Metropolitan Policy Program
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New Housing, Income Inequality, and Distressed Metropolitan Areas

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"Policies that reduce income inequality can help reduce overbuilding and income segregation in distressed areas."

Findings

This report examines the link between income inequality and new housing construction in various metropolitan areas. Using data from the Census and Neighborhood Change Database on 215 metropolitan areas, the analysis compares trends between economically distressed metropolitan areas (those that experienced little or no population or economic growth) and non-distressed metropolitan areas. It finds that:

- **Between 1960 and 2000, the average rate of new housing construction per decade was about six times the rate of population growth in distressed metropolitan areas, a ratio far greater than in any other type of metropolitan area.** In contrast, metropolitan areas experiencing the most rapid population growth had an average rate of new construction that was only about 1.5 times their population growth rate.

- **Between 1970 and 2000, both distressed and non-distressed metropolitan areas with rapidly growing income inequality experienced rapidly growing residential segregation by income.** Income segregation refers to the sorting of rich families into rich neighborhoods and poor families into poor neighborhoods. Oshkosh, WI, which had the third smallest increase in income inequality between 1970 and 2000 among the 47 distressed metropolitan areas, had the third smallest increase in income segregation. Flint, MI, had the greatest increase in income inequality and the second greatest increase in income segregation among the distressed areas.

- **In distressed metropolitan areas between 1970 and 2000, rising income segregation was associated with excess housing construction.** In non-distressed metropolitan areas, there was no relationship between income segregation and excess housing construction. Excess housing construction, defined as that beyond what would be predicted on the basis of population growth, often results in the abandonment of older housing in the urban core.

- **Rising income inequality and neighborhood income segregation accounted for 16 to 50 percent of new construction in distressed metropolitan areas between 1970 and 2000.** The percentage of new housing construction in distressed areas that resulted from increasing income inequality and income segregation since 1970 was 16 percent in 1980, 39 percent in 1990, and 50 percent in 2000.

Policymakers in economically distressed metropolitan areas who are concerned about the effects of overbuilding and income segregation—such as the decline of older cities and inner suburbs and the perpetuation of poverty—should be concerned about income inequality. Policies that reduce income inequality can help reduce overbuilding and income segregation in distressed areas.

Introduction

Rising income inequality, increasing segregation of neighborhoods by income, and the oversupply of new housing in metropolitan areas with stagnant populations are three phenomena that have attracted a great deal of interest from both researchers and policymakers.

• ***Income inequality has been increasing in the United States in recent decades.*** Between 1973 and 2000, the inflation-adjusted income of the bottom one-fifth of American families rose by about 12 percent, while that of the top one-fifth grew by about 67 percent.[2] The growing gap between the incomes of the rich and the poor has raised concerns about inequitable distribution of the benefits of economic growth, declining social cohesion, growing disparities in political influence between the rich and the poor, declining public support for public services on which low and moderate-income people rely, inadequate investment in human capital, and declining affordability of housing for poor and middle-income households.[3]

• ***Income segregation by neighborhood—the sorting of rich families into rich neighborhoods and poor families into poor neighborhoods—has also been increasing.*** Between 1970 and 2000, lower-income families were increasingly likely to live in lower-income neighborhoods, and higher-income families were increasingly likely to live in higher-income neighborhoods.[4] Despite improvement during the 1990s, nearly every major American city still has several neighborhoods with concentrated poverty.[5] The segregation of neighborhoods can limit the availability of stably employed role models and valuable social networks in low-income neighborhoods, thereby contributing to urban joblessness and social problems.[6] Although the issue is far from settled, several studies also suggest that the characteristics of one's neighbors and schoolmates affect educational and economic outcomes of children.[7] Furthermore, neighborhood segregation by income may influence the average quality of schools and other local public services and may make the quality of services more unequal across neighborhoods. Finally, neighborhood segregation by income can also affect the distance between jobs and homes, in turn influencing commuting patterns and labor market decisions.

• ***New housing construction has outpaced population growth, especially in metropolitan areas with slow population growth.*** Between 1982 and 1997, metropolitan areas with slow population growth increased their consumption of urbanized land—including land for the construction of new housing—more rapidly than places whose populations grew faster.[8] Although new construction is not inherently good or bad, new construction that outstrips population growth can lead to the abandonment of older housing in the urban core, which in turn can lead to the decay of older urban neighborhoods.[9] It can also facilitate the migration of middle- and upper-income households into neighborhoods that are geographically segregated from the poor.

Previous analyses of these problems have treated them, and their potential public policy solutions, in isolation from one another.[10] This report argues that income inequality, income segregation, and overbuilding of new housing are related. Specifically, it shows that growing income inequality is associated with growing income segregation, which in turn is associated with overbuilding in economically distressed metropolitan areas. Thus, rising income inequality is an important reason why such metropolitan areas as Buffalo and Detroit have seen a great deal of new housing construction (much of it in outer suburbs) despite their slow population and income growth. This report suggests that policies to reduce income inequality can help reduce overbuilding and income segregation in such places. Policymakers in distressed metropolitan areas who are concerned about the spatial and social consequences of overbuilding and income segregation should be concerned about income inequality because of its impact on those two phenomena, even if they do not view income inequality per se as a public policy problem.

The argument presented in this report has three parts.

1. Growing income inequality is associated with growing income segregation within metropolitan areas. Growing income inequality within a metropolitan area changes the residential location decisions of rich and poor families in ways that cause neighborhoods to become more segregated by income.[11] As the rich become richer relative to the poor, they are increasingly willing and able to pay to live in neighborhoods that offer physical amenities, such as nice views and tree-lined streets, that the poor can no longer afford. The same is true for neighborhoods with desirable social characteristics, such as low crime rates. Similarly, as the incomes of the rich rise relative to those of the poor, the rich can increasingly outbid the poor to live in neighborhoods that offer high-quality public services, such as excellent schools. Even if all families find the same neighborhoods attractive, as incomes become more unequal, the rich are more likely to live in attractive neighborhoods and the poor are more likely to be priced out of those neighborhoods.

As income inequality increases, growing tax and public service differences across municipalities increase the odds that rich and poor families live in different municipalities. When the incomes of rich and poor families differ little, municipalities can set similar tax rates and provide similar packages of public services. Under these circumstances, rich families

have little economic incentive to segregate themselves in high-income municipalities. However, as the incomes of the rich and poor diverge, the gap between the quality of public services that they want and can afford also diverges, as do income-related differences in municipal tax bases.[12] Therefore, the taxes that rich municipalities must levy to finance a given quality of public services will decline relative to the taxes that poor municipalities must levy to finance services of the same quality. Thus, as inequality increases, rich families have a growing incentive to segregate themselves into rich municipalities to escape both the relatively low-quality public services and the relatively high taxes that they would face in poor municipalities.

So far, this association between income inequality and income segregation depends solely on the growth of the income gap, not on whether the incomes of the rich are rising or those of the poor are falling. That is, what matters is whether the incomes of the rich are rising relative to those of the poor. However, a final reason for an association between income segregation and income inequality applies only when the incomes of the poor are falling. Because the social consequences of severe poverty make the poor less desirable neighbors as they become poorer, the rich are less likely to choose to live in the same neighborhoods as the poor as the incomes of the poor fall. This phenomenon is likely to be most evident in distressed areas, where declining labor market opportunities particularly affect the lowest earners.

2. In economically distressed metropolitan areas, growing income segregation is associated with new construction in excess of what would be expected given population growth.

When neighborhoods within a metropolitan area become increasingly segregated by income, the housing stock changes to accommodate the new residential patterns. High-income families are interested in living in high-quality neighborhoods. They also are willing to pay for such things as hardwood floors, high ceilings, and finished basements. In rapidly growing metropolitan areas, high-income residents move into newly built high-income neighborhoods. In "supply constrained" metropolitan areas (those in which zoning or building code restrictions or a lack of developable land make new construction difficult or expensive), high-income residents renovate existing housing. Older urban neighborhoods gentrify; the housing stock is upgraded and the poor are displaced. In economically distressed metropolitan areas, however, it may be easier and cheaper to construct new housing in areas without much previous development. In distressed areas, and only in distressed areas, the market pressure for income segregation drives new construction even though there is little or no overall population growth.[13]

The following paragraphs explain in more detail the relationship between income inequality and residential patterns for each type of metropolitan area.

Rapidly growing metropolitan areas. Booming new construction is expected in places with rapid employment and population growth, such as Las Vegas and Tucson. In these rapidly growing areas, new housing is constructed to respond to the influx of new residents. If income inequality is rising as the metropolitan area is built, new neighborhoods will tend to be homogeneous, reflecting market pressure for segregation by income. If inequality remains unchanged, new neighborhoods will resemble existing neighborhoods. In other words, inequality will lead to income segregation in booming metropolitan areas, but new housing will be built regardless of whether inequality is rising or falling. In these places, growing income segregation is unrelated to the amount of new construction.

Supply-constrained metropolitan areas. A second type of metropolitan area is economically vibrant but its supply of housing is constrained or restricted. These areas, such as New York and San Francisco, have healthy economies. (For example, they have experienced rapid growth of per capita income and are attractive to migrants.) However, restrictions such as zoning or building codes, a lack of developable land, or other constraints make it expensive to build new housing. As a result, little new housing is built, housing prices rise, and population growth is slower than economic growth.[14] Because new construction is so expensive in supply-constrained metropolitan areas, the market pressure for income segregation that results from rising income inequality leads to gentrification of low- and middle-income neighborhoods and the displacement of their former residents. In supply-constrained areas, inequality affects income segregation, but income segregation is not associated with new construction. Regardless of the degree of income segregation, there is little new construction.

Distressed metropolitan areas. A third category of metropolitan area is the focus of this report: the distressed metropolitan area. Distressed areas are those that have little or no population or economic growth. They include such places as Buffalo and Detroit. They typically have low or declining housing prices. In distressed metropolitan areas, land prices are low, making it relatively inexpensive to build new housing. Therefore, when the rich want to segregate themselves from the poor, they move into new high-income neighborhoods. Unlike in supply-constrained metropolitan areas, it is less expensive for the rich to buy new housing than to gentrify existing housing. Unlike in rapidly growing metropolitan areas, this new housing construction would not occur solely because of population growth, because there is little or no population growth in distressed areas. Unlike in the other

two types of metropolitan areas, in distressed areas, market pressure for income segregation leads to new housing construction in excess of what would be expected given population growth alone. This new construction may, in turn, accelerate the decline of older urban neighborhoods.[15]

3. Growing income inequality and growing income segregation, therefore, is associated with excess new construction in economically distressed metropolitan areas.

The first two steps of the argument presented above imply a link between the growth of both income inequality and income segregation in distressed metropolitan areas and overbuilding. First, rising income inequality creates differences in how much families are willing and able to pay for certain neighborhood characteristics, thereby increasing market pressure for income-segregated neighborhoods. Second, reshaping the residential patterns of rich and poor requires changing the housing stock. The change can take the form of retrofitting the existing housing stock or building new housing. Growing income segregation in distressed metropolitan areas (but not in other types of metropolitan areas) is linked to new construction in excess of what is needed to accommodate population growth. Therefore, the argument concludes, rising income inequality and rising income segregation in distressed metropolitan areas lead to new construction in excess of what is needed to accommodate population growth. The findings of the report provide evidence for this argument.

Methodology

The analysis in this report is based on the tract-level data published by the U.S. Census and the Neighborhood Change Database, which matches neighborhoods over time using tract-level Census data. The analysis focuses on 215 metropolitan areas followed over four U.S. Censuses: 1970, 1980, 1990, and 2000. To the extent possible, the boundaries of metropolitan areas are held constant at the federal government's 2003 metropolitan area definitions. However, because not all counties were tracted in 1970, the boundaries of some metropolitan areas changed during the period of analysis. Metropolitan areas with no tracted counties in 1970 are excluded from the analysis, as are two additional metropolitan areas with missing data.

There are a number of reasonable ways to define a distressed metropolitan area. This report's definition is intended to capture both population growth and economic growth. Economic growth in this case should not be measured by simple employment growth. Slow employment growth does not necessarily mean that a metropolitan area is distressed; an economically vibrant area can experience slow population and employment growth if its housing supply is constrained. To avoid categorizing such metropolitan areas as distressed, this report instead measures economic growth in a way that reflects the growth of nationwide demand for the products of the industries in which the metropolitan area specialized in 1970. It defines the economic growth rate of a metropolitan area as the rate of employment growth that would have occurred between 1970 and 2000 if every industry in that area had grown at its national average employment growth rate during that time period.[16] This measure of economic growth, therefore, depends heavily on the industrial composition of the metropolitan area in 1970. For example, because manufacturing employment fell slightly between 1970 and 2000 while employment in professional services grew rapidly during that period, a metropolitan area that was heavily concentrated in manufacturing in 1970 would have slower economic growth during the 1970–2000 period than an area that was concentrated in professional services in 1970.

The 215 metropolitan areas are divided into thirds by population growth and economic growth. Distressed areas are defined as those in the bottom one-third of both economic growth and population growth.[17] Forty-seven areas fit this description; they are primarily older manufacturing and mining centers (see Table 1).

Non-distressed areas are divided into three remaining categories: supply-constrained, rapidly growing, and "other" non-distressed. Supply-constrained areas are those with strong economic growth between 1970 and 2000 and with housing price growth that substantially exceeded population growth during that time period.[18] These 16 areas include some with distressed central cities but strong economic growth in the suburbs. Rapidly growing areas are those in the top one-third of population growth; 72 areas included in this report are rapidly growing. Other non-distressednon-distressed areas are those that do not fit into any of the other categories; these 80 metropolitan areas are best considered a hybrid of semi-distressed and moderate-growth areas. The categorization of metropolitan areas into the four groups is somewhat arbitrary. However, the results described here are not sensitive to reasonable changes in the definitions. Appendix Table A1 lists the metropolitan areas in each category. In some findings reported here, it is not always necessary or useful to distinguish among the different types of non-distressednon-distressed metropolitan areas. Where that is the case, the findings simply compare distressed and non-distressed areas.[19]

Residential income segregation is measured with an isolation index for each metropolitan area in each of the Census years. The isolation index measures the extent to which a typical family in the bottom one-fifth of the income distribution lives in a Census

Table 1. Distressed Metropolitan Areas

Akron, OH
Altoona, PA
Anderson, IN
Bay City, MI
Beaumont-Port Arthur, TX
Binghamton, NY
Buffalo-Niagara Falls, NY
Canton-Massillon, OH
Chicago-Naperville-Joliet, IL-IN-WI
Cincinnati-Middletown, OH-KY-IN
Cleveland-Elyria-Mentor, OH
Davenport-Moline-Rock Island, IA-IL
Dayton, OH
Decatur, IL
Detroit-Warren-Livonia, MI
Dothan, AL
Erie, PA
Flint, MI
Gadsden, AL
Huntington-Ashland, WV-KY-OH
Jackson, MI
Johnstown, PA
Lewiston-Auburn, ME
Lima, OH
Mansfield, OH
Milwaukee-Waukesha-West Allis, WI
Monroe, MI
Muncie, IN
Muskegon-Norton Shores, MI
New Haven-Milford, CT
Norwich-New London, CT
Oshkosh-Neenah, WI
Peoria, IL
Pittsfield, MA
Providence-New Bedford-Fall River, RI-MA
Racine, WI
Rochester, NY
Rockford, IL
Saginaw-Saginaw Township North, MI
Scranton—Wilkes-Barre, PA
Springfield, OH
Utica-Rome, NY
Vineland-Millville-Bridgeton, NJ
Weirton-Steubenville, WV-OH
Wheeling, WV-OH
Worcester, MA
Youngstown-Warren-Boardman, OH-PA

Source: Author's analysis data from Census and Neighborhood Change database.

tract with other bottom-fifth families. (Census tracts are the rough equivalent of neighborhoods.) If bottom-fifth families are scattered randomly throughout the metropolitan area, each Census tract includes 20 percent bottom-fifth families, and each bottom fifth family lives in a neighborhood that is 20 percent bottom-fifth. Such a metropolitan area has an isolation index of 0.2. The isolation index increases as bottom-fifth families become increasingly segregated from other families. For example, if bottom-fifth families are concentrated such that a typical bottom-fifth family lives in a Census tract with 40 percent bottom-fifth families, the isolation index is 0.4. A perfectly segregated area, in which every bottom-fifth family lives in a Census tract made up of 100 percent bottom-fifth families, would have an isolation index of 1.[20]

Income inequality is measured by the ratio of the income of a typical high-income family to that of a typical low-income family in each metropolitan area in each Census year.[21] The 80th percentile of family income is used as a measure of the income of a typical high-income family, meaning that 80 percent of families in a metropolitan area have incomes below that point, while 20 percent have incomes above that level. The 20th percentile is used as a measure of the income of a typical low-income family.

The relationship between income segregation and income inequality in metropolitan areas is obtained from a regression analysis in which income segregation is the dependent variable and income inequality, population, land area, median family income, industry composition, racial and ethnic composition, age structure, educational attainment, fixed characteristics of a metropolitan area, and national trends over time are the explanatory variables. In this regression, as in all others used in this report, all variables are measured for each metropolitan area in each of the four Census years: 1970, 1980, 1990, and 2000.

The rate of new housing construction is defined, for each Census year, as the number of housing units built in the last 10 years expressed as a percentage of the number of housing units that were in existence at both the beginning and the end of the decade. (For example, the rate of new construction in 1980 is the number of units built between 1970 and 1980 as a percentage of the number of units that existed in 1970 and still existed in 1980.) To facilitate comparisons between new construction and population growth rates, the results reported in the Findings section under heading A describe the rate of new construction as an average rate for the decade prior to each Census year rather than as the rate associated with the Census year. The definition of the new construction rate, however, is the same as elsewhere in the report. (In Finding A, the number of units built between 1970 and 1980 as a percentage of the number of units that existed in 1970 and still existed in 1980 is called the new construction rate for the decade 1970-1980 rather than the rate for the year 1980.)

"Excess" new construction is defined as the rate of new construction in excess of the amount predicted by a regression in which the explanatory variables are the 10-year population growth rate of a metropolitan area and its square, fixed characteristics of a metropolitan area, and national trends over time. The relationship between excess new construction and residential segregation by income in metropolitan areas is obtained from a regression analysis in which the rate of new construction is the dependent variable, and explanatory variables are income segregation in each of the different types of metropolitan areas, the 10-year population growth rate and its square, fixed characteristics of a metropolitan area, and national trends over time.

The population rather than housing growth rate is used as a measure of the

underlying demand for new housing. The formation of households depends both on population growth and on housing supply. Therefore, the household growth rate depends on both the rate of new construction and the population growth rate. The population growth rate is a purer measure of the demand for new housing than the household growth rate because it is less dependent on the amount of new housing being built.

To assess the impact of rising income inequality and segregation on new housing construction, the report uses regression analysis to simulate the level of new construction that would have occurred in each metropolitan area in each Census year if income inequality and segregation had remained constant since 1970 (rather than increasing as they did). The report uses a regression model derived from the ones described above to predict the amount of new construction that would have occurred in each metropolitan area under each of the following scenarios: (a) if income inequality and segregation had remained constant at their 1970 values during each of the subsequent Census years, and (b) if income inequality and segregation had taken on their actual, observed values in each of the subsequent years. By comparing the two predictions, it is possible to assess how much of the new construction that occurred in each metropolitan area would not have occurred if income inequality and income segregation had not increased. (For any given metropolitan area, the true housing construction and the predicted level using actual values of inequality and construction are slightly different because of idiosyncratic factors not captured by the regression model. For this reason, prediction (a) is compared with prediction (b) rather than with the actual amount of new construction.)

The results of this simulation should be interpreted with caution. They are sensitive to the variables included in the regression model. In addition, the regression does not account for the possibility of reverse causality. That is, new housing construction could drive income segregation and/or income inequality, in addition to or instead of income inequality driving income segregation and income segregation driving new construction.[22] There may also be unobserved factors that are related to inequality and segregation but that the model has implicitly held fixed.[23]

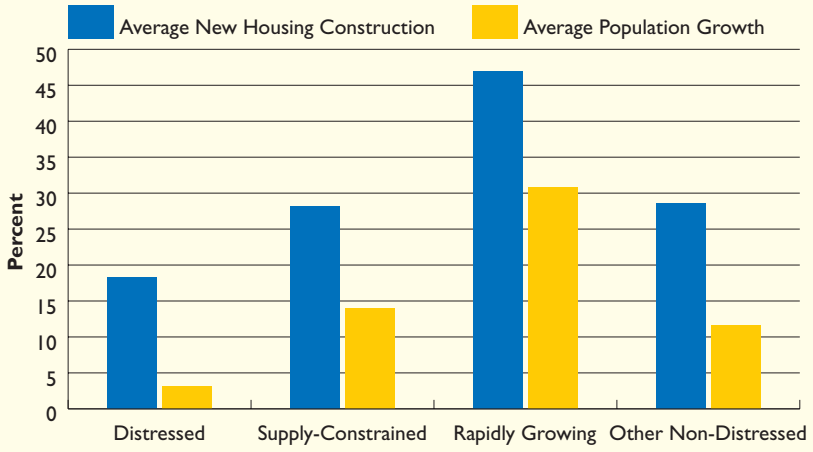
Appendix B provides more detailed information about the data sources, variables, and regression models used in the analysis.

Findings

A. Between 1960 and 2000, the average rate of new housing construction per decade was about six times the rate of population growth in distressed metropolitan areas, a ratio far greater than in any other type of metropolitan area.

Of the four types of metropolitan area, distressed areas had by far the most new housing construction relative to their population growth (see Figure 1). Not surprisingly, distressed metropolitan areas had the slowest rate of population growth among the four types of metropolitan areas, averaging just 3.1 percent population growth per decade between 1960 and 2000. However, their new housing construction rate averaged 18.2 percent per decade during that time period, making the rate of new construction, on average, about six times the rate of population growth in distressed areas.[24] (Population growth and new housing data cover the 1960–2000 period because data from the 1970 Census include population growth and new housing construction that occurred during the previous decade.) In contrast, rapidly

Figure 1. New Housing Construction and Population Growth, Average Rates per Decade 1960-2000, by Metropolitan Area Type



Note: The average new housing construction rate is the unweighted, simple (not compounded) decadal average rate of new housing construction over the four decades 1960–1970, 1970–1980, 1980–1990, and 1990–2000. The rate of new housing construction in each decade equals the amount of new construction that occurred during the decade as a percentage of the number of housing units that existed at the beginning of the decade and continued to exist at the end of the decade. The average population growth rate is the unweighted, simple decadal rate of population growth over the same four decades.

Source: Author's analysis of data from Census and Neighborhood Change Database.

Table 2. Top10 Metropolitan Areas with the Largest Ratios of New Housing Construction to Population Growth, for Metropolitan Areas That Gained Population, 1960–2000

Metropolitan Area	Type	Average Decadal New Housing Construction Rate, 1960–2000 (percent)*	Average Decadal Population Growth Rate, 1960–2000 (percent)*	Ratio of Average New Housing Construction Rate to Average Population Growth Rate, 1960–2000
Duluth, MN-WI	Other non-distressed	14.5%	0.2%	71.7
Binghamton, NY	Distressed	15.3	0.3	55.7
Huntington-Ashland, WV-KY-OH	Distressed	23.2	0.6	41.3
Cleveland-Elyria-Mentor, OH	Distressed	15.5	0.4	38.2
Pittsburgh, PA	Other non-distressed	13.2	0.4	36.8
Bay City, MI	Distressed	17.8	0.9	20.0
Lima, OH	Distressed	17.1	1.2	14.2
Gadsden, AL	Distressed	22.8	1.8	12.9
Anderson, IN	Distressed	16.9	1.6	10.3
Wichita Falls, TX	Other non-distressed	22.8	2.4	9.4

**Percentages are rounded to the nearest tenth of a percentage point.*

Note: The average new housing construction rate is the unweighted, simple (not compounded) decadal average rate of new housing construction over the four decades 1960–1970, 1970–1980, 1980–1990, and 1990–2000. The rate of new housing construction in each decade equals the amount of new construction that occurred during the decade as a percentage of the number of housing units that existed at the beginning of the decade and continued to exist at the end of the decade. The average population growth rate is the unweighted, simple decadal rate of population growth over the same four decades.

Source: Author's analysis of data from Census and Neighborhood Change Database.

growing areas had the fastest population growth rate, an average of 30.9 percent per decade, but their new construction rate was only about 1.5 times their population growth rate. The other two types of metropolitan areas fell between these two extremes in their population growth and new construction rates and in the ratio of population growth to new construction. (For underlying data to Figure 1, see Appendix Table A2.)

Distressed areas make up a disproportionate share of the metropolitan areas that had the highest rates of new construction relative to population growth between 1960 and 2000. For metropolitan areas that gained population during that time period, Table 2 shows the 10 areas with the highest ratios of new construction to population growth. Seven of the 10 are distressed areas, even though distressed areas make up only about 22 percent of all the metropolitan areas analyzed in this report.

New housing was built even in distressed areas that lost population. In the 1980s, for example, the average distressed area's population fell by 2 percent, but the new housing units built amounted to 13 percent of the number of housing units that existed in both 1980 and 1990 (See Appendix Table A2). Table 3 shows the metropolitan areas that lost population but built new housing between 1960 and 2000. All but one of these 11 areas is distressed.

Distressed metropolitan areas also suburbanized more rapidly than other types of metropolitan areas between 1980 and 2000 (the only period for which data are available). Comparisons of suburbanization rates across types of metropolitan areas are complicated, because central cities of non-distressed areas are likely to have large and expanding boundaries. However, even supply-constrained areas (which, like distressed areas, have central city boundaries likely to be fixed) did not witness the same type of suburbanization as distressed areas. In distressed areas, the share of families living in the central city fell by 3.1 percentage points between 1980 and 2000, from 39.5 percent to 36.4 percent. It was middle- and upper-income families who left the central city; the fraction of bottom one-fifth of that lived in the central city hardly changed. In contrast, supply-constrained areas saw the share of families living in the central city rise from 36.7 percent to 39.1 percent, with increases across all income groups (see Appendix Table A3).

Income inequality. Between 1970 and 2000, distressed metropolitan areas generally experienced larger increases in income inequality than non-distressed areas. In distressed

Table 3. Metropolitan Areas That Lost Population but Gained New Housing, 1960–2000

Metropolitan Area	Type	Average Decadal New Housing Construction Rate, 1960–2000 (percent)*	Average Decadal Population Growth Rate, 1960–2000 (percent)*
Altoona, PA	Distressed	14.9%	-1.5%
Buffalo-Niagara Falls, NY	Distressed	11.2	-2.6
Decatur, IL	Distressed	17.1	-0.5
Johnstown, PA	Distressed	10.2	-6.9
Pittsfield, MA	Distressed	12.0	-1.2
Scranton–Wilkes-Barre, PA	Distressed	11.7	-0.9
Terre Haute, IN	Other non-distressed	15.7	-0.1
Utica-Rome, NY	Distressed	12.6	-2.3
Weirton-Steubenville, WV-OH	Distressed	14.2	-5.7
Wheeling, WV-OH	Distressed	13.6	-5.1
Youngstown-Warren-Boardman, OH-PA	Distressed	15.6	-1.2

**Percentages are rounded to the nearest tenth of a percentage point.*

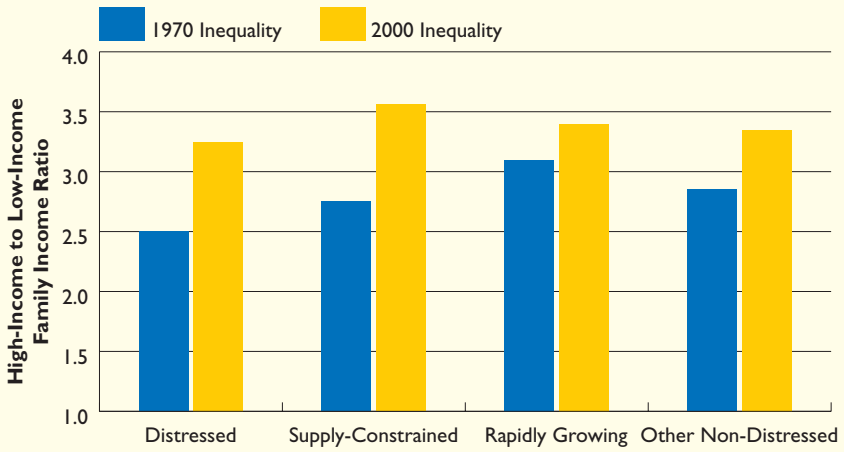
Note: The average new housing construction rate is the unweighted, simple (not compounded) decadal average rate of new housing construction over the four decades 1960–1970, 1970–1980, 1980–1990, and 1990–2000. The rate of new housing construction in each decade equals the amount of new construction that occurred during the decade as a percentage of the number of housing units that existed at the beginning of the decade and continued to exist at the end of the decade. The average population growth rate is the unweighted, simple decadal rate of population growth over the same four decades.

Source: Author's analysis of data from Census and Neighborhood Change Database.

metropolitan areas in 1970, a typical high-income family's income was 2.50 times more than a typical low-income family's. By 2000, this ratio was 3.25. Inequality grew much less in rapidly growing and "other non-distressed" areas.[26] Supply-constrained areas, alone among non-distressed areas, experienced a jump in inequality comparable to that of distressed areas. Figure 2 shows how the different types of metropolitan areas compare on income inequality, while Appendix Table A4 provides the underlying data on income inequality.

Distressed areas account for a disproportionately large share of metropolitan areas experiencing growing income inequality between 1970 and 2000. Table 4 shows the 10 metropolitan areas with the largest increases in income inequality during that time period. Four of the 10 are distressed areas. In contrast, distressed areas make up only about 22

Figure 2. Family Income Inequality in 1970 and 2000, by Type of Metropolitan Area



Note: Family income inequality is measured by the ratio of the income of a typical high-income family (80th percentile of family income) to that of a typical low-income family (20th percentile of family income).

Source: Author's analysis of data from Census and Neighborhood Change Database.

Table 4. Top 10 Metropolitan Areas with the Largest Increases in Family Income Inequality, 1970–2000

Metropolitan Area	Type	1970 Income Inequality*	2000 Income Inequality*	Change in Income Inequality, 1970-2000
Los Angeles-Long Beach-Santa Ana, CA	Other non-distressed	2.83	4.44	1.61
New York-Northern New Jersey-Long Island, NY-NJ-PA	Supply-constrained	2.94	4.44	1.50
Flint, MI	Distressed	2.37	3.70	1.33
Saginaw-Saginaw Township North, MI	Distressed	2.44	3.73	1.29
Bridgeport-Stamford-Norwalk, CT	Other non-distressed	2.98	4.20	1.22
Houston-Baytown-Sugar Land, TX	Rapidly growing	2.84	4.04	1.20
Odessa, TX	Other non-distressed	2.55	3.66	1.11
San Jose-Sunnyvale-Santa Clara, CA	Supply-constrained	2.44	3.55	1.11
Detroit-Warren-Livonia, MI	Distressed	2.48	3.58	1.10
Beaumont-Port Arthur, TX	Distressed	2.86	3.90	1.05

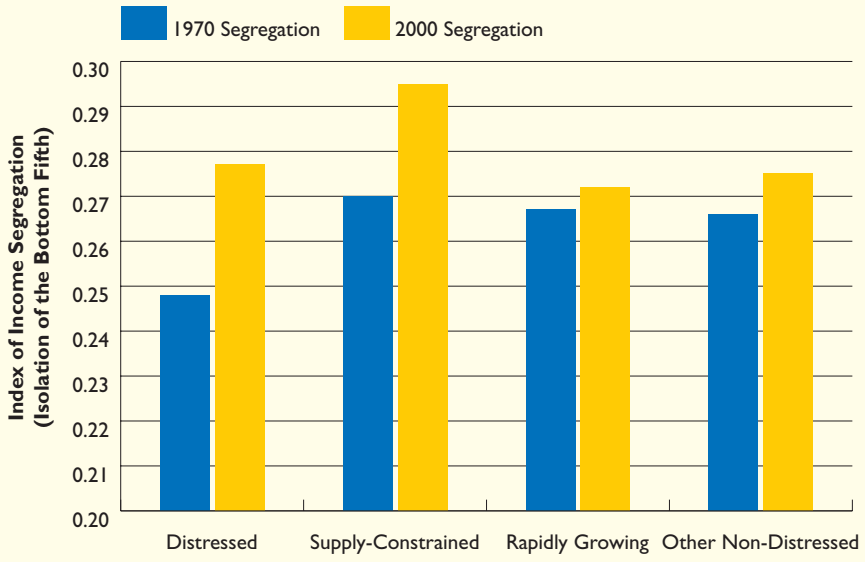
**Income inequality is measured by the ratio of the income of a typical high-income family (80th percentile of family income) to that of a typical low-income family (20th percentile of family income).*
Source: Author's analysis of data from Census and Neighborhood Change Database.

percent of all the metropolitan areas analyzed in this report.

Despite the rapid growth of income inequality in distressed metropolitan areas, the income gap between rich and poor families was smaller in distressed areas than in other types of metropolitan areas in both 1970 and 2000 (see Figure 2 and Appendix Table A4). In 2000, the incomes of high-income families were 3.25 as large as those of low-income families in distressed metropolitan areas. The corresponding figures were 3.46 in "other non-distressed" areas, 3.48 in rapidly growing areas, and 3.53 in supply-constrained areas.

Income segregation. Distressed metropolitan areas experienced a greater increase in income segregation between 1970 and 2000 than did other types of metropolitan areas. In 1970, a typical low-income family in a distressed area lived in a neighborhood where 24.7 percent of families earning in the bottom one-fifth lived, rising to 27.6 percent among the bottom-fifth in 2000.[27] This 2.9 percentage point increase in income segregation was greater than the corresponding increases in supply-constrained metro-

Figure 3. Income Segregation in 1970 and 2000, by Type of Metropolitan Area



Note: Income segregation is measured by the residential isolation of families in the bottom one-fifth of the income distribution. See text for details.
Source: Author's analysis of data from Census and Neighborhood Change Database.

Table 5. Top 10 Metropolitan Areas with the Largest Increases in Income Segregation, 1970–2000

Metropolitan Area	Type	1970 Index of income segregation*	2000 Index of income segregation*	Change in Income Segregation, 1970–2000
Milwaukee-Waukesha-West Allis, WI	Distressed	0.274	0.352	0.078
Provo-Orem, UT	Rapidly growing	0.236	0.314	0.077
Flint, MI	Distressed	0.246	0.319	0.073
Reading, PA	Other non-distressed	0.234	0.302	0.068
Springfield, MA	Other non-distressed	0.255	0.315	0.060
Hartford-West Hartford-East Hartford, CT	Other non-distressed	0.275	0.335	0.060
Worcester, MA	Distressed	0.231	0.290	0.059
Saginaw-Saginaw Township North, MI	Distressed	0.255	0.313	0.058
Providence-New Bedford-Fall River, RI-MA	Distressed	0.245	0.302	0.058
Buffalo-Niagara Falls, NY	Distressed	0.264	0.321	0.057

** Income segregation is measured by the residential isolation of families in the bottom fifth of the income distribution. See text for details.*
Source: Author's analysis of data from Census and Neighborhood Change Database.

politan areas (which had a 2.5 percentage point increase), other non-distressednon-distressed areas (1.0 percentage point increase), and rapidly growing areas (0.4 percentage point increase). Distressed areas in fact moved from the least income-segregated in 1970 to a mid-range ranking in 2000 (tied with other non-distressed areas and slightly more segregated than rapidly growing areas). Figure 3 shows how the different types of metropolitan areas compare on income segregation, while Appendix Table A5 provides the underlying data on income segregation.

Distressed areas are overrepresented among the metropolitan areas experiencing the largest increases in income segregation between 1970 and 2000. Table 5 shows the 10 metropolitan areas with the greatest increases in income segregation during that time period. Six of the 10 are distressed areas, although distressed areas make up only about 22 percent of all the metropolitan areas analyzed in this report.

Appendix Tables 7, 8, and 9 provide information about new construction, income inequality, and income segregation for each of the 47 distressed metropolitan areas.

B. Between 1970 and 2000, both distressed and non-distressed metropolitan areas with rapidly growing income inequality experienced rapidly growing residential segregation by income.

High income inequality is associated with substantial residential segregation by income. As shown above, distressed areas generally had larger increases in income inequality and income segregation than non-distressed areas. Moreover, as Figure 4 shows, even among distressed areas, those with larger increases in inequality experienced greater growth in income segregation. (Each dot in Figure 4 represents a metropolitan area.) Oshkosh, WI, which had the third smallest increase in income inequality between 1970 and 2000 among the 47 distressed metropolitan areas, also had the third smallest increase in income segregation. Cincinnati, OH, and New Haven, CT, had progressively larger increases in both income inequality and income segregation compared with Oshkosh. Flint, MI, saw the largest increase in income inequality and the second largest increase in income segregation among the distressed areas.

A similar relationship between the growth of income inequality and the growth of income segregation is evident among non-distressed areas, as shown in Figure 5.

Both across metropolitan areas and within them over time, the relationship between inequality and segregation is strong and persistent. That is, metropolitan areas with larger income gaps between rich and poor have greater income segregation, and as income inequality grows so does income segregation. The regression analysis presented in Appendix B confirms this finding.[28]

This report focuses on the effect of income inequality on residential patterns, but the reverse relationship is also possible: segregated neighborhoods may lead to income inequality. Geographic isolation may reduce job opportunities for the poor and lack of exposure to higher-income families may affect skill acquisition among disadvantaged youth. The regression analysis attempts to account for this possibility by controlling for the characteristics of each metropolitan area that do not change over time and accounting for many time-varying characteristics. However, it is possible

that unobserved factors contributing to income segregation could cause short-run changes in the income distribution. Therefore, the results should be interpreted with caution.

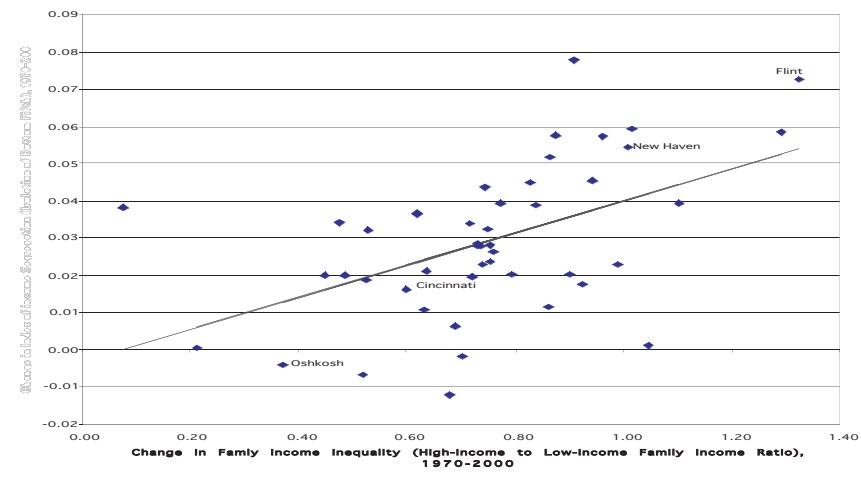
C. In distressed metropolitan areas between 1970 and 2000, rising income segregation was associated with excess housing construction.

Greater income segregation was associated with excess housing construction in distressed metropolitan areas between 1970 and 2000. Figure 6 shows the relationship in scatter plot form. Each dot represents a distressed metropolitan area in 1970, 1980, 1990, or 2000.[29] On the vertical axis is the rate of excess housing construction. On the horizontal axis is income segregation, which has been adjusted for the same population, metropolitan, and national factors as housing construction. Figure 6 shows that distressed metropolitan areas had more excess new construction as their levels of income segregation rose. For example, in 1970, Cleveland, OH's, index of income segregation was 0.29, which was below its average level of income segregation during all four Census years. Its rate of new housing construction in 1970 was 2.2 percentage points below what was expected. By 2000, Cleveland's income segregation index had risen to 0.34, which was 0.02 points above what was expected. Its rate of new housing construction in 2000 was 1.4 percentage points above its expected rate. Appendix B presents in detail the regression analysis underlying this result.

This relationship is not evident in non-distressed areas. As shown in Figure 7 and in more detail in Appendix B, the relationship between new housing construction and segregation is weak and statistically insignificant in non-distressed areas.[30]

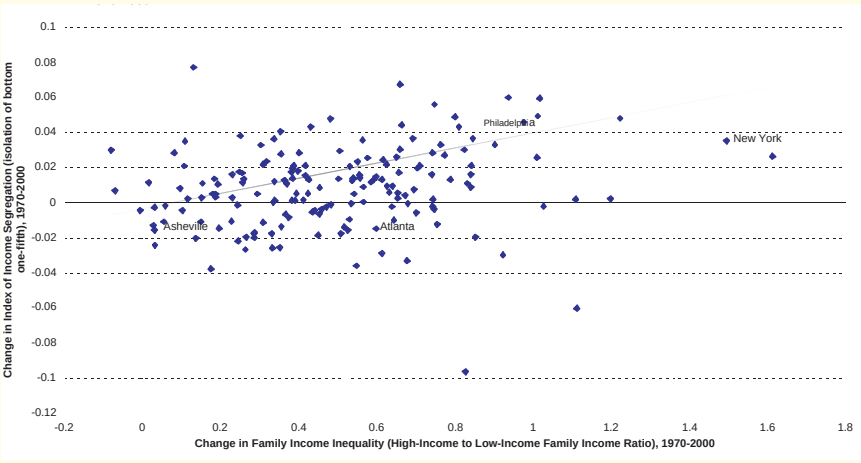
These results demonstrate the different relationships between income segregation and new housing construction in distressed and non-distressed metropolitan areas.

Figure 4. Growth in Income Inequality and Growth in Income Segregation, Distressed Metropolitan Areas, 1970–2000



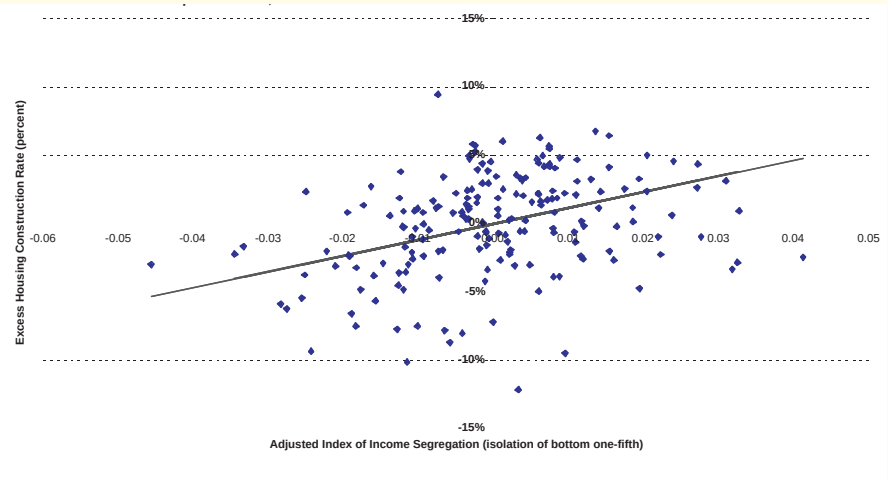
Note: Income inequality is measured by the ratio of the income of a typical high-income family (80th percentile of family income) to that of a typical low-income family (20th percentile of family income). Income segregation is measured by the residential isolation of families in the bottom fifth of the income distribution. The chart shows the change in each of these measures between 1970 and 2000 in each metropolitan area. Each dot represents a metropolitan area.
Source: Author's analysis of data from Census and Neighborhood Change Database.

Figure 5. Growth in Income Inequality and Growth in Income Segregation, Nondistressed Metropolitan Areas, 1970–2000



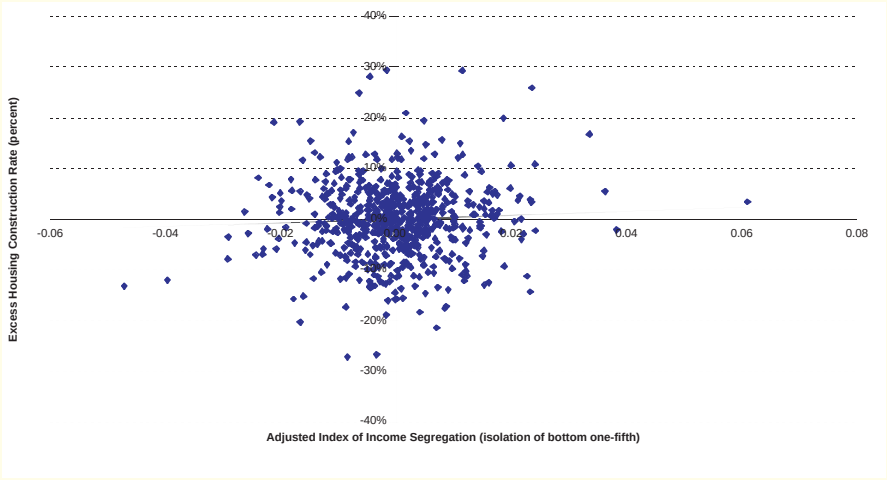
Note: Income inequality is measured by the ratio of the income of a typical high-income family (80th percentile of family income) to that of a typical low-income family (20th percentile of family income). Income segregation is measured by the residential isolation of families in the bottom one-fifth of the income distribution. Each dot represents a metropolitan area.
Source: Author's analysis of data from Census and Neighborhood Change Database.

Figure 6. Income Segregation and Excess New Housing Construction in Distressed Metropolitan Areas, 1970–2000



Note: Excess housing construction is defined as the rate of new housing construction in excess of what would be predicted based on population growth, the fixed characteristics of the metropolitan area, and the year. The adjusted index of income segregation is the index that would be predicted based on population growth, the fixed characteristics of the metropolitan area, and the year. Each dot represents a metropolitan area in one of the four years 1970, 1980, 1990, or 2000.
Source: Author's analysis of data from data from Census and Neighborhood Change Database.

Figure 7. Income Segregation and Excess New Housing Construction in Nondistressed Metropolitan Areas, 1970–2000



Note: Excess housing construction is defined as the rate of new housing construction in excess of what would be predicted based on population growth, the fixed characteristics of the metropolitan area, and the year. The adjusted index of income segregation is the index that would be predicted based on population growth, the fixed characteristics of the metropolitan area, and the year. Each dot represents a metropolitan area in one of the four years 1970, 1980, 1990, or 2000.
Source: Author's analysis of data from Census and Neighborhood Change Database.

When income segregation rises in either type of metropolitan area, the housing stock adjusts, but it does so in different ways. In distressed metropolitan areas, the adjustment occurs through new construction, which would not have occurred in the absence of growing income segregation. For that reason, distressed areas experience an increase in excess housing construction when they become more segregated by income. In non-distressed areas, in contrast, rising income segregation has no relationship to excess new construction. Market pressure for income-segregated housing in non-distressed areas is met by new construction that would have occurred in any case (in rapidly growing areas) or through retrofitting of existing housing (in supply-constrained areas). It is only in distressed areas (and perhaps some of the "other non-distressed areas" that most resemble distressed areas) that rising segregation is associated with excess new construction.

D. Rising income inequality and neighborhood income segregation accounted for 16 to 50 percent of new construction in distressed metropolitan areas between 1970 and 2000.

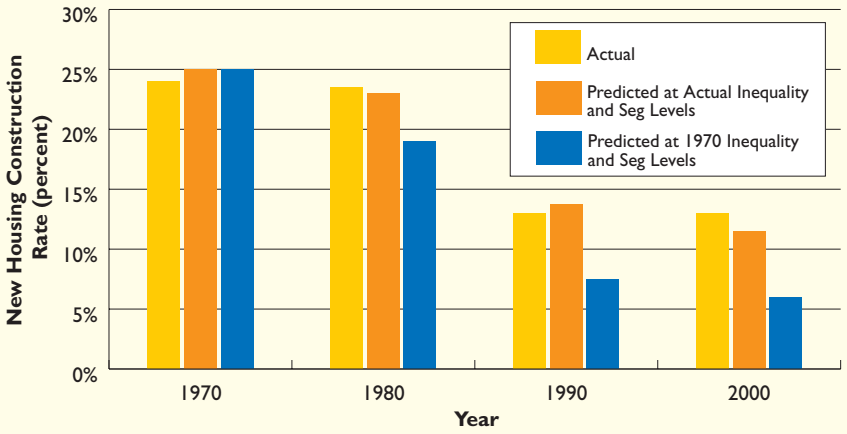
Suppose income inequality and segregation had not changed in distressed areas between 1970 and 2000. How would this have affected housing? Figure 8 presents the actual rate of new construction, the rate predicted by the regression model given the actual values of inequality and segregation in each Census year, and the predicted rate given constant 1970 values. In 1990, for example, the model predicts that the new housing construction rate would have been 13.2 percent given existing levels of income inequality and segregation but only 8.1 percent if income inequality and segregation had remained at their 1970 levels. Therefore, the share of new housing construction in 1990 that occurred as a result of increased income inequality

and segregation during the previous two decades was 39 percent, which is the percentage difference between these two new construction rates (13.2 and 8.1 percent).

Figure 8 shows that growing income inequality and segregation in distressed areas accounted for a rising share of new housing construction in those areas in the late 20th century. The percentage of new housing construction in distressed areas that resulted from growing income inequality and segregation since 1970 was 16 percent in 1980, 39 percent in 1990, and 50 percent in 2000.[31] As noted in the methodology section, however, these results should be interpreted cautiously. See Appendix B for a description of the regression model that underlies them.

This finding does not mean that rising income inequality and income segregation were solely responsible for the growing decentralization of housing development in distressed metropolitan areas. Indeed, the housing stock has been moving from the city center in recent decades everywhere; this is no more true in distressed areas than other areas. However, any excess new construction that took place in outlying parts of distressed metropolitan areas as the result of rising income inequality and income segregation was likely to have exacerbated the abandonment of older housing in the central city and inner suburbs. Therefore, growing income inequality and segregation probably contributed to the decline of older, inner neighborhoods in such metropolitan areas as Buffalo and Detroit.

Figure 8. Impact of income Inequality and income Segregation on New Housing Construction, Distressed Metropolitan Areas, 1970–2000



Note: For each year the first bar shows the actual rate of new housing construction, the second shows the rate that the regression model predicts if income inequality and segregation had taken on their actual values in that year, and the third shows the rate that the regression model predicts if income inequality and segregation had remained at their 1970 levels. See appendix B for a description of the regression model.

Source: Author's analysis of data from Census and Neighborhood Change Database.

Conclusion

In metropolitan areas with substantial growth in inequality between 1970 and 2000, the rich and the poor grew increasingly less likely to live in the same neighborhoods. The growth of income inequality was associated with the growth of income segregation in both distressed and non-distressed metropolitan areas. In distressed metropolitan areas, this income segregation was associated with new housing construction that otherwise might not have occurred.

Although it is impossible to account for all factors driving the relationship between income inequality, income segregation, and new construction, the analysis suggests that inequality has implications for neighborhood residential patterns and urban form. The new construction that occurred because of rising income inequality and segregation in distressed metropolitan areas probably contributed to the decline of older neighborhoods. In addition, if neighborhoods affect the life chances of people who live in them, then inequality today could perpetuate future inequality via continued income segregation and polarization. Furthermore, if new housing is constructed to accommodate the current market pressure for income-segregated neighborhoods, then metropolitan areas could be left with a stock of homogeneous neighborhoods even if inequality were to decline in the future.

Policymakers in economically distressed metropolitan areas who are concerned about overbuilding and income segregation and their possible effects—such as the decline of older cities and inner suburbs and the perpetuation of poverty—should be concerned about income inequality. Policies that reduce income inequality can also reduce overbuilding and income segregation in distressed areas. Many federal, state, and local policies directly or indirectly affect inequality. Tax policies—including the overall pro-

gressivity of the tax system as well as policies such as the Earned Income Tax Credit that are specifically designed to assist low-income families—affect the amount of income that families at different income levels have available to spend on housing and neighborhood quality. So too do income transfer programs such as Temporary Assistance for Needy Families. In addition, such labor market policies as the minimum wage, state and local living wage requirements, and policies that promote or inhibit unionization affect the distribution of wages, which is one of many things that influence the size of the income gap between rich and poor families. As policymakers weigh the costs and benefits of policies to reduce the income gap, they should consider the potential consequences of income inequality for residential segregation and urban form.

Appendix A: Characteristics of Different Types of Metropolitan Areas

Table A1. Metropolitan Areas by Type

Distressed Metropolitan Areas	Rapidly Growing Metropolitan Areas	Other Non-distressed Metropolitan Areas
Akron, OH	Albany, GA	Abilene, TX
Altoona, PA	Albuquerque, NM	Albany-Schenectady-Troy, NY
Anderson, IN	Asheville, NC	Allentown-Bethlehem-Easton, PA-NJ
Bay City, MI	Atlanta-Sandy Springs-Marietta, GA	Amarillo, TX
Beaumont-Port Arthur, TX	Augusta-Richmond County, GA-SC	Appleton, WI
Binghamton, NY	Austin-Round Rock, TX	Billings, MT
Buffalo-Niagara Falls, NY	Bakersfield, CA	Bloomington, IN
Canton-Massillon, OH	Baton Rouge, LA	Bridgeport-Stamford-Norwalk, CT
Chicago-Naperville-Joliet, IL-IN-WI	Boise City-Nampa, ID	Cedar Rapids, IA
Cincinnati-Middletown, OH-KY-IN	Boulder, CO	Champaign-Urbana, IL
Cleveland-Elyria-Mentor, OH	Brownsville-Harlingen, TX	Charleston, WV
Davenport-Moline-Rock Island, IA-IL	Charlotte-Gastonia-Concord, NC-SC	Charleston-North Charleston, SC
Dayton, OH	College Station-Bryan, TX	Chattanooga, TN-GA
Decatur, IL	Colorado Springs, CO	Columbus, GA-AL
Detroit-Warren-Livonia, MI	Columbia, MO	Corpus Christi, TX
Dothan, AL	Columbia, SC	Des Moines, IA
Erie, PA	Columbus, OH	Duluth, MN-WI
Flint, MI	Dallas-Fort Worth-Arlington, TX	Eugene-Springfield, OR
Gadsden, AL	Denver-Aurora, CO	Evansville, IN-KY
Huntington-Ashland, WV-KY-OH	Durham, NC	Fargo, ND-MN
Jackson, MI	El Paso, TX	Fayetteville, NC
Johnstown, PA	Fort Smith, AR-OK	Fort Wayne, IN
Lewiston-Auburn, ME	Fresno, CA	Greensboro-High Point, NC
Lima, OH	Grand Rapids-Wyoming, MI	Harrisburg-Carlisle, PA
Mansfield, OH	Green Bay, WI	Hartford-West Hartford-East Hartford, CT
Milwaukee-Waukesha-West Allis, WI	Greenville, SC	Honolulu, HI
Monroe, MI	Gulfport-Biloxi, MS	Huntsville, AL
Muncie, IN	Holland-Grand Haven, MI	Kalamazoo-Portage, MI
Muskegon-Norton Shores, MI	Houston-Baytown-Sugar Land, TX	Kansas City, MO-KS
New Haven-Milford, CT	Jackson, MS	Lafayette, IN
Norwich-New London, CT	Jacksonville, FL	Lake Charles, LA
Oshkosh-Neenah, WI	Lafayette, LA	Lancaster, PA
Peoria, IL	Laredo, TX	Lansing-East Lansing, MI
Pittsfield, MA	Las Vegas-Paradise, NV	Lawton, OK
Providence-New Bedford-Fall River, RI-MA	Lexington-Fayette, KY	Lincoln, NE
Racine, WI	Little Rock-North Little Rock, AR	Los Angeles-Long Beach-Santa Ana, CA

Table A1. Metropolitan Areas by Type (continued)

Distressed Metropolitan Areas	Rapidly Growing Metropolitan Areas	Other Non-distressed Metropolitan Areas
Rochester, NY	Madison, WI	Louisville, KY-IN
Rockford, IL	McAllen-Edinburg-Pharr, TX	Lubbock, TX
Saginaw-Saginaw Township North, MI	Miami-Fort Lauderdale-Miami Beach, FL	Lynchburg, VA
Scranton—Wilkes-Barre, PA	Midland, TX	Macon, GA
Springfield, OH	Modesto, CA	Manchester-Nashua, NH
Utica-Rome, NY	Montgomery, AL	Memphis, TN-MS-AR
Vineland-Millville-Bridgeton, NJ	Nashville-Davidson—Murfreesboro, TN	Minneapolis-St. Paul-Bloomington, MN-WI
Weirton-Steubenville, WV-OH	Ogden-Clearfield, UT	Mobile, AL
Wheeling, WV-OH	Orlando, FL	Monroe, LA
Worcester, MA	Oxnard-Thousand Oaks-Ventura, CA	New Orleans-Metairie-Kenner, LA
Youngstown-Warren-Boardman, OH-PA	Phoenix-Mesa-Scottsdale, AZ	Odessa, TX
	Portland-South Portland-Biddeford, ME	Oklahoma City, OK
	Portland-Vancouver-Beaverton, OR-WA	Omaha-Council Bluffs, NE-IA
	Provo-Orem, UT	Pensacola-Ferry Pass-Brent, FL
Supply-Constrained Metropolitan Areas	Raleigh-Cary, NC	Pine Bluff, AR
Ann Arbor, MI	Reno-Sparks, NV	Pittsburgh, PA
Atlantic City, NJ	Richmond, VA	Pueblo, CO
Baltimore-Towson, MD	Riverside-San Bernardino-Ontario, CA	Reading, PA
Birmingham-Hoover, AL	Rochester, MN	Roanoke, VA
Boston-Cambridge-Quincy, MA-NH	Sacramento—Arden-Arcade—Roseville, CA	San Angelo, TX
Indianapolis, IN	Salem, OR	Savannah, GA
Knoxville, TN	Salt Lake City, UT	Sherman-Denison, TX
Napa, CA	San Antonio, TX	Shreveport-Bossier City, LA
New York-Northern New Jersey-Long Island, NY-NJ-PA	San Diego-Carlsbad-San Marcos, CA	Sioux City, IA-NE-SD
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	Santa Cruz-Watsonville, CA	South Bend-Mishawaka, IN-MI
Salinas, CA	Sioux Falls, SD	Spokane, WA
San Francisco-Oakland-Fremont, CA	Springfield, MO	Springfield, IL
San Jose-Sunnyvale-Santa Clara, CA	Stockton, CA	Springfield, MA
Santa Barbara-Santa Maria-Goleta, CA	Tallahassee, FL	St. Joseph, MO-KS
Seattle-Tacoma-Bellevue, WA	Tampa-St. Petersburg-Clearwater, FL	St. Louis, MO-IL
Trenton-Ewing, NJ	Tucson, AZ	Syracuse, NY
	Tyler, TX	Terre Haute, IN
	Vallejo-Fairfield, CA	Texarkana, TX-Texarkana, AR
	Warner Robins, GA	Toledo, OH
	Wilmington, NC	Topeka, KS
	Winston-Salem, NC	Tulsa, OK
		Tuscaloosa, AL
		Virginia Beach-Norfolk-Newport News, VA-NC
		Waco, TX
		Washington-Arlington-Alexandria, DC-VA-MD-WV
		Waterloo-Cedar Falls, IA
		Wichita, KS
		Wichita Falls, TX
		York-Hanover, PA

Source: Author's analysis of data from Census and Neighborhood Change Database.

Table A2. New Housing Construction and Population Growth, by Metropolitan Area Type, 1960–2000

	Average Decadal New Housing Construction Rate (percent)	Average Decadal Population Growth Rate (percent)	Ratio
DISTRESSED METROPOLITAN AREAS			
1960–1970	24.2	9.4	2.6
1970–1980	23.8	2.6	9.1
1980–1990	12.6	-1.9	-6.7*
1990–2000	12.3	2.1	5.9
Average, 1960–2000	18.2	3.1	6.0
SUPPLY-CONSTRAINED METROPOLITAN AREAS			
1960–1970	42.4	21.8	1.9
1970–1980	31.1	11.1	2.8
1980–1990	22.2	11.4	1.9
1990–2000	16.8	11.3	1.5
Average, 1960–2000	28.1	13.9	2.0
RAPIDLY GROWING METROPOLITAN AREAS			
1960–1970	55.1	27.5	2.0
1970–1980	59.7	44.5	1.3
1980–1990	41.2	27.2	1.5
1990–2000	32.2	24.2	1.3
Average, 1960–2000	47.0	30.8	1.5
OTHER NON-DISTRESSED METROPOLITAN AREAS			
1960–1970	35.6	12.2	2.9
1970–1980	35.9	16.2	2.2
1980–1990	23.7	9.2	2.6
1990–2000	19.0	9.0	2.1
Average, 1960–2000	28.5	11.7	2.4

**New housing construction occurred despite loss of population.*

Note: The average new housing construction rate is the unweighted, simple (not compounded) decadal average rate of new housing construction over the four decades 1960–1970, 1970–1980, 1980–1990, and 1990–2000. The rate of new housing construction in each decade equals the amount of new construction that occurred during the decade divided by the pre-existing housing stock at the beginning of the decade. The average population growth rate is the unweighted, simple rate of population growth over the same four decades. The ratio shown in the table is the ratio of average new housing construction to average population growth.

Source: Author's analysis of data from Census and Neighborhood Change Database.

Table A3. Percentage of Families Living in Central City, by Metropolitan Area Type, 1980–2000

	Percentage of All Families in Central City	Percentage of All Families in the Bottom One-Fifth of Income that Lived in Central City	Percentage of All Families in the Top One-Fifth of Income that Lived in Central City
DISTRESSED METROPOLITAN AREAS			
1980	39.5	49.3	34.1
1990	36.6	48.9	29.5
2000	36.4	49.1	28.8
Percentage point change, 1980–2000	-3.1	-0.2	-5.3
SUPPLY-CONSTRAINED METROPOLITAN AREAS			
1980	36.7	46.4	29.5
1990	34.6	45.4	27.2
2000	39.1	50.2	31.9
Percentage point change, 1980–2000	2.4	3.9	2.4
RAPIDLY GROWING METROPOLITAN AREAS			
1980	46.9	50.7	46.9
1990	42.3	45.6	43.2
2000	46.9	51.3	47.2
Percentage point change, 1980–2000	0.0	0.7	0.3
OTHER NON-DISTRESSED METROPOLITAN AREAS			
1980	50.2	55.8	48.1
1990	45.2	52.1	43.2
2000	47.5	55.4	44.8
Percentage point change, 1980–2000	-2.8	-0.4	-3.4

Source: Author's analysis of data from Census and Neighborhood Change Database.

Table A4. Income Inequality (Ratio of High to Low Family Income*), by Metropolitan Area Type, 1970–2000

	Distressed Metropolitan Areas	Supply-Constrained Metropolitan Areas	Rapidly Growing Metropolitan Areas	Other Non-distressed Metropolitan Areas
1970	2.50	2.78	3.04	2.86
1980	2.92	3.17	3.20	3.10
1990	3.24	3.26	3.43	3.34
2000	3.25	3.53	3.48	3.36
Change, 1970–2000	0.75	0.75	0.44	0.50

** Income inequality is measured by the ratio of the income of a typical high-income family (80th percentile of family income) to that of a typical low-income family (20th percentile of family income).*
Source: Author's analysis of 1970-2000 Census data.

Table A5. Residential Segregation by Income (Residential Isolation of Families in the Bottom One-Fifth of the Income Distribution), by Metropolitan Area Type, 1970–2000

	Distressed Metropolitan Areas	Supply-Constrained Metropolitan Areas	Rapidly Growing Metropolitan Areas	Other Non-Distressed Metropolitan Areas
1970	0.247	0.270	0.268	0.266
1980	0.259	0.282	0.266	0.270
1990	0.281	0.295	0.277	0.283
2000	0.276	0.295	0.272	0.276
Change, 1970–2000	0.029	0.025	0.004	0.010

Source: Author's analysis of data from Census and Neighborhood Change Database.

Table A6. New Housing Construction and Population Growth in Distressed Metropolitan Areas, 1960–2000

	Average Decadal New Housing Construction Rate (percent)	Average Decadal Population Growth Rate (percent)	Ratio	Rank of Ratio among Distressed Areas with Growing Populations
Akron, OH	20.4	3.7	5.5	16
Altoona, PA	14.0	-1.5	*	*
Anderson, IN	16.9	1.6	10.3	7
Bay City, MI	17.8	0.9	20.0	4
Beaumont-Port Arthur, TX	24.0	6.4	3.8	24
Binghamton, NY	15.3	0.3	55.7	1
Buffalo-Niagara Falls, NY	11.2	-2.6	*	*
Canton-Massillon, OH	19.1	4.7	4.1	23
Chicago-Naperville-Joliet, IL-IN-WI	19.3	7.3	2.6	30
Cincinnati-Middletown, OH-KY-IN	23.9	8.2	2.9	27
Cleveland-Elyria-Mentor, OH	15.5	0.4	38.2	3
Davenport-Moline-Rock Island, IA-IL	18.7	4.5	4.1	21
Dayton, OH	21.8	4.3	5.1	18
Decatur, IL	17.1	-0.5	*	*
Detroit-Warren-Livonia, MI	18.8	3.2	5.8	13
Dothan, AL	19.9	3.0	6.6	11
Erie, PA	16.4	2.9	5.6	15
Flint, MI	22.2	4.3	5.2	17
Gadsden, AL	22.8	1.8	12.9	6
Huntington-Ashland, WV-KY-OH	23.2	0.6	41.3	2
Jackson, MI	19.3	4.7	4.1	22
Johnstown, PA	10.2	-6.9	*	*
Lewiston-Auburn, ME	17.8	4.8	3.7	25
Lima, OH	17.1	1.2	14.2	5
Mansfield, OH	18.0	2.4	7.5	9
Milwaukee-Waukesha-West Allis, WI	18.3	4.2	4.4	20
Monroe, MI	24.6	10.0	2.5	34
Muncie, IN	17.1	2.1	8.2	8
Muskegon-Norton Shores, MI	18.8	3.3	5.8	14
New Haven-Milford, CT	18.7	5.8	3.2	26
Norwich-New London, CT	22.8	9.1	2.5	33
Oshkosh-Neenah, WI	24.0	10.0	2.4	35

Table A6. New Housing Construction and Population Growth in Distressed Metropolitan Areas, 1960–2000

	Average Decadal New Housing Construction Rate (percent)	Average Decadal Population Growth Rate (percent)	Ratio	Rank of Ratio among Distressed Areas with Growing Populations
Peoria, IL	18.4	4.1	4.5	19
Pittsfield, MA	12.0	-1.2	*	*
Providence-New Bedford-Fall River, RI-MA	16.5	6.0	2.8	29
Racine, WI	19.9	7.7	2.6	32
Rochester, NY	19.2	9.3	2.1	37
Rockford, IL	24.5	8.8	2.8	28
Saginaw-Saginaw Township North, MI	20.3	2.8	7.4	10
Scranton—Wilkes-Barre, PA	11.7	-0.9	*	*
Springfield, OH	17.3	2.9	6.0	12
Utica-Rome, NY	12.6	-2.3	*	*
Vineland-Millville-Bridgeton, NJ	18.4	8.3	2.2	36
Weirton-Steubenville, WV-OH	14.2	-5.7	*	*
Wheeling, WV-OH	13.6	-5.1	*	*
Worcester, MA	17.1	6.5	2.6	31
Youngstown-Warren-Boardman, OH-PA	15.6	-1.2	*	*

**New housing construction occurred despite loss of population.*

Note: The average new housing construction rate is the unweighted, simple (not compounded) decadal average rate of new housing construction over the four decades 1960–1970, 1970–1980, 1980–1990, and 1990–2000. The rate of new housing construction in each decade equals the amount of new construction that occurred during the decade divided by the pre-existing housing stock at the beginning of the decade. The average population growth rate is the unweighted, simple rate of population growth over the same four decades. The ratio shown in the table is the ratio of average new housing construction to average population growth.

Source: Author's analysis of data from Census and Neighborhood Change Database.

Table A7. Income Inequality (Ratio of High to Low Family Income*) in Distressed Metropolitan Areas, 1970–2000

	1970	2000	Change, 1970–2000	Rank of Change Among Distressed Areas
Akron, OH	2.38	3.22	0.84	16
Altoona, PA	2.63	3.08	0.45	44
Anderson, IN	2.43	3.15	0.72	30
Bay City, MI	2.37	3.23	0.86	15
Beaumont-Port Arthur, TX	2.86	3.90	1.05	4
Binghamton, NY	2.60	3.24	0.64	34
Buffalo-Niagara Falls, NY	2.44	3.41	0.96	8
Canton-Massillon, OH	2.28	3.04	0.76	20
Chicago-Naperville-Joliet, IL-IN-WI	2.52	3.51	0.99	7
Cincinnati-Middletown, OH-KY-IN	2.63	3.23	0.60	38
Cleveland-Elyria-Mentor, OH	2.45	3.39	0.94	9
Davenport-Moline-Rock Island, IA-IL	2.46	3.09	0.63	35
Dayton, OH	2.42	3.22	0.80	18
Decatur, IL	2.54	3.29	0.75	22
Detroit-Warren-Livonia, MI	2.48	3.58	1.10	3
Dothan, AL	2.49	2.70	0.21	46
Erie, PA	2.39	3.14	0.75	21
Flint, MI	2.37	3.70	1.33	1
Gadsden, AL	3.53	3.60	0.07	47
Huntington-Ashland, WV-KY-OH	3.28	3.80	0.52	41
Jackson, MI	2.46	2.99	0.53	39
Johnstown, PA	2.56	3.09	0.52	40
Lewiston-Auburn, ME	2.55	3.03	0.47	43
Lima, OH	2.47	3.22	0.75	23
Mansfield, OH	2.37	3.11	0.74	25
Milwaukee-Waukesha-West Allis, WI	2.31	3.22	0.91	11
Monroe, MI	2.21	2.91	0.70	31
Muncie, IN	2.53	3.40	0.86	14
Muskegon-Norton Shores, MI	2.44	3.21	0.77	19
New Haven-Milford, CT	2.45	3.46	1.01	6
Norwich-New London, CT	2.54	3.02	0.48	42
Oshkosh-Neenah, WI	2.29	2.66	0.37	45
Peoria, IL	2.34	3.07	0.73	27
Pittsfield, MA	2.40	3.14	0.74	26
Providence-New Bedford-Fall River, RI-MA	2.62	3.50	0.87	13
Racine, WI	2.26	2.88	0.62	37
Rochester, NY	2.43	3.26	0.83	17
Rockford, IL	2.30	3.03	0.73	28
Saginaw-Saginaw Township North, MI	2.44	3.73	1.29	2
Scranton—Wilkes-Barre, PA	2.54	3.26	0.72	29
Springfield, OH	2.49	3.11	0.62	36
Utica-Rome, NY	2.54	3.28	0.75	24
Vineland-Millville-Bridgeton, NJ	2.69	3.61	0.92	10
Weirton-Steubenville, WV-OH	2.45	3.13	0.68	33
Wheeling, WV-OH	2.67	3.36	0.69	32
Worcester, MA	2.39	3.41	1.02	5
Youngstown-Warren-Boardman, OH-PA	2.33	3.23	0.90	12

** Income inequality is measured by the ratio of the income of a typical high-income family (80th percentile of family income) to that of a typical low-income family (20th percentile of family income).*

Source: Author's analysis of data from Census and Neighborhood Change Database.

Table A8. Residential Segregation by Income (Residential Isolation of Families in the Bottom Fifth of the Income Distribution) in Distressed Metropolitan Areas, 1970–2000

	1970	2000	Change, 1970–2000	Rank of Change Among Distressed Areas
Akron, OH	0.255	0.293	0.04	14
Altoona, PA	0.219	0.239	0.02	34
Anderson, IN	0.229	0.263	0.03	19
Bay City, MI	0.225	0.237	0.01	39
Beaumont-Port Arthur, TX	0.280	0.281	0.00	42
Binghamton, NY	0.235	0.256	0.02	30
Buffalo-Niagara Falls, NY	0.264	0.321	0.06	6
Canton-Massillon, OH	0.244	0.271	0.03	26
Chicago-Naperville-Joliet, IL-IN-WI	0.299	0.322	0.02	28
Cincinnati-Middletown, OH-KY-IN	0.287	0.303	0.02	38
Cleveland-Elyria-Mentor, OH	0.291	0.336	0.05	9
Davenport-Moline-Rock Island, IA-IL	0.245	0.255	0.01	40
Dayton, OH	0.266	0.286	0.02	32
Decatur, IL	0.278	0.302	0.02	27
Detroit-Warren-Livonia, MI	0.284	0.323	0.04	13
Dothan, AL	0.239	0.239	0.00	43
Erie, PA	0.243	0.271	0.03	23
Flint, MI	0.246	0.319	0.07	2
Gadsden, AL	0.223	0.261	0.04	15
Huntington-Ashland, WV-KY-OH	0.241	0.234	-0.01	46
Jackson, MI	0.233	0.265	0.03	21
Johnstown, PA	0.226	0.244	0.02	36
Lewiston-Auburn, ME	0.232	0.266	0.03	18
Lima, OH	0.246	0.278	0.03	20
Mansfield, OH	0.239	0.262	0.02	29
Milwaukee-Waukesha-West Allis, WI	0.274	0.352	0.08	1
Monroe, MI	0.222	0.220	0.00	44
Muncie, IN	0.239	0.291	0.05	8
Muskegon-Norton Shores, MI	0.236	0.275	0.04	12
New Haven-Milford, CT	0.264	0.318	0.05	7
Norwich-New London, CT	0.250	0.270	0.02	33
Oshkosh-Neenah, WI	0.231	0.227	0.00	45
Peoria, IL	0.254	0.283	0.03	22
Pittsfield, MA	0.224	0.251	0.03	24
Providence-New Bedford-Fall River, RI-MA	0.245	0.302	0.06	5
Racine, WI	0.245	0.281	0.04	16
Rochester, NY	0.271	0.316	0.04	10
Rockford, IL	0.257	0.284	0.03	25
Saginaw-Saginaw Township North, MI	0.255	0.313	0.06	4
Scranton—Wilkes-Barre, PA	0.213	0.232	0.02	35
Springfield, OH	0.248	0.285	0.04	17
Utica-Rome, NY	0.234	0.278	0.04	11
Vineland-Millville-Bridgeton, NJ	0.233	0.251	0.02	37
Weirton-Steubenville, WV-OH	0.237	0.225	-0.01	47
Wheeling, WV-OH	0.230	0.236	0.01	41
Worcester, MA	0.231	0.290	0.06	3
Youngstown-Warren-Boardman, OH-PA	0.252	0.272	0.02	31

Source: Author's analysis of data from Census and Neighborhood Change Database.

Appendix B: Technical Details

This appendix provides regression results and technical details about the variables.

Finding B. **Between 1970 and 2000, distressed and non-distressed metropolitan areas with rapidly growing income inequality also experienced rapidly growing residential segregation by income.** Factors raising the relative willingness-to-pay of the rich to live in a good neighborhood would be expected to increase income segregation in a metropolitan area. A number of factors are likely to contribute to market pressure for segregation; this report focuses on rising income inequality. According to the report's theoretical argument, rising inequality is likely to affect the relative willingness of high- and low-income families to pay for certain neighborhood attributes.

A fixed effects specification using four decennial censuses (1970–2000) controls for any unobserved attributes of metropolitan areas that do not change over time and that could be correlated with both inequality and segregation levels. I estimate the following reduced form model of the determinants of income segregation:

$$\text{Segregation\_}e_t = \beta_1 * \text{Inequality\_}e_t + \beta_2 * \text{PredictedEmployment\_}e_t + \beta_3 * \text{Predicted Employment For Less Skilled Men\_}e_t + \beta_4 * \text{Predicted Central City Employment Share\_}e_t + \text{other MSA characteristics\_}e_t * \beta_5 + \alpha_m + \delta_t + \text{\_}e_t,$$

where *e* indexes metropolitan areas, *t* indexes years, and α_m, δ_t, $\text{\_}e_t$ denote, respectively, metropolitan area fixed effects, year fixed effects, and a random error term that varies across both metropolitan areas and years.

Three industrial composition variables—predicted employment, predicted employment for less-skilled men, and predicted central city employment share—are constructed using 1970 industrial shares in each metropolitan area interacted with national industry trends. It is important to control for the industrial composition variables because metropolitan areas with different economic bases are likely to have differentially changing residential patterns independent of differential changes in the income distribution.

Metropolitan areas may have long-standing differences in residential patterns that are correlated with the income distribution in those areas. Metropolitan area fixed effects, α_m, are included in the model to control for time-invariant differences across metropolitan areas. Year fixed effects, δt, control any for national trends in preferences common to all metropolitan areas that could influence segregation levels. Additional time-varying metropolitan area characteristics are included as well.[33]

Results of the fixed effects model are shown in Appendix Table B1. Column 1 presents a baseline model, in which the log of the 80th-to-20th percentile family income ratio is the measure of income inequality and the isolation of the bottom quintile is the measure of income segregation. As predicted by theory, income inequality is highly correlated with observed income segregation. The magnitude of the effect suggests that a rise of inequality from 2.8 to 3.4 (comparable to the average 1970 to 2000 change) would increase the isolation index by 0.011. This is most of the actual observed change of 0.013 in an average metropolitan area in the sample.

Appendix Table B1 also shows the results separately for distressed and non-distressed metropolitan areas. There is a positive relationship between inequality and income segregation in both types of areas. In distressed areas, the average increase in inequality is predicted to raise isolation by 0.017, more than half the actual increase of 0.029.

3. ***Finding C.*** **Between 1970 and 2000, both distressed and non-distressed metropolitan areas with rapidly growing income inequality experienced rapidly growing residential segregation by income.** The theory predicts that rising segregation is accompanied by higher than expected levels of new housing construction and retrofitting in economically distressed metropolitan areas. To test this prediction, the analysis examines the relationship between the date of housing construction and economic segregation across different types of metropolitan areas using a fixed effects model.[34] The dependent variable is the new construction relative to the previously existing housing stock, that is, housing units housing built in the previous 10 years divided by housing units built 10 or more years ago and still in existence in the observation year. (In the main text of the report, this fraction is expressed as a percentage.) Controls for the previous 10-year population growth rate and its square, as well as metropolitan area fixed effects and year effects, are included. The key independent variable of interest is the isolation index interacted with a dummy variable indicating whether the metropolitan area is distressed. The theory predicts that, after controlling flexibly for population growth, income segregation should be positively correlated with new housing construction in distressed areas but not in non-distressed areas.

The empirical evidence presented in Table B2 supports this hypothesis. Distressed metropolitan areas show a significant positive relationship between income segregation and new construction. A 0.01 increase in the isolation index is associated with an extra 1.1 percentage points of new

Table B1. Fixed Effects Analysis of the Income Inequality-Income Segregation Relationship, 1970–2000 (dependent variable: isolation of bottom one-fifth)

	All Metropolitan Areas	Distressed Metropolitan Areas	Non-distressed Metropolitan Areas
Log (80–20 Family Income Ratio)	**0.060****	**0.065***	**0.037****
	(0.016)	(0.038)	(0.017)
Predicted employment	**0.189****	**0.457****	**0.153****
	(0.063)	(0.135)	(0.065)
Predicted employment of less-skilled men	**-0.814****	**-1.737****	**-0.623****
	(0.238)	(0.523)	(0.254)
Predicted central city employment	**-0.807****	**-1.385****	**-0.642***
	(0.327)	(0.395)	(0.371)
Log (population)	**0.007**	**-0.009**	**0.005**
	(0.007)	(0.032)	(0.007)
Fraction black	**0.133****	**0.366****	**0.094**
	(0.063)	(0.164)	(0.063)
Fraction Hispanic	**0.000**	**-0.076**	**-0.002**
	(0.050)	(0.131)	(0.054)
Fraction foreign-born	**-0.078***	**-0.168**	**-0.054**
	(0.047)	(0.155)	(0.054)
Log (mean family income in 2000 dollars)	**-0.012**	**-0.007**	**-0.010**
	(0.014)	(0.023)	(0.017)
Fraction of high school graduates among those aged 25 and older	**-0.007**	**0.000**	**-0.010**
	(0.012)	(0.030)	(0.013)
Fraction of college graduates among those aged 25 and older	**0.071**	**0.009**	**0.121****
	(0.046)	(0.083)	(0.056)
Fraction under age 18	**0.194****	**0.062**	**0.274****
	(0.077)	(0.115)	(0.082)
Fraction under age 65	**0.091**	**0.317**	**0.049**
	(0.079)	(0.205)	(0.080)
Log (square miles)	**-0.014****	**-0.018**	**-0.011****
	(0.003)	(0.014)	(0.003)
Year fixed effects	**yes**	**yes**	**yes**
MSA fixed effects	**yes**	**yes**	**yes**
Number of observations	860	188	672
Number of metropolitan areas	215	47	168
R-squared	0.91	0.95	0.90

**significantly different from zero at 10 percent level.*

*** significantly different from zero at 5 percent level.*

Note: Standard errors in parentheses, clustered by metropolitan area. The analysis is unweighted. See text of main report and Appendix B for variable descriptions. MSA = metropolitan statistical area.

Source: Author's analysis of data from Census and Neighborhood Change Database.

Table B2. Fixed Effects Analysis of the Income Segregation–New Construction Relationship, 1970–2000 (dependent variable: new construction relative to pre-existing housing units)

	Comparing Distressed and Non-distressed Areas Only	Comparing All Four Types of Metropolitan Areas
Isolation of bottom quintile*distressed	**1.171****	**1.221****
	(0.333)	(0.335)
Isolation of bottom quintile*non-distressed	**0.373**	
	(0.421)	
Isolation of bottom quintile*supply constrained		**-0.193**
		(0.988)
Isolation of bottom quintile*rapidly growing		**-0.698**
		(0.842)
Isolation of bottom quintile*other non-distressed		**1.427****
		(0.409)
10-year population growth rate	**0.549****	**0.555****
	(0.082)	(0.079)
10-year population growth rate squared	**-0.019**	**-0.041**
	(0.123)	(0.120)
Year fixed effects	**yes**	**yes**
MSA fixed effects	**yes**	**yes**
Number of observations	860	860
Number of metropolitan areas	215	215
R-squared	0.88	0.88

**significantly different from zero at 10 percent level.*

*** significantly different from zero at 5 percent level.*

Note: Standard errors in parentheses, clustered by metropolitan area. The analysis is unweighted. See text of main report and Appendix B for variable descriptions. The effect of isolation on new construction in distressed areas is significantly different from the effect in non-distressed areas at the 10 percent significance level. The effect of isolation on new construction in distressed areas is significantly different from the effect in supply constrained and rapidly growing areas at the 5 percent significance level, but is statistically indistinguishable from the effect in other non-distressed areas.

Source: Author's analysis of data from Census and Neighborhood Change Database.

construction in an economically distressed metropolitan area. As expected, non-distressed metropolitan areas show no statistically significant relationship between income segregation and housing construction. The difference in coefficients between distressed and non-distressed is statistically significant at the 10 percent level. In sum, distressed metropolitan areas have a positive association between income segregation and excess housing construction, while distressed areas do not.

The analysis is repeated for the three types of non-distressed areas: supply-constrained, rapidly growing, and other non-distressed. As the theory predicts, supply-constrained and rapidly growing areas exhibit no statistically significant relationship between income segregation and new construction.

4. Finding D: Rising income inequality and neighborhood income segregation accounted for 16 to 50 percent of the new construction in distressed metropolitan areas between 1970 and 2000. Finding D is based on a simulation exercise. A regression analysis predicts new housing construction as a function of isolation interacted with an indicator for distressed, isolation interacted with an indicator for non-distressed, income inequality interacted with an indicator for distressed, income inequality interacted with an indicator for non-distressed, population growth, population growth squared, year fixed effects, and metropolitan area fixed effects. The model is then used to simulate new housing construction that that would be predicted if segregation and inequality had remained at their 1970 levels. Results are shown in Table B3.

Table B3. Simulation Results for New Housing Construction Rates in Distressed Metropolitan Areas under Alternative Assumptions about Income Inequality and Segregation, 1970–2000

1970	1980	1990	2000	
New construction rate predicted at 1970 income inequality and segregation levels	0.252	0.195	0.081	0.056
New construction rate predicted at actual income inequality and segregation levels	0.252	0.232	0.132	0.112
Actual new construction rate	0.242	0.238	0.126	0.123
Fraction of new construction attributable to increase in income inequality and segregation since 1970	0.00	0.16	0.39	0.50

Source: Author's analysis of 1970 and 2000 data from Census and Neighborhood Change Database.

5. Income Segregation Measure. The formula for an exposure index of quintile x to quintile y in metropolitan area m is:

$$\text{Exposure}_{xym} = \Sigma_t \, (X_t/X_m) * (Y_t/J_t),$$

Where:
X_t = number of quintile X families in tract t,
X_m = number of quintile X families in metro area m,
Y_t = number of quintile Y families in tract t, and
J_t = number of families in tract t.

The exposure of quintile x to quintile y can be interpreted as the average fraction of quintile y families in the typical quintile x family's census tract. Isolation is the exposure of a quintile to itself.

6. Data Description. Tract-level Census data for 1970, 1980, 1990, and 2000 are from the Neighborhood Change Database. The analysis also uses county-level information from the Census CDs and the City and County Data books. It uses the IPUMS to estimate national trends in industrial mix and job centralization.

The income inequality and income segregation measures for families are derived from tract-level data on the number of families in different income bins in the year previous to the Census year. There are 15 income bins in the 1970 data, 17 in the 1980 data, 25 in the 1990 data, and 16 in the 2000 data.

7. Metropolitan area definitions. The boundaries of metropolitan areas change over time. A researcher must make a decision about how to deal with this fact in the analysis. Consistency is desirable but it is also desirable to capture genuine changes in the area of the residential market. An intermediate approach is pursued here. The consolidated metropolitan areas defined by the Census Bureau as of 2003 are used, including all the counties that were tracted in a particular year. Therefore, the boundaries of about half of the metropolitan areas in the sample change over time. Metropolitan areas that had no tracted counties in 1970 are excluded. For New England, the county-based metropolitan area definitions developed by the Census (NECMAs) rather than the standard town-based definitions are used. Metropolitan areas outside of New England are based on counties or county-equivalents as usual.

8. Families versus Households. I use data for families because they are available for all four Census years. Families, which are households in which at least two residents are related by blood or marriage, make up a large fraction (ranging from 68 percent in 2000 to 75 percent in 1980) of households. Between 1980 and 2000, families have higher segregation levels than all households. Comparing the baseline regression relating family segregation and family income inequality for the 1980–2000 time span to the analogous model using households, the results are very similar and highly significant.

9. Industrial Mix Variables. Ten initial metropolitan area industry shares are interacted with national industry changes over time to predict the level of total employment relative to 1970 total employment, the level of employment of less-skilled men relative to 1970 total employment, and the fraction of metropolitan employment in the central city. Less-skilled workers are defined as those with a high school diploma or less. The national trends for centralization and skill level are computed using IPUMS data on 18–65-year-olds in metropolitan areas who worked at least 15 hours in the previous week. Predicted variables are used rather than direct measures of employment growth, demand for less-skilled men, and job centralization because these characteristics may be endogenous to segregation. Therefore, the industrial mix variables in some sense "undercontrol" because they do not capture the effect of idiosyncratic changes in industrial composition.

The formula for Predicted Employment is:

$PredEmp_{mt} = \Sigma_i (Emp_{im70}/Emp_{m70}) * (NatEmp_{it}/NatEmp_{i70})$,

Where:

$PredEmp_{mt}$ is the predicted employment level in metropolitan area m at time t,

$Empi_{m70}$ is the employment in metropolitan area m in 1970 in industry i (from aggregated county-level data),

Emp_{m70} is the total employment in metropolitan area m in 1970 (from aggregated county-level data),

$NatEmp_{it}$ is the total employment in all metropolitan areas in industry i at time t (from aggregated county-level data),

$NatEmp_{i70}$ is the total employment in all metropolitan areas in industry i in 1970 (from aggregated county-level data).

It is clear from the formula that all metropolitan areas have a predicted employment of 1 in 1970.

The formula for Predicted Employment of Less Skilled Men is:

$PredEmpLSM_{mt} = \Sigma_i (Emp_{im70}/Emp_{m70}) * (Nat2LSM_{it}/Nat2Emp_{it}) * (NatEmp_{it}/NatEmp_{i70})$,

where:

PredEmpLSMmt is the predicted employment of less-skilled men in metropolitan area m at time t,

Nat2LSMit is the employment of less-skilled men in all metropolitan areas at time t in industry i (from the PUMS),

Nat2Empit is the total employment of less-skilled men in all metropolitan areas at time t (from the PUMS),

and other variables are as above.

The variable is a prediction of employment of less-skilled men in year t relative to total metropolitan area employment in 1970.

The formula for Predicted Job Centralization is:

$PredCent_{mt} = \Sigma_i (PredFrac_{imt}) * (Nat2CC_{it}/Nat2Emp_{it})$,

Where:

$PredCent_{mt}$ is the predicted fraction of employment in the central city,

$Nat2CC_{it}$ is the employment in industry *i* at time *t* in all central cities (from the PUMS),

$Nat2Emp_{it}$ is the employment in industry *i* at time *t* in all metropolitan areas (from the PUMS),

$PredFrac_{imt}$ is the predicted fraction of employment in industry *i* in metropolitan area *m* at time t and is defined by:

$PredFrac_{imt} = Emp_{im70} * (Nat2Emp_{it}/Nat2Emp_{i70}) / \Sigma i [Empi_{m70} * (Nat2Emp_{it}/Nat2Emp_{i70})]$.

where:

Emp_{im70} is the employment in industry *i* in metropolitan area *m* in 1970 (from aggregated county-level data),

$Nat2Emp_{i70}$ is the employment in industry *i* in 1970 in all metropolitan areas (from the IPUMS),

and other variables are defined as above.

10. Measurement of Metropolitan Area Income Inequality. The construction of metropolitan area income inequality measures is based on a methodology described and tested by Jargowsky.[35] In particular, metropolitan area income is assumed to be distributed with a linear distribution below the mean and a Pareto distribution above the mean.[36]

11. Central City and Suburbs and Decentralization. Central cities are those places identified by the Census Bureau as such in 2003 based on metropolitan area residential and commuting patterns. They represent consistent geographic areas over time. There may be more than one central city in a metropolitan area; these are combined for the purpose of the analysis. The suburbs include all remaining tracted portions of the metropolitan area in a given year. Suburbs are also combined for the purpose of the analysis. Census tracts between 1980 and 2000 are matched to places, which in turn are matched to central cities. A Census tract that includes both central city places and suburban places is considered part of the central city if at least half of the tract area is within the central city. In 1970, neither central cities nor places are identified in the data.

12. New Construction. New construction in each Census year is defined as newly constructed housing relative to previously existing housing. The variable in any given year is the number of housing units built in the past 10 years divided by the number of housing units built more than 10 years ago and still in existence in the Census year. In the main text of the report this fraction is expressed as a percentage.

References

Bartik, Timothy J. 1991. *Who Benefits from State and Local Economic Development Policies?* Kalamazoo, MI: Upjohn Institute for Employment Research.

Bernstein, Jared, Elizabeth McNichol, and Karen Lyons. 2006. *Pulling Apart: A State-by-State Analysis of Income Trends.* Washington: Center on Budget and Policy Priorities.

Berube, Alan, and Bruce Katz. 2005. *Katrina's Window: Confronting Concentrated Poverty Across America.* Washington: Brookings Institution.

Bier, Thomas, and Charlie Post. 2003. *Vacating the City: An Analysis of New Homes versus Household Growth.* Washington: Brookings Institution.

Booza, Jason C., Jackie Cutsinger, and George Galster. 2006. *Where Did They Go? The Decline of Middle-Income Neighborhoods in Metropolitan America.* Washington: Brookings Institution.

Case, Anne C., and Lawrence F. Katz. 1991. "The Company You Keep: The Effects of Family and Neighborhood on Disadvantaged Youths." Working Paper 3705. Cambridge, MA.: National Bureau of Economic Research.

Cutler, David M., and Edward L. Glaeser. 1997. "Are Ghettos Good or Bad?" *Quarterly Journal of Economics* 112: 827_872.

Dew-Becker, Ian, and Robert J. Gordon. 2005. "Where Did the Productivity Growth Go? Inflation Dynamics and the Distribution of Income," in William C. Brainard and George L. Perry, eds., *Brookings Papers on Economic Activity* 2. Washington: Brookings Institution.

Fulton, William, and others. 2001. *Who Sprawls Most? How Growth Patterns Differ across the U.S.* Washington: Brookings Institution.

Gyourko, Joseph, Christopher Mayer, and Todd Sinai. 2006. "Superstar Cities." Working Paper 12355. Cambridge, MA: National Bureau of Economic Research.

Hoxby, Caroline. 2000. "Peer Effects in the Classroom: Learning From Gender and Race Variation." Working Paper 7867, Cambridge, MA.: National Bureau of Economic Research.

Jargowsky, Paul A. 1995. "Take the Money and Run: Economic Segregation in U.S. Metropolitan Areas," Discussion Paper 1056-95, Institute for Research on Poverty, University of Wisconsin.

_____. 2003. *Stunning Progress, Hidden Problems: The Dramatic Decline of Concentrated Poverty in the 1990s.* Washington: Brookings Institution.

Kling, Jeffrey R., Jeffrey B. Liebman, and Lawrence F. Katz. 2007. "Experimental Analysis of Neighborhood Effects." *Econometrica* 75: 83-119.

Mishel, Lawrence, Jared Bernstein, and Sylvia Allegretto. 2006. *The State of Working America* 2006/2007. Ithaca, NY: Cornell University/ILR Press.

Oreopoulos, Philip. 2003. "The Long Run Consequences of Growing Up in a Poor Neighborhood." *Quarterly Journal of Economics* 118: 1533_1575.

Orfield, Myron, 1997. *Metropolitics.* Washington: Brookings Institution.

Rusk, David. 2006. *Annexation and the Fiscal Fate of Cities* Washington: Brookings Institution.

Vey, Jennifer S. 2007. *Restoring Prosperity: The State Role in Revitalizing America's Older Industrial Cities.* Washington: Brookings Institution.

———. 2006. "Metropolitan Growth, Inequality, and Neighborhood Segregation by Income," in Gary Burtless and Janet Rothenberg Pack, eds., Brookings-Wharton Papers on Urban Affairs 2006 Washington: Brookings Institution.

_____. 2007. "Inequality and the Measurement of Residential Segregation by Income in American Neighborhoods," Unpublished manuscript.

Wilson, William J. 1987. *The Truly Disadvantaged: The Inner City, the Underclass, and Public Policy.* Chicago: University of Chicago Press.

Endnotes

1. Tara Watson is Assistant Professor of Economics at Williams College, a Faculty Research Fellow of the National Bureau of Economic Research, and a Robert Wood Johnson Scholar in Health Policy Research.

2. Lawrence Mishel, Jared Bernstein, and Sylvia Allegretto, *The State of Working America 2006/2007* (Ithaca, NY: Cornell University/ILR Press, 2006), p. 55.

3. For a summary of these and other reasons why growing income inequality is undesirable, see Jared Bernstein, Elizabeth McNichol, and Karen Lyons, *Pulling Apart: A State-by-State Analysis of Income Trends* (Washington: Center on Budget and Policy Priorities, 2006). For evidence on the distribution of the benefits of productivity growth between 1966 and 2001, see Ian Dew-Becker and Robert J. Gordon, "Where Did the Productivity Growth Go? Inflation Dynamics and the Distribution of Income." In William C. Brainard and George L. Perry, eds., Brookings Papers on Economic Activity 2, 2005 (Washington: Brookings Institution, 2005).

4. Jason C. Booza, Jackie Cutsinger, and George Galster, *Where Did They Go? The Decline of Middle-Income Neighborhoods in Metropolitan America* (Washington: Brookings Institution, 2006).

5. Alan Berube and Bruce Katz, Katrina's Window: Confronting Concentrated Poverty Across America (Washington: Brookings Institution 2005). On the decline of concentrated poverty in the 1990s, see Paul A. Jargowsky, *Stunning Progress, Hidden Problems: The Dramatic Decline of Concentrated Poverty in the 1990s* (Washington: Brookings Institution, 2003).

6. See, for example, William J. Wilson, *The Truly Disadvantaged: The Inner City, the Underclass, and Public Policy* (Chicago: University of Chicago Press, 1987).

7. See, for example, Anne C. Case and Lawrence F. Katz, "The Company You Keep: The Effects of Family and Neighborhood on Disadvantaged Youths." Working Paper 3705 (Cambridge, MA: National Bureau of Economic Research, 1991); David M. Cutler and Edward L. Glaeser, "Are Ghettos Good or Bad?" Quarterly Journal of Economics 112 (1997): 827–872; Caroline Hoxby, "Peer Effects in the Classroom: Learning From Gender and Race Variation." Working Paper 7867 (Cambridge, MA: National Bureau of Economic Research, 2000); Philip Oreopoulos, "The Long Run Consequences of Growing Up in a Poor Neighborhood." *Quarterly Journal of Economics* 118 (2003): 1533–1575; Jeffrey R. Kling, Jeffrey B. Liebman, and Lawrence F. Katz, "Experimental Analysis of Neighborhood Effects," *Econometrica* 75 (2007): 83-119.

8. William Fulton and others, *Who Sprawls Most? How Growth Patterns Differ across the U.S.* (Washington: Brookings Institution, 2001).

9. Thomas Bier and Charlie Post, *Vacating the City: An Analysis of New Homes versus Household Growth* (Washington: Brookings Institution, 2003).

10. See the sources listed in notes 3–10 above.

11. This portion of the argument and the evidence supporting it are presented in more detail in Tara Watson, "Metropolitan Growth, Inequality, and Neighborhood Segregation by Income," in Gary Burtless and Janet Rothenberg Pack, eds., Brookings-Wharton Papers on Urban Affairs 2006 (Washington: Brookings Institution, 2006). That article also provides further details about the measurement of segregation and other aspects of the analysis.

12. For illustrative examples of differences in property tax bases between high- and low-income municipalities, see Myron Orfield, *Metropolitics* (Washington: Brookings Institution, 1997).

13. As noted in the methodology section of this report, some metropolitan areas do not fall into any of the three categories of distressed, supply-constrained, or rapidly growing. The argument presented in the text implies that in these "other" non-distressed metropolitan areas rising income inequality leads to rising income segregation and that rising income segregation may be associated with housing construction in the other non-distressed areas that most resemble distressed areas.

14. Gyourko, Mayer, and Sinai explain how nationwide population growth and increasing income inequality can turn some supply-constrained metropolitan areas into "superstar cities" that become increasingly unaffordable to low- and moderate-income residents. See Joseph Gyourko, Christopher Mayer, and Todd Sinai, "Superstar Cities." Working Paper 12355 (Cambridge, MA: National Bureau of Economic Research, 2006).

15. Previous work has reported that housing growth exceeding household growth is associated with central city decline. See Bier and Post, *Vacating the City.*

16. Bartik has popularized the use of this measure of economic growth, which is the same as the industry-mix component of a shift-share analysis. See Timothy J. Bartik, *Who Benefits from State and Local Economic Development Policies?* (Kalamazoo, MI: Upjohn Institute for Employment Research, 1991).

17. To include old manufacturing and mining centers that have not yet found ways to reinvent themselves, this report identifies distressed areas on the basis of economic growth (as defined in the text) and population growth. However, there are a number of ways one could identify distressed areas. These could include criteria based on population growth, employment growth, per capita income growth, or other factors. Alternative methodologies yield substantially overlapping sets of places. For example, Jennifer S. Vey, *Restoring Prosperity: The State Role in Revitalizing America's Older Industrial Cities* (Washington: Brookings Institution, 2007) defines "older industrial cities" on the basis of growth in employment, payroll, and establishments, and measures of income, poverty, and labor force status. Vey's list of 65 older industrial cities include large cities in 25 of the 47 metropolitan areas that this report identifies as distressed.

18. Specifically, supply constrained areas are defined as those that had all the following characteristics between 1970 and 2000: (a) were in the top one-third of housing price appreciation, (b) were in the top one-half of real per capita income growth, (c) had population growth less than 70 percent of housing price growth, and (d) were not defined as distressed or rapidly growing.

19. When the findings refer to measures of income inequality or other statistics for different types of metropolitan areas, they refer to unweighted averages of the appropriate statistic across all metropolitan areas of a particular type. For example, the measure of income segregation for distressed metropolitan areas is the average across all distressed metropolitan areas of the measure of income segregation within each of those areas.

20. The isolation index is particularly well suited to understanding the relationship between income inequality and residential choice because it is based on income percentiles and, therefore, is not mechanically related to the income distribution. If the income distribution widens but no family moves, then the isolation index does not indicate a change in the level of income segregation. The isolation index only registers a change in income segregation if families at the bottom of the income distribution are more or less likely to live with other families. This feature distinguishes the isolation index used here from another commonly used index, the isolation of the poor. Changes in the income distribution directly affect the isolation of the poor, that is, of families with incomes below the poverty line, even if no family moves.

21. Because the argument of this report is that a growing gap between the incomes of the rich and those of the poor leads to growing income segregation and, in distressed metropolitan areas, to an increase in housing construction, a measure of the rich-poor income gap is a better measure of income inequality, for the purposes of this report, than the Gini coefficient, a commonly used measure of inequality that measures income differentials throughout the income distribution. The results of the analysis are similar with alternative measures of the gap between percentiles of the income distribution, such as the ratio of the 50th percentile of family income to the 10th percentile.

22. An instrumental variables analysis presented in Watson, "Metropolitan Growth, Inequality, and Neighborhood Segregation by Income," indicates that factors such as inequality driving segregation are associated with new housing construction, mitigating the reverse causality concern to some extent.

23. Indeed, the actual rates of new construction in distressed areas are lower in 1970 and higher in 2000 than those that the model predicts. This suggests that, in addition to income inequality and segregation and the other variables included in the regression model, there are important unmeasured factors that drive new construction in distressed areas.

24. The statistics reported in this paragraph are simple (non-compound) unweighted averages across the four decades 1960–1970, 1970–1980, 1980–1990, and 1990–2000, across all metropolitan areas of a given type.

25. See David Rusk, Annexation and the Fiscal Fate of Cities (Washington: Brookings Institution, 2006).

26. Between 1970 and 2000, the ratio of high- to low-income family income increased by 0.44 in rapidly growing metropolitan areas and by 0.50 in other non-distressednon-distressed areas.

27. Families in the top one-fifth of the income distribution also grew more isolated between 1970 and 2000. Rising segregation of the bottom one-fifth was most pronounced during the 1970s and 1980s in distressed areas. Segregation of the bottom one-fifth fell slightly during the 1990s.

28. The regressions in Appendix B that show the relationships between income inequality and income segregation in distressed and non-distressednon-distressed metropolitan areas differ from the regression lines shown in Figures 4 and 5 because appendix regression use the logarithm of income inequality as an explanatory variable and include metropolitan area fixed effects and other control variables. The appendix regressions fit the data better than the regressions in Figures 4 and 5, but the basic relationships are similar. Figures 4 and 5 are shown in the text because they are the simplest way to portray those relationships graphically.

29. Therefore, there are 188 dots in the figure (47 metropolitan areas times four years).

30. The regressions in Appendix B that show the relationships between income segregation and excess housing construction in distressed and non-distressed metropolitan areas differ from the regression lines shown in Figures 6 and 7 because the regressions in the appendix include metropolitan area fixed effects and other control variables. The appendix regressions fit the data better than the regression lines shown in figures 6 and 7 but the basic relationships are similar. Figures 6 and 7 are shown in the text because they are the simplest way to portray those relationships graphically.

31. Here the regression model's predicted rate of new construction is used in the denominator rather than the actual rate. If the actual rate is used instead, the fraction of new construction attributable to rising income inequality and segregation is 8 percent in 1980, 33 percent in 1990, and 26 percent in 2000.

32. Further information can be found in Watson, "Metropolitan Growth, Inequality, and Neighborhood Segregation by Income."

33. Time-varying metropolitan area characteristics include log of population, racial and ethnic composition variables, educational composition variables, age composition variables, and land area. Land area changes if a county eventually included in a metropolitan area was not included in that tract in 1970.

34. Retrofitting cannot be inferred from the Census data unless it changes the reported date of construction of the dwelling.

35. Paul A. Jargowsky, "Take the Money and Run: Economic Segregation in U.S. Metropolitan Areas." Discussion Paper 1056-95 (Madison: Institute for Research on Poverty, University of Wisconsin, 1995).

36. For more details see Tara Watson, "Inequality and the Measurement of Income Segregation in American Neighborhoods." Unpublished manuscript, 2007.

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