

## **The struggle to belong**

Dealing with diversity in 21st century urban settings

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Suburban gentrification: the spatial and temporal pattern of residential redevelopment in the inner-ring suburbs of Chicago, IL, 2000-2010

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“Suburban gentrification” of older, inner-ring suburbs is an emerging phenomenon that has the potential to transform American metropolitan regions. It may foreshadow shifts in household location patterns and changes in the socio-economic composition of neighborhoods, similar to the examples of classical gentrification observed in central cities. Yet, few empirical studies specifically address the transformation of older, inner-ring suburbs through gentrification. Gentrification is most visible through capital reinvestment in the built environment. This paper examines one particular type of reinvestment—the incremental, private sector, residential redevelopment process in which older single-family housing is demolished and replaced with larger single-family housing. Through a case study of single-family residential redevelopment in 128 inner-ring suburbs of Chicago between 2000 and 2010, this study uses spatial statistical analysis and geographic information systems (GIS) mapping to identify the spatial and temporal pattern of single-family redevelopment in inner-ring suburban neighborhoods. Two research questions addresses in this paper are (1) what is the nature and magnitude and the spatial pattern of single-family residential redevelopment in inner-ring suburbs, and (2) how has the spatial pattern of single-family residential redevelopment in inner-ring suburbs changed over the course of the last decade?

This study examines a conspicuous form of capital reinvestment in inner-ring suburban neighborhoods—the private-sector demolition and replacement of single-family housing—referred to colloquially as “teardowns,” “scrape-offs,” or “dozers.” In this process, older single-family housing is demolished and larger single-family housing is built in its place. An example of this type of redevelopment in suburban Chicago, Illinois is presented in Figure 1. A property owner may decide to demolish a single-family house and rebuild another house on the property

for his/her own use; or a real estate developer may purchase a property with the intention of demolishing the existing house, rebuilding a larger one, then selling the property for a profit.



Figure 1: A redeveloped single-family property in suburban Chicago, Illinois.

This type of single-family residential redevelopment is often publicized in the journalistic literature as primarily occurring in historically wealthy neighborhoods (Fine and Lindberg 2002; Hirshey 2008). But anecdotal evidence indicates that during the past decade, it occurred in a group of inner-ring neighborhoods that are diverse in terms of property values, household incomes, and resident occupations. In many middle-income suburban neighborhoods, the smaller, moderately priced postwar housing is being replaced with housing that is much larger and more expensive. Some scholars associate this type of redevelopment with neighborhoods undergoing gentrification (Weber et al. 2006).

“Gentrification,” a term first coined by Ruth Glass (1964), broadly refers to residential redevelopment in which disinvested urban neighborhoods receive new private-sector investment, a process she observed occurring in neighborhoods of London during the mid-1960s. Early scholarly conceptions of American gentrification were faithful to Glass’s original definition—they emphasized the rehabilitation of housing (as opposed to newly constructed housing) and the direct displacement (e.g., eviction) of the original residents (Smith 1982). However, as gentrification expanded in scale and location over the past several decades, the generally accepted definition has evolved as well. Smith (1996), as well as other scholars, now argues that a distinction between renovated, nineteenth-century housing and newly-constructed housing is no longer useful—he claims that the term “gentrification” now legitimately refers to a much broader phenomenon. Hackworth (2002) succinctly defines this phenomenon as “the production of space for progressively more affluent users.” Lees, Slater and Wyly (2008) argue that any definition of gentrification must include the reinvestment of capital, landscape change, social upgrading by high-income groups, and the displacement of low-income groups.

An important difference between suburban gentrification and classic urban gentrification is how physical changes in the built environment bring about the displacement of the original residents of a neighborhood. Early definitions of gentrification include the direct displacement, or eviction, of residents. Current theories contend that displacement may also be indirect, resulting latently from changes in the real estate market brought about by physical changes in the built environment (Davidson 2008, 2009; Atkinson 2000; Hackworth 2002). This type of indirect displacement is best articulated in Marcuse’s (1985) notion of “exclusionary displacement”—as housing is redeveloped and becomes more expensive, households similar in socio-economic status to the original residents of the neighborhood can no longer afford to live there. Since

indirect or exclusionary displacement proceeds in a somewhat stealthy manner—incrementally over time, rather than through more noticeably direct eviction—the class remake of the suburban landscape may occur without resistance. Moreover, in this way suburban gentrification may be viewed by neighborhood residents and policy makers as an inevitable or a natural process.

Gentrification scholarship has extended well beyond classic gentrification to include many new forms, which vary in location and scale; however, very little research has been devoted to the gentrification of suburban neighborhoods. Exceptions include the work of Niedt (2006), which explores suburban policy makers and residents' potentially popular support for gentrification in industrial suburbs—playing off of Smith's (1996) concept, he calls it a “suburban revanchism” and Badcock's (2001) 30-year study of gentrification and neighborhood change in Adelaide, Australia. In an unpublished seminar paper, Johnson et al. (2008) find evidence of suburban gentrification in three Swedish cities; moreover, they specifically address the gentrification of middle-class areas (as opposed to lower-income areas, the focus of classic gentrification), which they call an “invisible mass of ‘ordinary gentrification.’”

Suburban policy makers and residents often view suburban gentrification as having positive implications for their individual municipalities. Residential redevelopment results in the replacement of older housing with that which is more in keeping with currently popular trends in house size, features, and styles. It may raise neighboring property values and create additional revenue through increased property tax assessments, which is often welcomed by local municipalities heavily reliant on residential property taxes to fund public services. Moreover, many smart growth proponents support inner-ring suburban residential redevelopment, considering it an anti-sprawl tactic. Although it does not increase the density of land use on a unit-per-acre basis, they view this type of redevelopment as an attempt to recycle older, well-

located neighborhoods by attracting higher-income households that might otherwise have chosen new, larger housing on the urban fringe (Danielsen, Lang, and Fulton 1999; Bromley, Tallon, and Thomas 2005).

Inner-ring suburban policymakers' myopic view of gentrification's benefits for an individual municipality may overshadow the deleterious effects of suburban gentrification for the metropolitan region as a whole. Like other forms of gentrification, inner-ring suburban residential redevelopment may cause the indirect/exclusionary displacement of existing residents, and alter the socio-economic and physical characteristics of neighborhoods. It may reduce the stock of smaller, affordable (or mid-priced) housing, pushing lower-income households to less expensive housing on the urban fringe—less desirable locations due to the distance from employment opportunities, and lack of public transportation and other desirable amenities. In contrast to examples of central city gentrification in which existing residents often protest redevelopment, suburban residents and policymakers may be politically quiescent, or may even be outright proponents of this type of change (Niedt 2006). The noncritical stance of suburban residents and policymakers, combined with a scholarly lack of attention to inner-ring suburban redevelopment, may have negative implications for those most vulnerable to the detrimental effects of this process.

This study examines the extension of gentrification across city boundaries to suburban neighborhoods, a phenomenon that has not received attention from gentrification scholars. This study uses an original, more accurate, parcel-level database of redeveloped, single-family residential parcels in 128 inner-ring suburbs of Chicago—a scale of analysis that researchers have not addressed due, in part, to the difficulty of obtaining data from multiple political jurisdictions. Using spatial statistical methods, not commonly used to study gentrification, this

paper analyzes the spatial pattern of residential redevelopment, identifying the spatial location and extent of statistically significant clusters (or hot spots) of redevelopment activity. By overlaying the cluster maps upon maps of the socio-economic characteristics of suburban neighborhoods, the study reveals the socio-economic diversity of neighborhoods in which redevelopment has taken place. Moreover, the study reveals how the location of redevelopment has changed over time. This information is potentially important to policy makers and regional planners in order to address the negative effects of suburban gentrification.

#### Data

The Chicago metropolitan area was chosen for this case study because it is an area where preliminary evidence indicates that residential redevelopment is particularly widespread (Dye and McMillen 2007; Fine and Lindberg 2002). The National Trust for Historic Preservation has described the residential redevelopment phenomenon in Chicago as an epidemic, and, in 2002, they labeled the Chicago metropolitan area the “epicenter of teardowns,” specifically identifying over 50 suburbs in the Chicago area that are experiencing high rates of residential redevelopment activity (Fine and Lindberg 2002).

Previous studies use the issuance of a demolition permit as a proxy for redevelopment activity (Weber et al. 2006; Helms 2003; Dye and McMillen 2007). This study combines demolition permit data with parcel data from the Cook County Assessor’s Office (CCAO) to identify more accurately parcels upon which a structure was both demolished and subsequently rebuilt. The dataset used in this study includes all single-family residential parcels that were demolished and rebuilt in the 128 inner-ring suburbs of Chicago located in Cook County between 2000 and 2010.

Property owners in suburban Cook County are required to obtain a demolition permit prior to the demolition of a structure on their property. Information regarding all single-family residential demolition permits in all Cook County suburban municipalities and unincorporated areas issued between January 1, 2000 and December 31, 2009 was collected and digitized. The demolition permit data were then matched by street address to the CCAO database of all single-family residential parcels in suburban Cook County.

The issuance of demolition permits may be an imprecise indicator of redevelopment activity; a demolition permit may be issued, but the house is not demolished; or house may be demolished, but it is not replaced with new construction. In order to capture only properties upon which a house was demolished and a new house was built, the square footage of each house in 2000 for which a demolition permit was issued was compared with the house square footage on record with the CCAO in August 2010. Only parcels for which a demolition permit was issued and that experienced at least a 150 square foot increase in square footage between 2000 and 2010 were classified in the dataset as having been redeveloped. 4,789 single-family residential properties in suburban Cook County were identified as having been redeveloped between 2000 and 2010.

Socio-economic data, including household income, house values, race and ethnicity, and occupation sector for each census block group in suburban Cook County was obtained from the 2000 U.S. Census and mapped using GIS. A measure of the quality of all elementary school districts in Cook County, i.e., the Illinois Standards Achievement Test (ISAT) score, was obtained from the Illinois Interactive Report Card and also mapped using GIS. ISAT scores are reported on a scale of 0 to 100.



## Methods

This study uses spatial statistical methods, including global and local measures of spatial autocorrelation to identify whether spatial clustering of redevelopment is present, and if so, to identify the spatial location of statistically significant clusters of single-family residential redevelopment activity. Global autocorrelation (i.e., clustering) statistics provide a single measure of spatial autocorrelation to describe the degree of clustering present in a mapped pattern. An appropriate and statistically powerful test for detecting and measuring the extent of global spatial autocorrelation is the global Moran's *I* statistic (Anselin 1988; Cliff and Ord 1972; Getis 2010; Moran 1950). When the global Moran's *I* statistic indicates that statistically significant spatial autocorrelation is present, local autocorrelation statistics are used to determine the location and their spatial extent of clusters of redevelopment activity.

In this study, I measured the local spatial autocorrelation by using a local indicator of spatial association (LISA), calculated with GeoDa software (Anselin 1995). LISA statistics provide a measure per unit area of the individual area's tendency to have a rate of redevelopment correlated with the rate of redevelopment in nearby areas. LISA statistics are also used to indicate the spatial location of statistically significant, local spatial clusters of redevelopment activity. These local spatial clusters, or hot spots, are defined as sets of contiguous locations for which the LISA is significant. Using GeoDa software, LISA significance maps are created using percentage of single-family housing redeveloped per  $\frac{1}{4} \times \frac{1}{4}$  mile grid.

In order to examine the combined spatio-temporal characteristics of residential redevelopment, the tests for global and local spatial autocorrelations are examined over time. Global Moran's *I* statistics are computed for each year to determine temporal changes in the overall spatial pattern—whether redevelopment activity is more clustered in some years than in

others. LISA significance maps are created for the cumulative redevelopment for each year in order to examine the change in the location of statistically significant clusters of redevelopment over the course of the study period. These LISA maps are overlaid upon maps illustrating socioeconomic variables, including 1999 median household income, 2000 median house value, 2000 resident occupation, and the 2000-2008 average ISAT score.

## Results and Discussion

Between 2000 and 2010, 4,789 single-family residential parcels were redeveloped—overall, slightly less than 1% of the entire single-family housing stock in suburban Cook County. Figure 2 illustrates the percentage of parcels redeveloped in each census block group, a percentage ranging from zero to 16.6%. The census block groups in which over 4% of the housing stock has been replaced are denoted by the darkest shade.

The rates of residential redevelopment at the census block group level are highly unevenly geographically distributed within suburban Cook County. The mapped data indicate that redevelopment is primarily confined to areas north, northwest, and southwest of the city of Chicago. The findings reveal that residential redevelopment has had a substantial impact on many suburban neighborhoods; there were 99 census block groups in which over 4% of the housing stock was redeveloped. Twenty census block groups experienced the demolition and replacement of over 8% of the housing stock. However, it must be noted that over 60% of the census block groups in Cook County (which include 56% of the housing stock) did not have any single-family residential redevelopment whatsoever between 2000 and 2010.

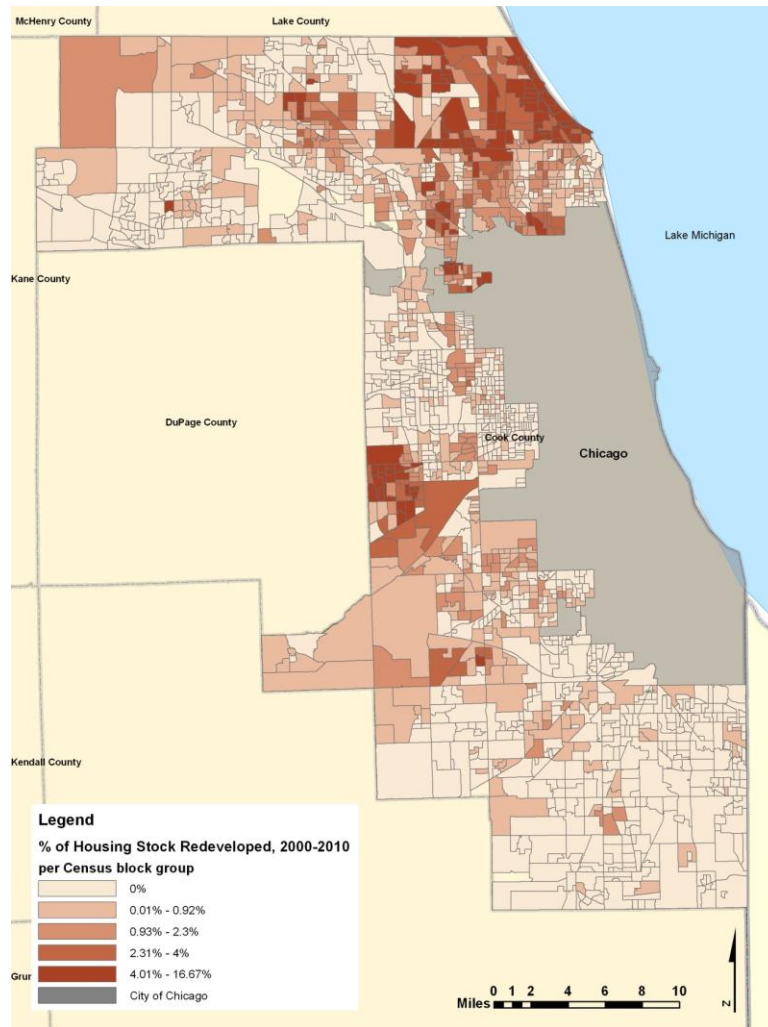


Figure 2: Percentage of redeveloped parcels per census block group, 2000-2010

Findings indicate that the neighborhoods in which redevelopment occurred are socio-economically quite diverse. Within the list of 20 municipalities with the highest overall percentages of redeveloped properties, the median house value, according to the 2000 census, ranges from \$128,300 to \$731,500. The median household income ranges from \$46,646 to over \$179,870. The median house value and household income for suburban Cook County in 2000 was \$154,000 and \$46,000, respectively. It is notable that the neighborhood that had the lowest median income when compared to the other census block groups with the highest rates of

redevelopment had the fourth highest rate of redevelopment. Within that neighborhood, 65 houses (i.e., 12.8% of the housing stock) were redeveloped within the ten-year period. Thus, relatively high rates of redevelopment are observed in both highly affluent as well as more modest middle-income neighborhoods. Table 1 presents the rates and quantities of redevelopment as well as selected socio-economic characteristics for the census block groups with the 20 highest rates of redevelopment between 2000 and 2010.

Table 1: Census block groups with the highest quantity of redeveloped parcels, 2000-201

Municipality	Number of Parcels Redeveloped 2000-2010	Percentage of Parcels Redeveloped 2000-2010	Median Household Income, 1999	Median House Value, 2000	Percentage non-Hispanic Black Residents, 2000	Percentage Hispanic Residents, 2000	Percentage Occupation: Service, Construction; Production, Trans., 2000
1 Northbrook	32	16.67%	65,781	273,800	0.00%	2.12%	17.49%
2 Unincorporated	36	15.45%	71,316	226,900	0.00%	0.00%	23.84%
3 Western Springs	48	13.33%	90,224	280,100	1.03%	0.69%	9.23%
4 Norridge	65	12.80%	46,646	187,400	0.42%	0.00%	36.20%
5 Arlington Heights	86	12.74%	70,789	170,000	3.72%	8.55%	19.74%
6 Winnetka	38	12.50%	114,214	516,100	0.00%	0.00%	5.21%
7 Winnetka	45	11.34%	139,469	604,900	0.00%	1.05%	6.53%
8 Norridge	5	10.64%	49,901	195,200	0.00%	4.32%	38.18%
9 Northbrook	51	10.45%	93,721	316,500	0.00%	0.00%	9.81%
10 Western Springs	53	9.76%	88,664	287,400	0.89%	1.16%	8.85%
11 Western Springs	43	9.75%	76,367	266,800	0.00%	6.19%	16.50%
12 Wilmette	19	9.36%	85,624	332,200	0.00%	10.68%	0.00%
13 Winnetka	31	9.04%	165,212	731,500	0.00%	1.66%	9.93%
14 Glenview	28	8.92%	54,750	230,200	1.01%	0.00%	28.92%
15 Glenview	57	8.64%	76,979	273,100	0.00%	2.03%	21.69%
16 Glenview	42	8.57%	141,117	447,900	0.00%	4.24%	11.96%
17 Winnetka	47	8.38%	179,870	719,000	0.00%	1.39%	4.70%
18 Glenview	17	8.37%	46,684	128,300	1.69%	10.83%	29.75%
19 Morton Grove	51	8.16%	48,452	174,400	0.00%	8.41%	30.56%
20 Northbrook	62	8.15%	100,000	356,400	0.00%	2.58%	13.16%

Although redevelopment occurred in a relatively diverse collection of neighborhoods in terms of house values and household incomes, the neighborhoods in which redevelopment occurred lack racial and ethnic diversity. Among the census block groups with the highest rates

of redevelopment, 70% do not have any Black residents, according to the 2000 census. The neighborhoods are slightly more diverse in terms of ethnicity. Although several of the neighborhoods do not have any Hispanic residents, two census block groups have Hispanic populations over 10%.

The analysis also finds that postwar neighborhoods experienced much of the residential redevelopment that took place between 2000 and 2010. Aside from three older neighborhoods, the average age of the original housing stock in the neighborhoods with the overall highest redevelopment rates ranges from 40 to 55 years. Many of these neighborhoods are located near the city of Chicago or adjacent to wealthier neighborhoods. However, there are several unexpected findings. For example, the census block group with the highest rate of redevelopment is located relatively far from the Chicago CBD, two miles south of the northern border of Cook County. Additionally, a middle-income, postwar neighborhood was the site of 37 redeveloped properties (7% of the housing stock) between 2000 and 2010, although it is located approximately 30 miles northwest of the Chicago CBD.

The preceding analysis reveals high rates of redevelopment in neighborhoods ranging from very affluent to moderate and in-between. However, in general, wealthy, white-collar neighborhoods are more often the locations of this type of reinvestment. Of all 4,789 parcels redeveloped between 2000 and 2010, 82.8% took place in the top half of all suburban Cook County census block groups in terms of the percentage of residents employed in white-collar occupations. This includes block groups in which at least 67% of the population is employed in management, professional, and sales occupations, according to the 2000 census. However, it is notable that 17.2% of all redevelopments occurred in the top half of all suburban Cook County census block groups in terms of residents employed in blue-collar occupations—this includes

neighborhoods where over 33% of the population is employed in service, construction, production, and transportation. Table 2 and Table 3 present the percentage of redevelopment cross tabulated by occupation and racial composition for 2000, and for 2006, respectively.

The change in location of redevelopment relative to the occupational profile of census block groups over the course of the study period is revealing. At the beginning of the study period in 2000, the percentage of the redevelopments in census block groups that were in the top half in terms of residents employed in blue-collar occupations was 10.4%. In 2006, at the height of the booming housing market, the share of the redevelopments taking place in these census block groups increased to 21.5%—a 107% increase. Although the statistics indicate that block groups in the top half of residents employed in white-collar occupations received the bulk of redevelopment activity throughout the study period, it also indicates that redevelopment shifted as it proceeded apace during the housing boom. It moved from affluent areas characterized by high property values, high median incomes, and high proportions of white-collar residents to neighborhoods with relatively lower socio-economic status measured by these criteria—areas that may be most at risk for wholesale gentrification.

Next, I conducted a similar analysis of the location of redevelopment relative to the racial composition of the census block groups. The census block groups were divided into halves in terms of the proportion of non-Hispanic White residents. Overall, between 2000 and 2010, 85.2% of redevelopment took place in neighborhoods in block groups with the highest proportion of non-Hispanic White residents, i.e., over 79% of the population. In 2000, only 11.3% of redevelopments took place in block groups below the fiftieth percentile of non-Hispanic White residents. In 2006, at the peak of the housing boom, that statistic increases to 19.9%—a 76% increase. This indicates that although the majority of redevelopments occurred in

census block groups in which a high percentage of the population is non-Hispanic White, by mid-decade a greater share of redevelopment occurred in neighborhoods with greater proportions of other races and ethnicities.

Table 2: Percentage of redevelopment by race/ethnicity and occupation, 2000

	Percentage Non-Hispanic White Residents per Census block group		Total
	High (highest 50% of block groups)	Low (lowest 50% of block groups)	
White-collar (highest 50% of block groups)	79.4%	10.1%	89.6%
Blue-collar (highest 50% of block groups)	9.3%	1.2%	10.4%
Total	88.7%	11.3%	

Table 3: Percentage of redevelopment by race/ethnicity and occupation, 2006

	Percentage Non-Hispanic White Residents per Census block group		Total
	High (highest 50% of block groups)	Low (lowest 50% of block groups)	
White-collar (highest 50% of block groups)	62.9%	15.5%	78.5%
Blue-collar (highest 50% of block groups)	17.2%	4.3%	21.5%
Total	80.1%	19.9%	

An examination of redevelopment at the intersection of resident occupation and race/ethnicity exposes a provocative pattern. The greatest percentages of redevelopment occurred in census block groups that are both above the fiftieth percentile of residents employed in white-collar occupations (i.e., greater than 67%) and above the fiftieth percentile of non-Hispanic White residents (i.e., greater than 79%). Overall, 71.8% of redevelopment during the entire study

period occurred in non-Hispanic White and white-collar census block groups. Redevelopment also occurred in blue-collar census block groups, but in the ones that were also above the fiftieth percentile of the proportion of non-Hispanic White residents. Redevelopment occurred at very low rates in census block groups that were both non-White and blue-collar (1.2% in 2000 and 4.3% in 2006). However, this pattern changed over the course of the decade. In 2000, 79.4% of redevelopment occurred in White, white-collar census block groups, but in 2006, the statistic decreased to 62.9%. Thus, by 2006, real estate developers and property owners were shifting their pattern of reinvestment to neighborhoods with greater percentages of non-White residents, and to neighborhoods with greater percentages of blue-collar workers.

Based on a visual analysis of the mapped data at the block group level of aggregation, I suspect the general (global) clustering of redevelopment activity—that, in general, redeveloped properties are located in close proximity to each other—is at work. This study sets out next to substantiate this hypothesis statistically and then to identify the specific locations of statistically significant clusters of redevelopment activity.

The data were aggregated to a regular  $\frac{1}{4} \times \frac{1}{4}$  mile vector grid surface in Arc GIS using the National Park Service Grid Tool extension for ArcGIS, and the percentages of housing redeveloped per grid cell were calculated; any cell with less than ten housing units was eliminated so as to not distort the analysis. Figure 3 presents the percentage of housing redeveloped per  $\frac{1}{4} \times \frac{1}{4}$  mile grid, divided into quintiles. The percentage of redeveloped parcels ranges from 0% to 33.3%. The top quintile, represented by the darkest shaded areas on the map, has redevelopment rates greater than 5%.



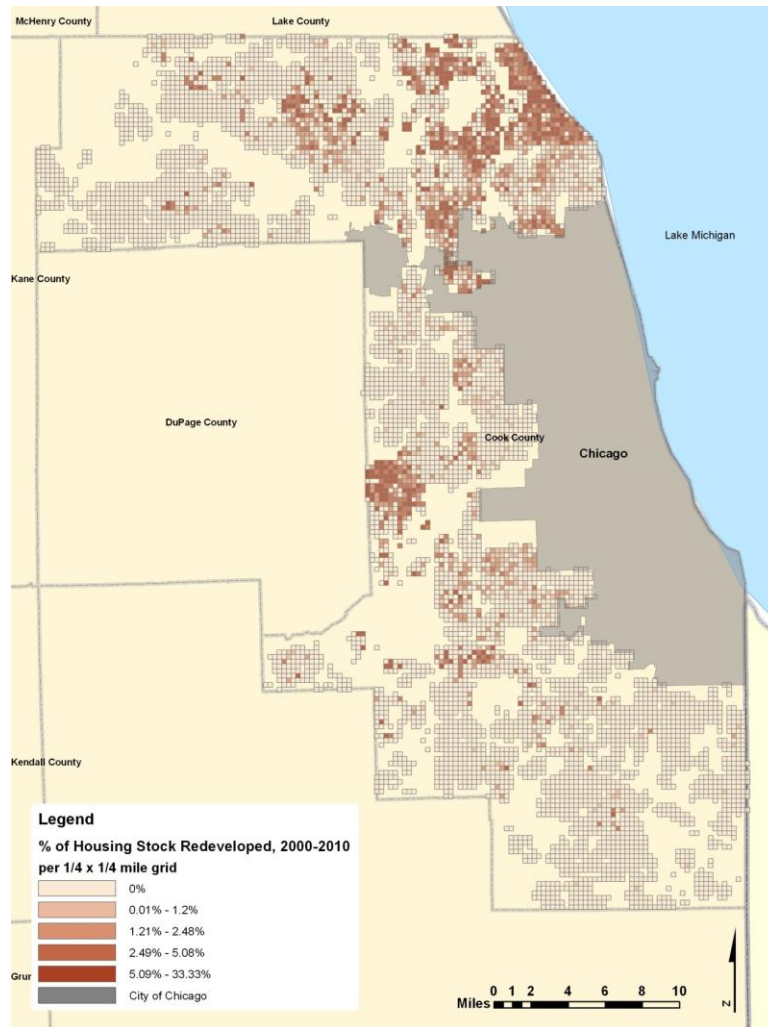


Figure 3: Percentage of redeveloped parcels per  $\frac{1}{4} \times \frac{1}{4}$  mile grid, 2000-2010

A test of global spatial autocorrelation (i.e., clustering), the Moran's  $I$  statistic, was calculated with GeoDa software for the rate of redevelopment per  $\frac{1}{4} \times \frac{1}{4}$  mile grid. The statistic tests whether  $\frac{1}{4} \times \frac{1}{4}$  mile areas with high redevelopment rates are located in close proximity to other, similar areas. The Moran's  $I$  statistic of 0.4693 is highly statistically significant ( $p < .001$ ). This result indicates that generally, single-family residential redevelopment activity in suburban Cook County is significantly clustered. This finding is not surprising, but it confirms the anecdotal evidence and visual inspection of the mapped, redeveloped parcels, and it

demonstrates that reinvestment in inner-ring suburbs of Chicago is highly uneven. Redeveloped areas are located in close proximity to other redeveloped areas.

While the tests for global spatial autocorrelation indicate that single-family residential redevelopment in suburban Cook County is significantly spatially clustered, the global statistic does not indicate the extents or locations of the clusters. A statistically significant cluster has a high rate of redevelopment and is surrounded by other areas with high rates of redevelopment. To test for statistically significant local clusters of redevelopment and identify their locations, a local indicator of spatial association (LISA) was calculated, using GeoDa software. Figure 4 presents a map of these clusters of redevelopment activity (statistically significant at the 95% confidence level,  $p < 0.05$ ); the darkest shade indicates areas with high rates of redevelopment next to other similar areas. The ten distinct clusters are discussed below.

The results indicate a large cluster of redevelopment activity (Cluster 1) that includes four wealthy North Shore suburbs extending to their municipal borders. These suburbs are among the wealthiest in Cook County—each has an overall median house value over \$400,000. The overall median house values are \$736,800 and \$976,400 in two of the suburbs. Overall, median household incomes in these four suburbs are greater than \$100,000, with the median income in one greater than \$200,000. Over 90% of the population is employed in white-collar occupations, and all of the elementary school districts in this cluster have average test scores between 92 and 95, which is within the top 10% of all districts.

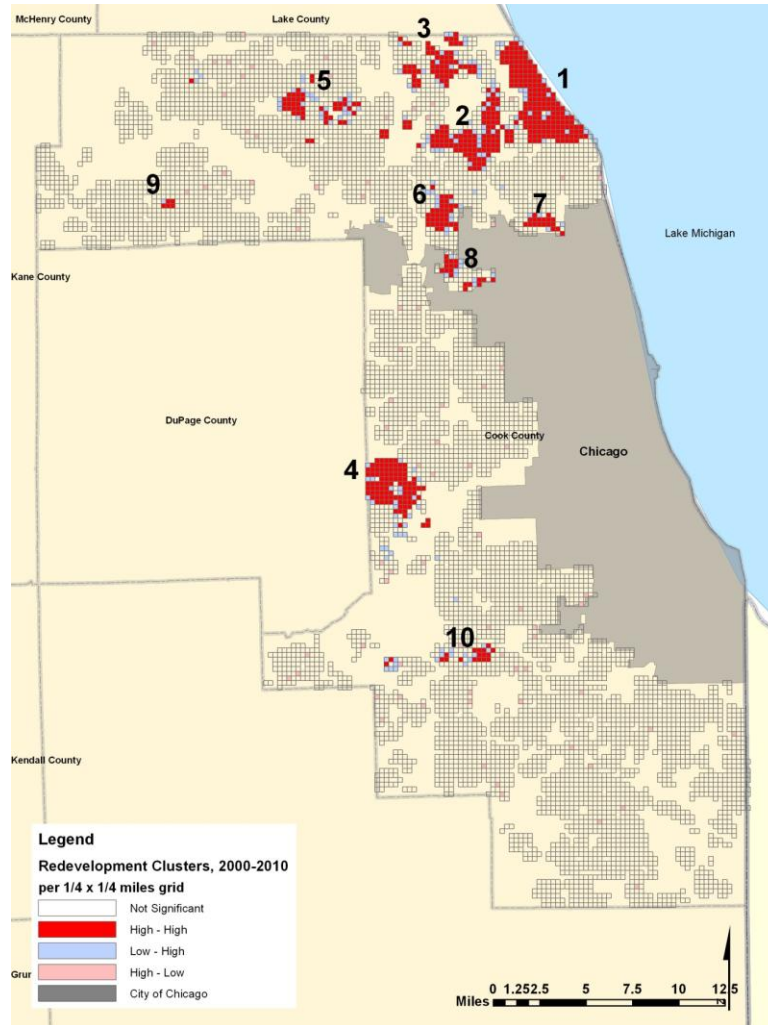


Figure 4: Redevelopment clusters, per  $\frac{1}{4} \times \frac{1}{4}$  mile grid, 2000-2010

Several neighborhoods within Cluster 1, primarily located along the shore of Lake Michigan, have median house values greater than \$900,000 and median household incomes greater than \$200,000. The least affluent neighborhood in this cluster has a median household income of \$62,000 and a median house value of greater than \$300,000. It is notable that the southern boundary of Cluster 1 aligns precisely with a border between two municipalities and elementary school districts. On the north side of the border, the school district has an average score of 94; on the south side of the border the school district has an average score of 77.

Another large cluster of redevelopment activity (Cluster 2) is located west of Cluster 1 and includes portions of three suburbs and several unincorporated areas. Two of the suburbs included are affluent, with high household incomes and property values; overall median household incomes range from approximately \$80,000 to \$90,000, and median housing values range from approximately \$300,000 to \$380,000. However, several neighborhoods within this cluster are relatively socio-economically diverse; one has a median income of \$46,700, according to 2000 census data. In one neighborhood approximately 30% of the population is employed in blue-collar occupations. This cluster of redevelopment also encompasses neighborhoods with relatively higher proportions of non-White residents—areas with less than 75% White residents are found in several neighborhoods. The southwestern border of the cluster distinctly aligns with the border between two school districts. The cluster is located in two school districts with average scores of 86 and 88; the adjacent school district has an average score of 77.

A third significant cluster of redevelopment activity (Cluster 3) is located north of Cluster 2. Socio-economic data indicate that this area is relatively affluent with an overall median household income of slightly less than \$100,000 and an overall median house value of over \$350,000. However, this cluster includes neighborhoods in which the median income ranges from \$66,000 to \$100,000. The entire cluster is contained within three elementary school districts in the top 10% of all districts—average scores range from 91 to 93.

Another significant cluster of redevelopment activity (Cluster 4) is located west of Chicago. This cluster contains areas of five suburban municipalities and unincorporated areas. Three of the municipalities have high median house values of \$490,000 and \$322,000, and \$256,000, respectively. However, other suburbs in this cluster are less affluent with median household incomes and median house values equal to or less than the median for suburban Cook

County; in one neighborhood, the median household income and median house value are \$45,500 and \$172,200, respectively, and over 35% of the population is employed in blue-collar occupations. The western portion of the cluster is located within elementary school districts in the top 10% of all districts; the eastern portion of the cluster encompasses areas located within districts ranked substantially lower. The elementary school district boundaries overlap municipal boundaries—some areas are located in a highly ranked district while others are not.

Several clusters of redevelopment activity, smaller in scale than those previously discussed are located northwest of the city of Chicago. The area with the overall highest rates of redevelopment is in the western portion of Cluster 5, located 26 miles northwest of Chicago. The cluster is located in neighborhoods in which the median household income ranges from \$56,700 to \$76,400, and the median house value ranges from \$170,000 to \$246,700. The elementary school district that encompasses these areas is in the top 10% of all districts. Although discontinuous, there is an adjacent cluster of redevelopment located further east, within a slightly lower ranked elementary school district. The median household income in these neighborhoods ranges from \$47,100 to \$68,400; the median house value is very similar to that in the western portion of the cluster.

Two smaller clusters of redevelopment activity are located directly north of the Chicago city limits (i.e., Cluster 6 and Cluster 7). These two clusters encompass the majority of their respective municipalities. In terms of socio-economic characteristics, both of these places are similar to the affluent suburbs described in Cluster 2 above; their median household incomes and house values are approximately \$70,000 and \$285,000, respectively. There are also two small clusters grouped as Cluster 8. Although this cluster is located adjacent to the municipality that contains Cluster 7, the neighborhoods that contain Cluster 8 are substantially less affluent, with

socio-economic characteristics very similar to the median for suburban Cook County. The median household incomes are \$47,800 and \$43,300, respectively; the median house values are \$198,000 and \$189,800, respectively. Cluster 8 is also differentiated from the previous two in that approximately 48% of the population of both suburbs is employed in blue-collar occupations.

Lastly, several smaller clusters were observed in somewhat unexpected areas—unexpected due to the neighborhood's distance from Chicago, as well as the relatively young age of the housing stock (i.e., built in the mid-1960s). For the most part, Cluster 9 is confined to one neighborhood; the median income is \$62,300 and the median house value is \$157,500. There is another small cluster (Cluster 10) in a neighborhood with socio-economic characteristics similar to Cluster 9. Clusters 8 and 9 both include neighborhoods in which over 35% of the population is employed in blue-collar occupations. The elementary schools districts in both clusters are not amongst the highest rated districts, but are in the top 20%.

The second research question asks: how has the spatial pattern of suburban residential redevelopment activity changed over time? To answer this question, I examine the incremental changes in the spatial location of the statistically significant redevelopment clusters from 2000 to 2010. LISA statistics were calculated and cluster maps were produced for the cumulative redevelopment activity from 2000 for each year (e.g., 2000-2001, 2000-2002, etc.). Maps of the cumulative redevelopment activity for years 2000 through 2007 are presented in Figures 5. Below, I describe the change in the locations of the clusters over time, and discuss key socio-economic indicators of the neighborhoods in which they occur.

At the beginning of the decade, Cluster 1, Cluster 2, and Cluster 4 are already apparent. Cluster 1 is located along the Lake Michigan shoreline and is near the geographic center of the

municipalities—the business districts and commuter train stations. All three clusters originated in very affluent areas where the median house value is greater than \$300,000. Several neighborhoods in Cluster 1 have median incomes over \$200,000 and median property values greater than \$900,000. The origins of Cluster 6 and of Cluster 5 are barely apparent in 2000. But at this time, Cluster 8, located in two moderate blue-collar suburbs, has already begun. By 2002, all clusters that were apparent in 2000 have begun to both fill in and expand outward, and Cluster 7 appears for the first time. Cluster 8 expands. Cluster 5 and Cluster 3, which both later become the areas with the overall highest rates of redevelopment, are still very small at this time.

In 2003, the previously existing clusters continue to infill. Cluster 2 expands westward into unincorporated areas with substantially lower median incomes—less than \$50,000. At this time, Cluster 3 significantly expands outward from its origin. Cluster 4, located west of Chicago, extends eastward into a less-affluent suburb to encompass areas in the adjacent, less-highly rated school districts. Cluster 5 expands significantly within the municipality, and for the first time, a small cluster appears in relatively less affluent neighboring municipality. In 2004, the borders of Cluster 2 and Cluster 3 remain similar to those of the previous year.

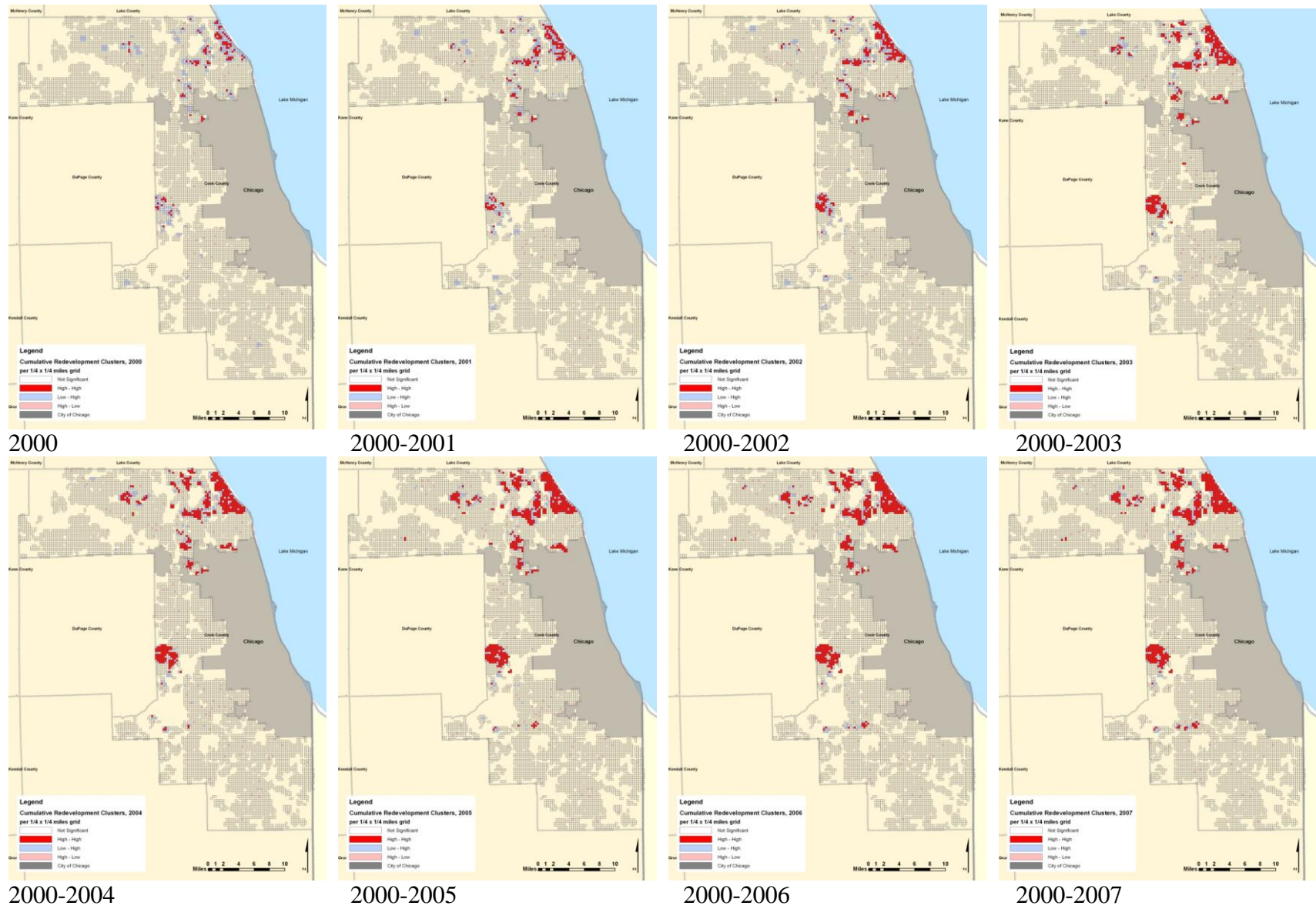


Figure 5: Annual Cumulative Redevelopment Clusters



The greatest quantity of parcels was redeveloped in 2005, and it is in this year that the greatest geographic expansion occurs. Cluster 2 expands even further south into moderate neighborhoods and westward into moderate unincorporated areas—including several neighborhoods with substantially lower median incomes. Cluster 4, located west of the city of Chicago, expands into adjacent moderate-income neighborhoods, in which the median household income is less than \$40,000. It is at this time that the more geographically remote Clusters 9 and Cluster 10 first appear. 2006 and after bring little expansion; additional redevelopment activity occurs for the most part within the existing cluster boundaries. It is notable that although the significant clusters expanded over the course of the decade, the overall clustering of redevelopment increased each year—the Moran's *I* statistic increased from 0.1537 in 2000 to 0.4693 in 2008, statistically significant at the 1% level each year. Thus, as redevelopment became more geographically diverse, it was also becoming more clustered.

Over the course of the decade, clusters generally first appeared in places with the highest incomes and house values. With one exception, these places all have median household incomes of approximately \$100,000 or higher. The surprising exception to this pattern is the redevelopment cluster in two blue-collar, middle-income suburbs (Cluster 8), which was statistically significant since the beginning of the decade. The temporal pattern of redevelopment observed in this area is unique, as the dominant pattern is for clusters to begin in an area characterized as very or moderately affluent—neighborhoods with median household incomes greater than \$80,000—in very highly ranked school districts. Commensurate with the rapid increases in housing prices during the first six years of the decade, redevelopment progressively extended into adjacent, less affluent neighborhoods—often blue-collar neighborhoods where the

residents may be most at risk for exclusionary displacement brought on by these substantial changes in the housing stock.

## Conclusions

This study first examines the nature and magnitude of single-family residential redevelopment in suburban Cook County and illustrated that data through maps at the neighborhood (census block group) level of aggregation. In some inner-ring suburban neighborhoods up to 16% of the housing stock was redeveloped during the ten-year study period, while in others, no redevelopment occurred. The data reveal that redevelopment occurred in a relatively wide range of municipalities in terms of median housing value, median income, and the occupations in which residents are employed. Several moderate neighborhoods with median incomes close to that of suburban Cook County and some neighborhoods with the highest median incomes have equally high rates of single-family residential redevelopment. However, redevelopment was not observed in neighborhoods with the lowest median incomes nor in neighborhoods with high proportions of Black residents.

This study then uses spatial statistical methods—global and local measures of autocorrelation (clustering)—to explore the spatial and temporal pattern of redevelopment. These techniques revealed redevelopment to be significantly geographically clustered—areas with high rates of redevelopment are located in close proximity to other similar areas. Although redevelopment is primarily clustered north, northwest, and southwest of Chicago, statistically significant clusters of redevelopment were found to have occurred in a relatively wide range of municipalities in terms of median housing value, median income, and resident occupation.

An examination of the changing locations of the cumulative redevelopment clusters revealed that clusters generally first appeared in places with the highest incomes and house

values. The dominant pattern is for clusters to begin in an area characterized as very or moderately affluent and with very highly ranked school districts. As house prices rose rapidly during the first six years of the decade, redevelopment progressively extended into adjacent, less affluent neighborhoods with lower-ranked school districts.

This paper explores one aspect of the gentrification process—the physical change in inner-ring suburbs. However, the physical change in the housing stock may result in social changes through the market-driven, exclusionary displacement of original residents. When properties are redeveloped, the sale prices are typically at least three times that of the original property (Fine and Lindberg 2002). Households with incomes similar to that of the residents of the original, pre-redevelopment house are often unable to afford to buy or rent the new, redeveloped house (Marcuse 1985).

Some of the neighborhoods where high rates of redevelopment occurred are the wealthiest in suburban Cook County, located in the most highly ranked school districts. In these areas, single-family residential redevelopment removes relatively less expensive houses from the housing stock. Redevelopment in originally middle-income neighborhoods incrementally removes moderately priced housing from the region's housing stock. One argument in favor of inner-ring suburban redevelopment is that it attracts households that might otherwise have located on the urban fringe (Bromley, Tallon, and Thomas 2005; Danielsen, Lang, and Fulton 1999). However, this does not consider that middle-income households that might otherwise have located in the inner-ring suburbs may be the ones pushed to the urban fringe—areas less desirable due to their distance from employment centers and services, as well as their reliance on automobile transportation.

Continued redevelopment of single-family housing may limit housing options for low- and moderate-income households and result in commensurate changes in the socio-economic characteristics of neighborhoods. These changes in household location patterns may result in more divided metropolitan areas. As Fishman (2000) predicts, wealthy residents will locate in portions of central cities and inner-ring suburbs, and the most vulnerable residents will be pushed to less-expensive inner-ring and exurban areas—areas that are less desirable due to their less highly ranked school districts, their distance from employment centers and services, as well as their reliance on automobile transportation. The paper helps to better understand where single-family redevelopment has occurred and how the spatial location of redevelopment has changed over time, information that can be used to craft more equitable, more accurately targeted, and more effective housing and urban development policies.

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