the mean grant size per capita, this translates to a 1.7% drop in the city-wide assault rate from the mean 1991 assault rate. The persistence of the drop in the assault rate is shown in Figure 6c. Columns (2) and (4) of Table 8 show no discernable effect of HOPE VI demolition grants on rape or robbery rates. Figure 6b does not show signs of a clear pattern either. Figure 6d shows signs of a reduction in robbery rates following a demolition grant. Columns (5) and (6) reveal that HOPE VI grants are not associated with a statistically significant change in burglary or theft rates. Figures 6e and 6f show signs of a drop in burglary and theft rates beginning around the year after receiving the demolition grant, but the drops are not particularly clear. Column (7) of Table 8 shows a statistically significant drop in auto-theft associated with demolition grants. For the mean grant this translates to about a 1% drop in auto-theft from the 1991 mean. The drop is not reflected particularly clearly in Figure 6g.

To some extent, the decrease in auto-theft associated with receiving a HOPE VI demolition grant is not consistent with the results in the previous sub-section and previous section for Chicago. In Chicago, public housing demolition did not appear to be related to changes in auto-theft rates. At the same time, neighborhoods that received a lot of displaced public housing residents saw significantly smaller reductions in auto-theft rates between 1991 and 2008 than other neighborhoods did. However, since Chicago is just one of 121 cities in the current analysis, it may be that Chicago looks like an average city in terms of how its

murder rate responds to demolitions but not in terms of how its auto-theft rate responds to demolitions.

5 Conclusion

This paper provides empirical evidence regarding the neighborhood-level and city-wide impact of the HOPE VI public housing demolition program on crime. It is the first to show that Chicago's large-scale public housing demolition program is associated with large drops in violent crime where public housing is demolished. Furthermore, estimates from 121 cities that received HOPE VI demolition grants indicate that public housing demolition is associated with a net reduction in city-wide murder and assault rates.

These results provide support for theories which predict that high concentrations of low-income households will lead to a greater amount of crime than would occur if low-income households were more evenly spatially distributed. The evidence is consistent with economic theories that emphasize the importance of social interaction or peer effects for crime, sociological theories that emphasize disorder and the breakdown of collective efficacy that can occur when poverty is spatially concentrated, and urban design theories that focus on the degree to which certain building designs enable criminals to avoid capture.

The preceding analysis demonstrates that, in Chicago, public housing demolitions are associated with an 11% decrease in murder in neighborhoods where high-rise public housing is demolished. Furthermore, besides rape, the drop in other violent crimes attributed to demolitions ranges from 14% to 21% in neighborhoods where high-rise public housing is demolished. Evidence on crime displacement stemming from public housing demolitions in Chicago is mixed. Rates of decline in violent crime in neighborhoods that received many displaced public housing residents appear to about the same as those in other neighborhoods. However, in neighborhoods that received the most displaced public housing households, property crime rates had rates of decline that were about half the size of those in other neighborhoods. Finally, examining the set of 121 cities that received HOPE VI demolition grants reveals that declines in murder, assault, and auto-theft rates ranging from 1% to 3% are associated with receiving a demolition grant. The net reduction for city-wide murder rates (3%) is very similar to that implied by the analysis of Chicago (2.7%). This implies that the reduction in murders in neighborhoods where high-rise public housing is demolished

is not being offset by an increase in murder elsewhere in the city. For murder and assault, displacement due to public housing demolition is likely to be small.

While I am unable to say whether de-concentration of public housing increases welfare, it is clear that policy makers with an objective of minimizing city-wide homicide and assault rates should avoid promoting the spatial concentration of low-income households by building large high-rise public housing developments as they did in Chicago in the 1950's and early 1960's. The results point to possible benefits of the current move toward a more even spatial distribution of public housing which emphasizes scattered-site low-rise construction and mixed-income developments.

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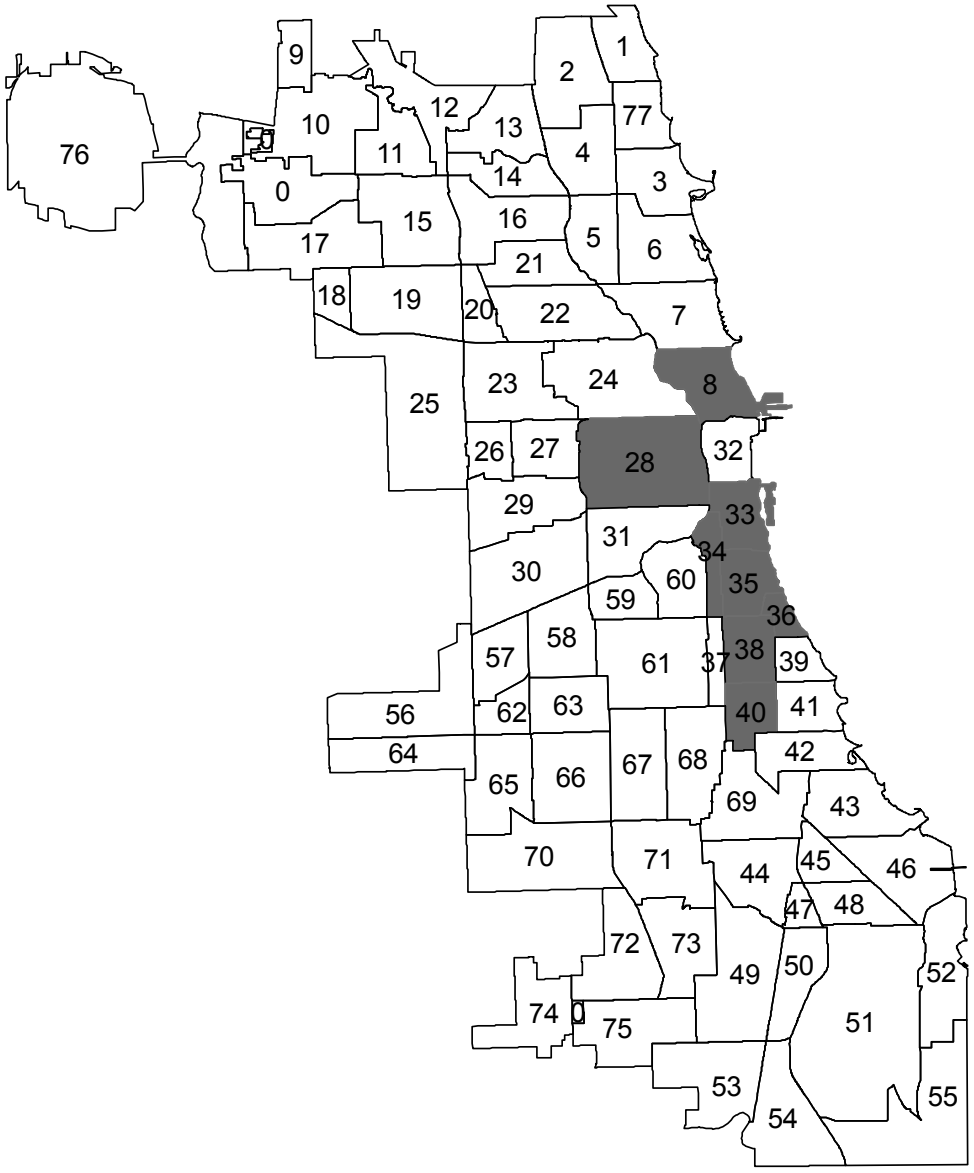


Figure 1: Community Areas with High-Rise Public Housing Developments

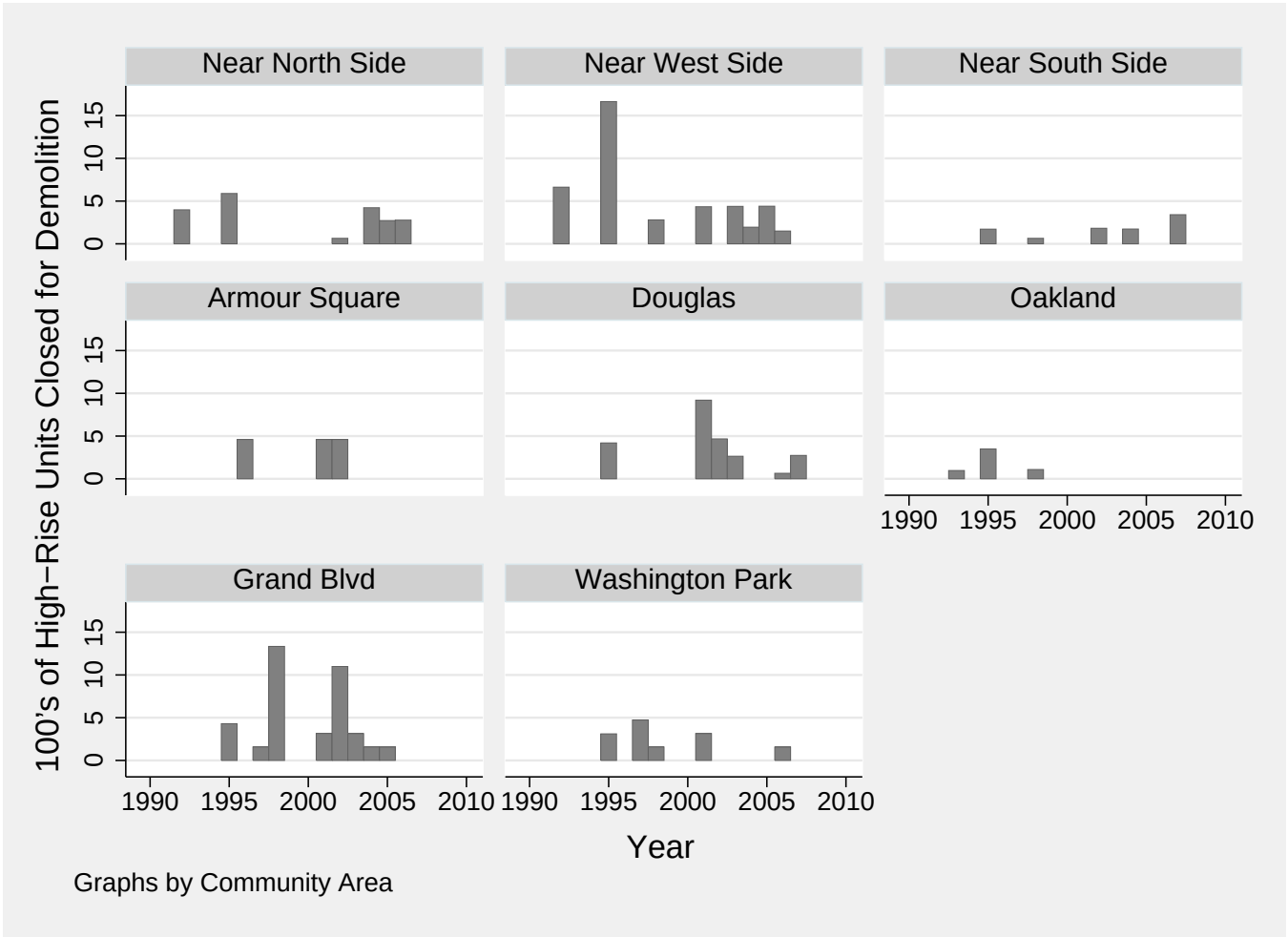


Figure 2: Annual Number of CHA Units Closed in High Rise Development Community Areas

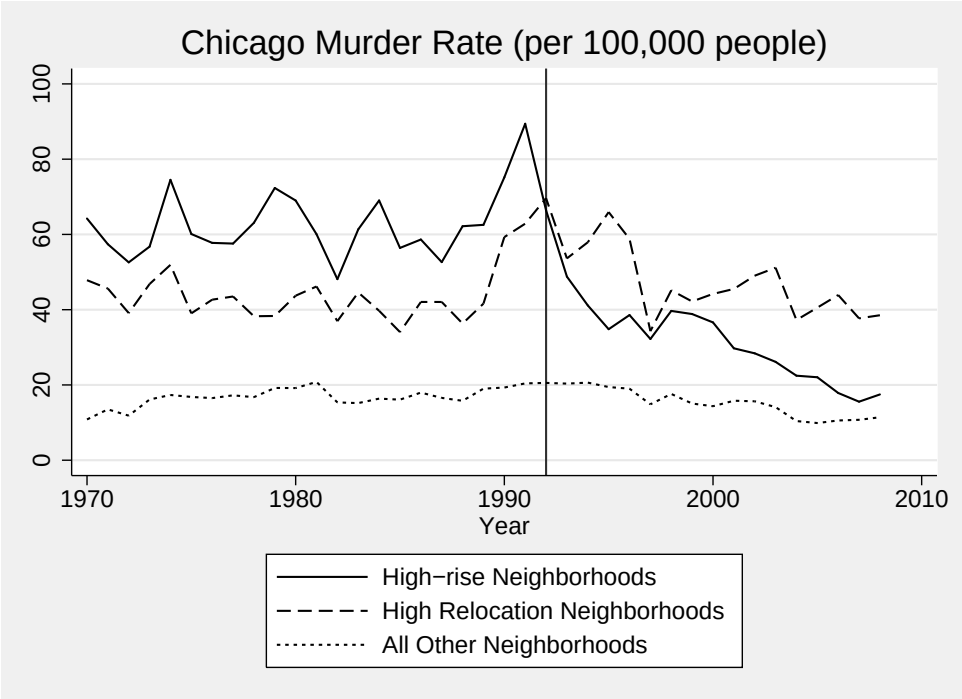
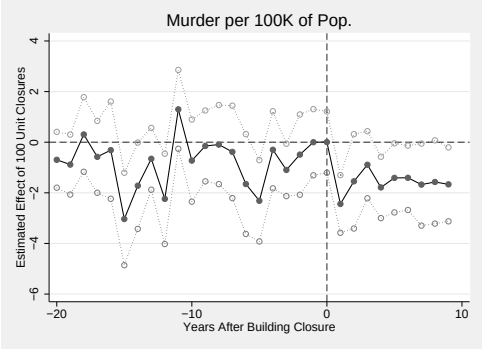
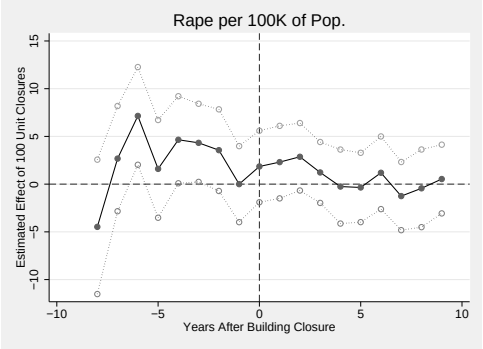


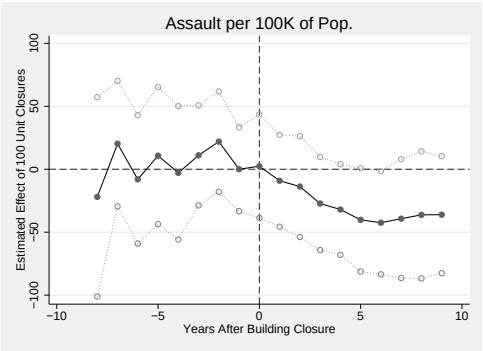
Figure 3: Murder Rate in High-Rise Public Housing Neighborhoods, High Relocation Rate Neighborhoods, and All Other Neighborhoods



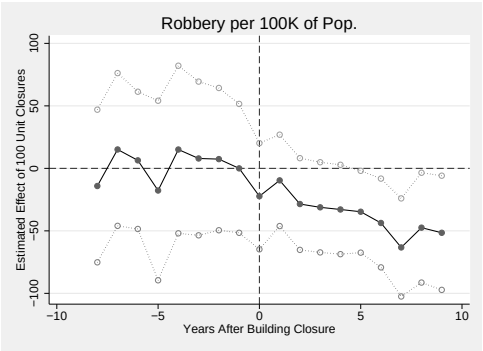
(a) Murder per Capita



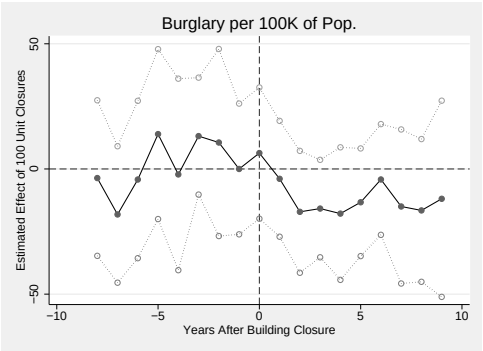
(b) Rape per Capita



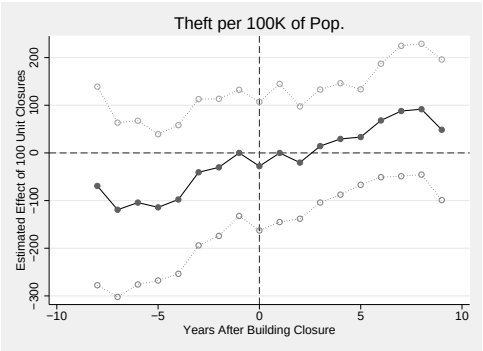
(c) Assault per Capita



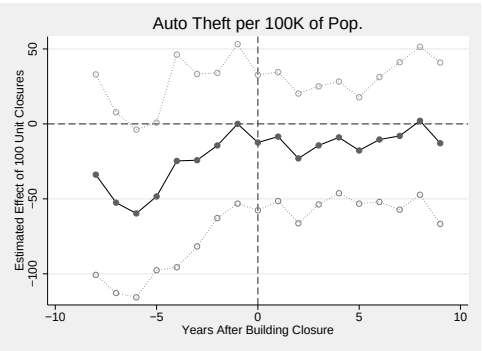
(d) Robbery per Capita



(e) Burglary per Capita



(f) Theft per Capita



(g) Auto Theft per Capita

Figure 4: Effect fraction of units closed for demolition on small and large high-rise development neighborhoods in Chicago.

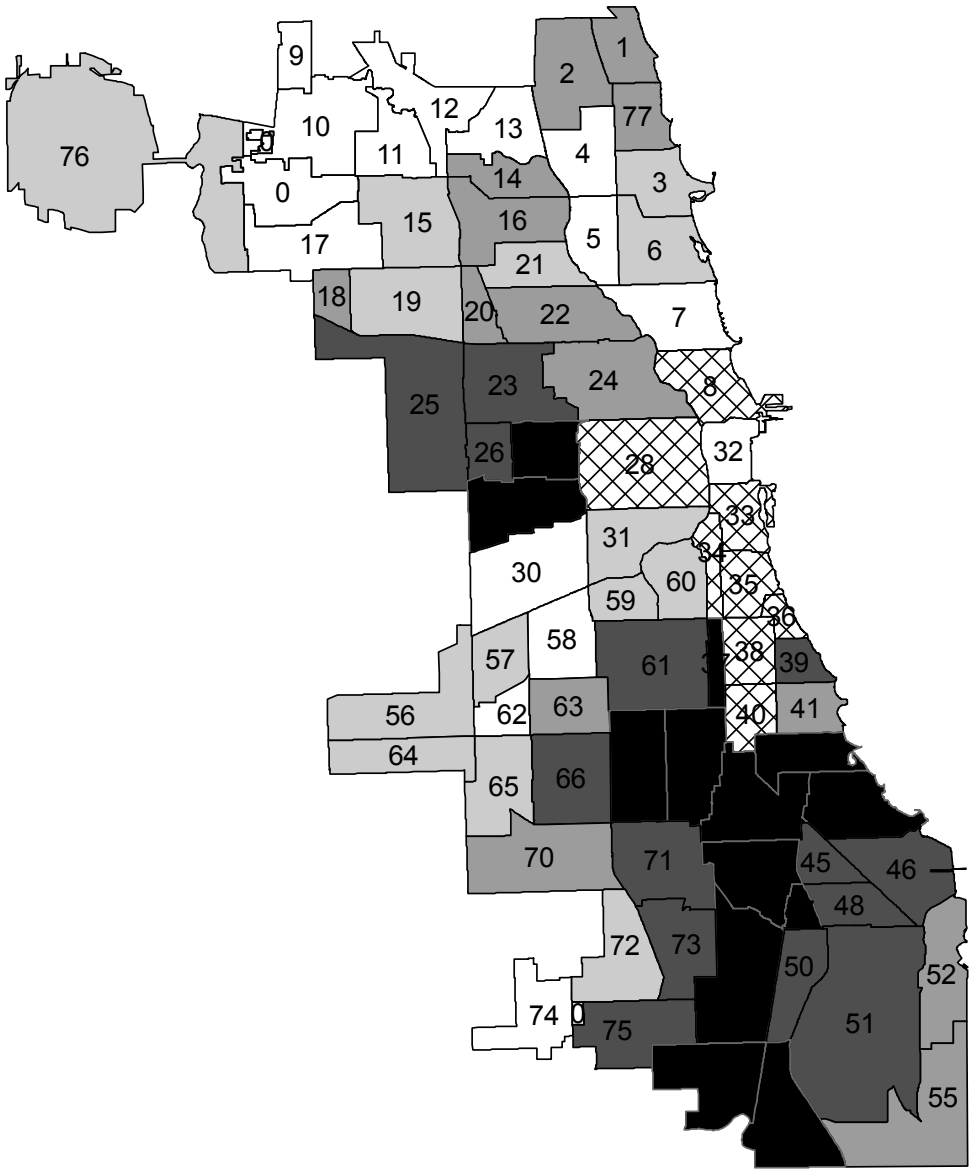
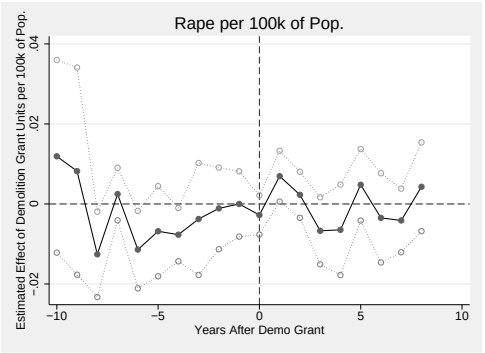
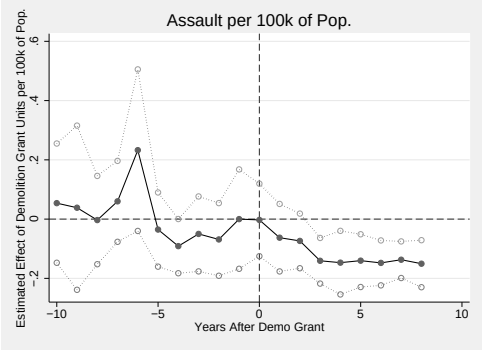


Figure 5: Quintiles of Displaced Public Housing Households per Capita in Non-High-Rise Community Area

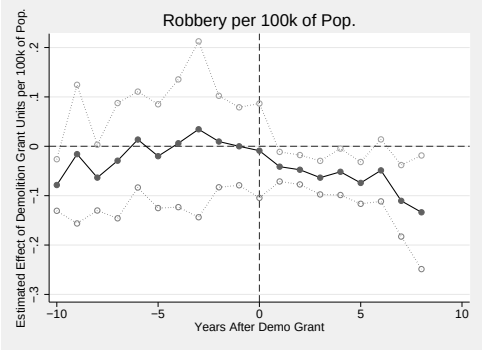
(a) Murder per Capita



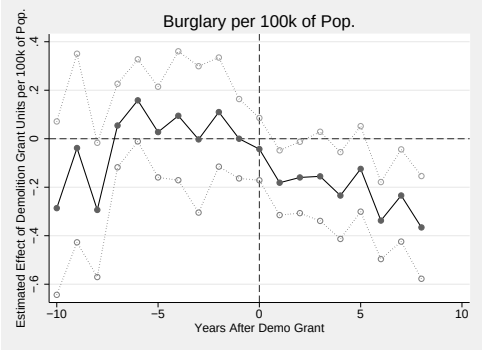
(b) Rape per Capita



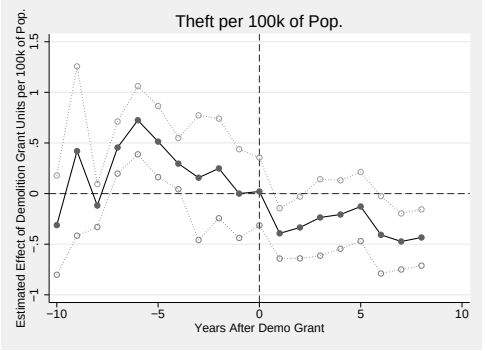
(c) Assault per Capita



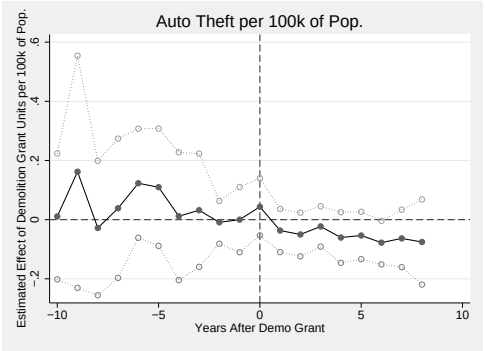
(d) Robbery per Capita



(e) Burglary per Capita



(f) Theft per Capita



(g) Auto Theft per Capita

Figure 6: Effect of HOPE VI demolition grants.

Table 1: CHA Family Housing Developments

Development Name	High-Rise	Year Completed	Community Area (Number)	Units
ABLA Homes	Yes	1961	Near West Side (28)	3,699
Altgeld-Murray Homes	No	1945/1954	Riverdale (54)	1,996
Bridgeport Homes	No	1943	Bridgeport (60)	141
Cabrini-Green Homes	Yes	1942/1962	Near North Side (8)	3,211
Dearborn Homes	Yes	1950	Armour Square (34)	48
			Douglas (35)	752
Henry Horner Homes	Yes	1957/1961	Near West Side (28)	1,933
Hilliard Homes	Yes	1966	Near South Side (33)	345
Ickes Homes	Yes	1955	Near South Side (33)	803
			Douglas (35)	203
Lakefront Homes	Yes	1963	Oakland (36)	923
Lathrop Homes	No	1937	North Center (5)	408
			Lincoln Park (7)	468
Lawndale Gardens	No	1942	North Lawndale (29)	187
			South Lawndale (30)	128
LeClaire Courts	No	1954	Garfield Ridge (56)	612
Lowden Homes	No	1953	Roseland (49)	127
Robert Taylor Homes	Yes	1962	Grand Boulevard (38)	3,312
			Washington Park (40)	1,103
Rockwell Gardens	Yes	1961	Near West Side (28)	1,136
Stateway Gardens	Yes	1958	Armour Square (34)	920
			Douglas (35)	724
Trumball Park Homes	No	1938	South Deering (51)	486
Washington Park Homes	Yes	1962	Grand Boulevard (38)	911
			Washington Park (40)	546
Wells-Darrow-Madden Homes	Yes	1941/1961/1970	Douglas (35)	1,520
			Oakland (36)	1,268
			Grand Boulevard (38)	289
Wentworth Gardens	No	1945	Armour Square (34)	422

Note: Total number of units as of 1990 for each non scattered-site, non city-state family development broken down by community area. High-rise indicates whether the development contained any high-rise buildings.

Table 2: Descriptive Statistics

	(1) Highrise 1990	(2) Highrise 2000	(3) Whole City 1990	(4) Whole City 2000
Median Income	36.2K	37.3K	47.0K	41.1K
Median Home Value	-	212K	155K	174K
Median Rent	572	627	613	642
Population	27.6K	26.9K	36.8K	38.3K
Households	12.0K	12.6K	13.6K	14.1K
Housing Units	14.9K	15.0K	15.0K	15.2K
HH Size	2.53	2.54	3.04	2.96
% Owner Occupied	17.6	29.1	41.0	43.7
% Units Vacant	19.9	15.8	9.4	7.8
% African-American	65.9	54.8	38.4	36.2
% Under 18	40.0	22.6	37.4	26.2
% Over 65	12.2	11.2	11.9	10.4
% Female Head	43.0	28.4	29.4	18.5
% Employed	41.2	51.1	55.7	54.3
% Public Asst.	26.4	9.5	14.2	6.8
% Under Poverty Line	41.9	29.2	20.4	18.6
% HS Grad.	60.9	74.0	64.1	70.0
% College Grad.	23.6	36.1	17.5	22.9
Murder	23.5	9.9	11.9	7.7
Rape	72.3	30.5	43.2	25.5
Assault	790	472	457	344
Robbery	1,018	306	561	250
Burglary	646	286	669	367
Theft	3,113	2,233	1,672	1,355
Auto Theft	660	364	605	383

Note: Population/Housing Unit weighted mean community area demographic data from 1990 and 2000 Census. All dollar amounts are in terms of year 2000 dollars. Highrise denotes 8 community areas with public housing developments that include high-rises. Income, rent, and home values are measured in year 2000 dollars. Median home values are not reported for 47 of the 121 census tracts in high-rise neighborhoods in 1990. In 2000, median home value data are missing for 13 high-rise census tracts. Similarly, there are too few home transactions in my data set to report median home prices for 1990. Crime means listed in columns (1) and (3) are for 1991.

Table 3: Decennial Population and the Number of Households Displaced by Closures in Neighborhoods where High-Rises were Demolished

Community Area	(1) Pop. 1980	(2) Pop. 1990	(3) Pop. 2000	(4) HH Disp. in 1990's	(5) HH Disp. in 2000's
Near North Side	67,158	62,842	72,811	367	644
Near West Side	57,296	46,197	46,419	708	612
Near South Side	7,243	6,828	9,509	322	418
Armour Square	12,475	10,801	12,032	68	418
Douglas	35,700	30,652	26,470	311	136
Oakland	16,748	8,197	6,100	184	513
Grand Boulevard	53,741	35,897	28,006	542	495
Washington Park	31,935	19,425	14,146	279	260
Total	282,296	220,839	215,503	2,781	3,168

Note: Population numbers from the Decennial Census are presented in columns (1) through (3). Columns (4) and (5) show an estimate of the number of households that were displaced by building closures in the 1990's and from 2000 through 2007, respectively. NORC survey data show that 39% of households that were displaced by building closures in 2002 and 2003 were still living in the 8 neigborhoods listed above in 2006.

Table 4: 1950 Characteristics of Neighborhoods where High-Rise Public Housing was Proposed

	(1) Accepted Sites	(2) Rejected by CHA	(3) Rejected by City Council
% African-American	65.6	0.4	4.7
Median Income	14.5k	28.7k	24.5k
Population per Square Mile	3.03k	2.80k	1.47k
Distance to CBD (miles)	2.82	7.74	8.29

Note: Population weighted community area means calculated from 1950 census data. All dollar amounts are in terms of year 2000 dollars. Column (1) includes 8 community areas where high-rise public housing was built: Near North Side, Near West Side, Near South Side, Armour Square, Douglas, Oakland, Grand Boulevard, Washington Park. Column (2) includes 5 North Side community areas containing sites considered for high-rise public housing but ultimately rejected by the CHA due to high cost of obtaining land: Rogers Park, West Ridge, Uptown, Lincoln Square, and North Park. Column (3) includes 9 South Side community areas containing sites considered for high-rise public housing but ultimately rejected due to objections from the City Council: South Chicago, South Deering, East Side, West Pullman, Riverdale, Hegewisch, Garfield Ridge, McKinley Park, New City, Clearing. (Source: Bowly, Jr. (1978) and Brad Hunt's notes from CHA historical archives.)

Table 5: 20 Neighborhoods with the Highest Predicted Probability of Containing High-Rise Public Housing

Neighborhood	(1) High-Rise Public Housing	(2) P-Score	(3) % Under Poverty Line	(4) % African-American
Rogers Park	No	0.015	27.5	19.5
Near North Side	Yes	0.023	23.3	20.0
Albany Park	No	0.036	3.4	17.5
Woodlawn	No	0.038	96.0	37.0
Hermosa	No	0.038	2.0	17.4
Avondale	No	0.039	1.3	17.4
Uptown	No	0.074	22.3	24.2
Austin	No	0.085	99.2	40.8
Englewood	No	0.145	99.2	43.2
Humboldt Park	No	0.166	50.5	33.8
Logan Square	No	0.224	6.8	26.4
New City	No	0.245	41.3	34.1
East Garfield Park	No	0.333	98.9	48.1
Lower West Side	No	0.333	1.1	27.8
Fuller Park	No	0.387	98.6	49.2
West Town	No	0.439	10.6	31.9
Douglas	Yes	0.469	91.6	49.4
Armour Square	Yes	0.523	22.2	36.0
Washington Park	Yes	0.805	99.4	58.4
Near West Side	Yes	0.889	67.0	54.5
Near South Side	Yes	0.938	93.5	62.5
Grand Boulevard	Yes	0.952	99.4	64.7
Oakland	Yes	0.996	99.4	72.3

Note: 20 neighborhoods with the highest predicted probability of containing high-rise public housing estimated by probit using the percentage of households below the poverty line in 1990 and the percentage of African-American households in 1990 as explanatory variables on a sample of the 68 community areas that do not contain low-rise public housing. Marginal effects (confidence levels) are 0.321 (0.002) for percent under the poverty line and -0.067 (0.080) for percent African-American.

Table 6: OLS Estimates of the Effect of Closures on Crime Rates

	(1) Murder	(2) Rape	(3) Assault	(4) Robbery
100 Units Closed	-0.50**	-1.1	-22**	-39***
	(0.21)	(0.74)	(9.0)	(8.6)
Observations	352	144	144	144
R-squared	0.66	0.86	0.90	0.87
1991 Mean	99	295	3,301	3,990
2008 Mean	22	68	830	813
Change Attributed to Demo	-11		-470	-829
Growth Attributed to Demo	-11%		-14%	-21%
Fraction of Drop Explained	14%		19%	26%

	(5) Burglary	(6) Theft	(7) Auto Theft
100 Units Closed	-13**	57	7.9
	(5.2)	(32)	(13)
Observations	144	144	144
R-squared	0.89	0.87	0.70
1991 Mean	2,465	11,000	2,597
2008 Mean	966	4,910	897
Change Attributed to Demo	-281		
Growth Attributed to Demo	-11%		
Fraction of Drop Explained	19%		

Note: Crime rates are expressed as number of crimes per 100,000 people. Unit of observation is community area - year. All specifications include community area effects and year effects. Eicker-White standard errors are shown in parentheses. A mean of 2118 units per high-rise community area had been closed for demolition as of 2008.

Table 7: OLS Estimates of Growth in Crime Rates from 1991 to 2008 on Number of Relocatees per Capita

	(1) Murder	(2) Rape	(3) Assault	(4) Robbery
Q1: Most Relocatees per Capita	-0.31	-0.16	0.03	0.08
	(0.48)	(0.13)	(0.18)	(0.09)
Q2	-0.35	-0.19	0.06	0.08
	(0.49)	(0.14)	(0.18)	(0.10)
Q3	0.07	-0.19	-0.04	0.18
	(0.54)	(0.15)	(0.20)	(0.21)
Q4	0.10	-0.01	-0.04	-0.06
	(0.68)	(0.18)	(0.18)	(0.09)
Constant	-0.07	-0.32**	-0.37**	-0.52***
	(0.47)	(0.12)	(0.17)	(0.07)

	(5) Burglary	(6) Theft	(7) Auto Theft
Q1: Most Relocatees per Capita	0.33**	0.17**	0.28***
	(0.14)	(0.08)	(0.05)
Q2	0.11	0.07	0.20***
	(0.09)	(0.07)	(0.04)
Q3	-0.03	-0.06	0.02
	(0.10)	(0.08)	(0.03)
Q4	-0.02	-0.07	-0.02
	(0.08)	(0.08)	(0.03)
Constant	-0.53***	-0.33***	-0.72***
	(0.06)	(0.05)	(0.02)

Note: Dependent variable is the growth in the crime rate from 1991 to 2008. Unit of observation is non-highrise community area. 69 observations for all columns except 57 for column (1) due to 12 community areas which have zero murders in 1991. Eicker-White standard errors are shown in parentheses.

Table 8: OLS Estimates of the Effect of HOPE VI Demolition Grants on Crime Rates

	(1) Murder	(2) Rape	(3) Assault	(4) Robbery	(5) Burglary	(6) Theft	(7) Auto Theft
Demolition City							
Grant Units / 100K Pop.	-0.0025***	0.0030	-0.062***	0.003	0.055	0.010	-0.058***
	(0.0009)	(0.0020)	(0.020)	(0.010)	(0.041)	(0.085)	(0.018)
Observations	4,929	4,899	4,937	4,936	4,940	4,940	4,937
R-squared	0.61	0.64	0.67	0.76	0.70	0.73	0.73
1991 Mean	20.06	64.28	862.1	597.2	2,190	5,212	1,196
2008 Mean	14.29	46.68	554.6	360.8	1,323	3,436	543.8
Change Attributed to Demo	-0.60		-14.9				-13.8
Growth Attributed to Demo	-3.0%		-1.7%				-1.2%

Note: Crime rates are expressed as number of crimes per 100,000 people. Unit of observation is city - year. Main explanatory variable is constructed as the ratio of the number of units that the HOPE VI demolition grant is for to the mean population of the city. All specifications include city fixed effects and year effects. Eicker-White standard errors are shown in parentheses. The mean ratio of the number of units that the HOPE VI demolition grant is for to population across the cities in the panel is 241 HOPE VI units per 100,000 people. In Chicago the ratio is 169 HOPE VI units per 100,000 people.