JRAP (1996) 26, 1: 49-97

The Journal of Regional Analysis & Policy

Epidemics and neighborhood change: an examination from 1970 to 1990

Elaine Peterson*
University of Wisconsin-Madison

Abstract. This paper analyzes 31,957 census tracts from 1970 to 1990 for evidence of long-term self-reinforcing trends, or *epidemics*, in quality indicators. The neighborhood quality indicators considered are:

- Real mean family income;
- Percent of persons with incomes below the poverty line;
- Percent of families with female heads;
- Percent of young adults who have dropped out of high school;
- Adult unemployment rate;
- Percentage of adults in high status occupations;
- Principal components measure of quality based on the other six indicators.

Based on the distributional analyses of the indicators, the magnitudes of their changes, and the decline in the principal components measure of neighborhood quality, average overall neighborhood quality has declined. The variations of the distributions of these indicators generally are increasing, consistent with self-reinforcing trends in neighborhood quality. The growth rates for the 5th and 95th percentiles for some of the indicators also are consistent with self-reinforcing trends in neighborhood quality. For most indicators, however, these patterns are difficult to distinguish from overall national trends. Examining the same neighborhoods over time suggests there is more relative mobility than expected if changes in neighborhood quality are self-reinforcing.

Changes in neighborhood quality indicators are significantly related to prior changes in neighborhood quality. Contrary to existing theoretical models of neighborhood change, however, these analyses generally support long-term negative feedback—or self-restraining—effects to changes in neighborhood quality. The exception is neighborhood real mean family income in high income neighborhoods. Regression analyses of this indicator show positive feedback effects.

Parameter estimates for neighborhoods at the tails of the neighborhood quality indicators differ significantly. Evidence of long-term positive feedback is consistent

* The author would like to thank the members of the public economics workshop at the University of Wisconsin, Michael Wiseman, and her committee members Robert Haveman, Barbara Wolfe, and Steven Durlauf for helpful comments and suggestions.

This paper explores long-term feedback effects to changes in neighborhood quality. Data on 31,957 census tracts from 1970 to 1990 are used. Six primary indicators of neighborhood quality are analyzed:

- Real mean family income;
- Percent of persons that have incomes below the poverty line;
- Percent of families with female heads;
- Percent of young adults who have dropped out of high school;
- Adult unemployment rate; and
- Percent of adults in the neighborhood in high status occupations (professional, technical, executive, or managerial positions).

Multiple indicators are considered for several reasons. Neighborhood quality may influence many different aspects of children's attainments, possibly in a "like begets like" manner (Case and Katz 1991). Hence, different aspects of neighborhood quality are potentially important. (See, for example, Crane 1991; Clark 1992; Haveman and Wolfe 1994.) Aspects of neighborhood quality subject to self-reinforcing changes have implications for policy. A single measure of neighborhood quality capturing most of the variation and summarizing overall patterns is a potentially useful way of thinking about overall neighborhood quality. Therefore, I repeat the analysis for a principal components measure of neighborhood quality based on the other six indicators.

Is there evidence of feedback loops for the neighborhood quality indicators examined? Several subsidiary questions also are considered. First I examine neighborhood changes over time using the distributions of the quality indicators in 1970, 1980, and 1990. Then I study how neighborhoods have changed by examining their relative mobility using the different indicators.

Crane (1988, 1991) suggests that social problems spread through peer influences at an accelerating rate as neighborhood quality declines. Based on his model we expect positive feedback loops in neighborhood quality concentrated in the worst neighborhoods. Durlauf (1992, 1993, and 1994) models human capital formation as a function of local investments in educational resources and the effectiveness of these investments, where effectiveness is a function of role models and labor market connections. In his model persons with high incomes are willing to pay more to live in a neighborhood with others of high income, and housing prices are used to stratify neighborhoods. This stratification leads to positive feedback loops in neighborhood income. The dynamic is one of reinforcing positive influences on children's development in higher income neighborhoods. Based on both models we expect increasing disparity among neighborhoods. In Durlauf's model the emphasis is increasing disparity in income due to stronger positive feedbacks in high income neighborhoods, while in Crane's model the positive feedback effects are strongest in the worst neighborhoods.

I examine the changing distributions of neighborhood quality indicators for consistencies or inconsistencies with these models. For example, if the distributions exhibit increasing, decreasing, or constant disparity between the top and bottom of the distributions, they provide some evidence about the feedback processes hypothe-

sized.[2] Next I assume that the costs faced by individuals in changing neighborhoods are sufficiently high (and, thus, changing neighborhood populations sufficiently slow) that we should be able to observe the overall feedback patterns in the same neighborhoods over time. I examine the same neighborhoods over time in terms of their relative distribution. Finally I present regression results with controls for the tails of the neighborhood quality distributions (as well as controls for other variables that may affect neighborhood trends).

The Crane and Durlauf models suggest the tails are affected differentially by positive feedback loops. Intervention often is justified from a policy perspective in order to mitigate problems in the worst neighborhoods.

Because positive feedback effects are not found for most of the indicators, a secondary question is whether the data are appropriately divided into subsamples. Perhaps suburban and central city neighborhoods evolve in sufficiently different ways that they should be examined using separate equations.[3] Or should we study the distribution of performance, i.e., do those neighborhoods improving the most or deteriorating the most exhibit signs of positive feedbacks? Crane's model may apply primarily to minority neighborhoods. Analyses based on these alternative breakdowns of the data suggest the overall results are robust.

Do the data support other theories of neighborhood change? Wilson (1987) argues that social dislocations, such as changes in the urban job structure from manufacturing to administration, information, and services production, have lead to increased social problems in inner cities. He suggests these dislocations have been greatest in large northern cities with high minority populations. The dislocation effects have been magnified by concentration effects and social isolation as the middle class has left central city neighborhoods and the population age in central cities has dropped. Other researchers suggest that local government conditions such as fiscal distress, fiscal disparity between the local and surrounding communities, and increasing fiscal divergence between the local and surrounding communities have led to urban decline and increasing central city neighborhood problems (Downs 1981; Bradbury, Downs, and Small 1982; Oakland 1979).

2. Prior research[4]

This paper is the first to use neighborhood data to test for feedback effects in neighborhood quality. Other research has examined how neighborhoods affect children and change over time. This research has developed intergenerational models where neighborhoods play a part in human capital formation (Durlauf 1992, 1993, and 1994). Most related empirical research has studied outcomes for individuals and the character-

[2] This weak test does not require adding the assumption that changing neighborhood populations is so costly and slow that the overall feedback patterns can be observed by following the same neighborhoods over time.

[3] For example, Crane focuses on ghettos; hence, his model may fit central city neighborhoods better.

[4] The body of research on neighborhood effects is extensive, although inconclusive. See Jencks and Mayer (1990) for a review of the empirical work or Haveman and Wolfe (1995) for a more recent review of children's attainments.

istics of either their present neighborhood (Crane 1991; Clark 1992) or the neighborhoods where they grew up (Haveman and Wolfe 1994; Jencks and Mayer 1990).[5] Some empirical research has studied neighborhood characteristics at points in time and contrasted aggregate statistics for some subsamples of neighborhoods (Wilson 1987) or analyzed issues such as the economic segregation of neighborhoods over time (Jargowsky 1995; Abramson and Tobin 1994).

Crane suggests that ghetto neighborhoods are areas where social problems have become epidemic. His study uses cross section data from the *1/100 15 Percent Neighborhood Characteristic* file of the *1970 Census Public Use Microdata* (PUMS) and tests 16 proxies for neighborhood quality for the effects on dropping out of high school and teenage childbearing. Crane uses a piecewise linear logit model to test for large increases in social problems among the worst neighborhoods. The probability that an individual has an undesired outcome such as dropping out (P_{Di}) in his reduced form model is:

$$P_{Di} = \frac{1}{1 + e^{(\alpha + X_i\beta + N_{ij}\gamma_j)}} \quad (1)$$

where:

X_i = Personal characteristics; and

N_{ij} = Neighborhood characteristics.

Crane finds nonlinear patterns with separate estimates for different racial subsamples. He concludes that as the percentage of workers in a neighborhood with high status jobs (professional or managerial) falls, the probability of children who grew up in such a neighborhood dropping out of high school increases at an increasing rate.[6] For example, as the percentage of high status jobs falls from 20.7 percent to 5.6 percent, the probability of dropping out increases from .111 to .120 for blacks. As the percentage of high status jobs falls from 5.6 percent to 3.5 percent, the probability of dropping out leaps to .192.[7]

The key problem of epidemics is their tendency to spread at an accelerating rate over time. Because Crane uses only cross section data, this dynamic element cannot be observed in his analysis. Another problem of cross section data is selection. The effects attributed to neighborhoods in which children grow up may reflect the effects of unobserved family characteristics correlated with neighborhood characteristics. Because the individuals are young adults when the neighborhood characteristics are observed in Crane's data, the neighborhoods also reflect the individuals' characteristics. As dropouts are unlikely to hold high status jobs, it is not surprising that the

[5] The extent to which neighborhoods affect children may lead to feedback effects on these childhood neighborhoods as the children grow up. Neighborhood effects on children and feedback effects in neighborhood quality may reflect the same phenomenon.

[6] Crane presents results for the percentage of high status jobs because this neighborhood characteristic has the largest estimated effect on dropping out of high school and teenage childbearing.

[7] One hypothesis that might be drawn from his results is that neighborhood effects occur due to role model effects and connections to the labor market through working adults in the neighborhood.

probability of an individual being a dropout is higher in neighborhoods with a low percentage of high status jobs.

Clark (1992) uses a cross sectional sample of teenage boys drawn from the 1980 PUMS 5 percent sample matched to census tract data to test for neighborhood effects on dropping out of school. She uses splines to test for tipping points in the relationships at 10 percent intervals and at the 1 percent, 2.5 percent, 3.5 percent, and 5 percent extremes. Although she finds evidence of neighborhood effects, they do not fit the pattern described by Crane. Clark finds larger changes in the probability of dropping out associated with changes in the neighborhood poverty rate for those living in neighborhoods with low poverty rates (e.g., below 5 percent). For example, the probability of a boy dropping out of high school as the neighborhood poverty rate falls from 6 percent to 5 percent drops only 0.7 percent, but as the neighborhood poverty rate falls from 1 percent to 0 the probability of dropping out falls 14 percent. She also finds that the percentage of the neighborhood with high income is inversely related to the likelihood of dropping out, but only while that percentage is less than 50 percent.[8]

Similar to Crane's work, Clark's research suffers from cross sectional data. Clark suggests the difference may be due to changes in neighborhoods and in the value of measures such as the percentage of high status jobs as indicators of distress from 1970 to 1980. Examining different quality indicators over time over a fuller distribution of neighborhoods could distinguish whether the relationships described by Crane are more likely to exist.

Durlauf's model suggests feedback loop effects to neighborhood income that maintain and increase intergenerational income inequality, including potential poverty traps. In his model neighborhood quality is positively related to economic success because local taxes are positively related to educational resources and investment. Role models and labor market connections influence the effectiveness of educational investment. Both of these can enhance the effectiveness of family-specific educational investment. Because these influences can be observed, persons with high incomes are willing to pay more to live in a neighborhood with other high income persons. As a result, housing prices tend to stratify neighborhoods. Once this stratification exists (with feedback loops), increasing intergenerational income inequality can exist.[9] If this model is correct we expect wealthier and improving neighborhoods to improve

[8] Although Clark tries two other methods to check for the epidemic relationship that Crane finds between the percentage of high status jobs and dropping out (step-coding of intervals and using OLS to fit the logistic regression coefficients to a line), she does not find any evidence of an abrupt increase in the probability of dropping out as the percentage of high status jobs falls to 3.5 percent or lower. Thus, Clark's results are consistent with the idea that neighborhoods can have both positive and negative role model effects, but that both effects are diminishing rather than increasing.

[9] To the extent more affluent neighbors build institutions that benefit children, these feedback loops would be further strengthened. Here the dynamic is one of reinforcing positive influences on children's development in wealthier neighborhoods.

further relative to poorer and declining neighborhoods. Instead of regression toward the overall mean, increasing disparity between neighborhoods would exist.[10]

Durlauf's model allows residents to instantaneously relocate into new and possibly further stratified neighborhoods. If we assume there are potentially large capital investments in institutions that benefit children for which tax support is secured over time, complete relocation or location swapping imposes additional unnecessary costs on wealthy residents. Therefore, I assume in examining the same neighborhoods over time that the patterns Durlauf has suggested would evolve across generations between neighborhoods.[11]

Evans, Oates, and Schwab's (1992) data from the *National Longitudinal Study of Youth* (NLSY) cast doubt on the causal nature of the relationship between neighborhood quality and children's outcomes (as suggested in Crane, Clark, and Durlauf's research). They find in changing from a single equation model to a simultaneous equations model that the estimated neighborhood effects for teen pregnancy and dropping out of high school change from statistically significant to insignificant.[12] Evans, Oates, and Schwab (p. 990) "emphatically do not conclude from [their] findings that peer group effects are inconsequential," but their paper "suggests strongly ... that endogeneity is a real issue here."

Researchers have used instrumental variables to isolate neighborhood effects from other potential factors affecting children to deal with endogeneity. The greatest difficulty is finding reliable instruments (Ludwig 1995). The problem that neighborhoods are chosen (i.e., endogenous, as presented by Evans, Oates and Schwab) is an argument that there may be omitted variables such as ambition, motivation, or parents' time and effort devoted to their children. If the omitted variables are related to both neighborhood quality and children's success, their omission will bias the estimated relationship between neighborhood quality and success. Other researchers have attempted to control for endogenous factors using richer data.[13]

---

[10] The parameters in Durlauf's model also could allow for low quality neighborhoods' tendency to decline; however, he emphasizes change patterns among high quality neighborhoods.

[11] Because Durlauf's model allows for instantaneous moving, inconsistencies between the relationship between changes in neighborhood quality over time based on his model and what we find in the neighborhoods examined in this paper can be attributed to moving or neighborhoods swapping populations. Attributing such moving or turnover in population as the cause of such inconsistencies makes it impossible to test Durlauf's model.

[12] The instruments used to identify neighborhood quality are the metropolitan area unemployment rate, median family income, poverty rate, and percentage of adults who completed college. The lack of significance of the estimated coefficients in their simultaneous equation estimations may be due to the failure of these instruments to capture a substantial share of the variance in neighborhood quality, thus making the relationship harder to detect.

[13] For example, Haveman and Wolfe (1994) use longitudinal data on 1705 children who were six years old or less in 1968 and still participating in the PSID in 1988 to examine the effects of family and social inputs on children's attainments as young adults. They use census tract data matched to the neighborhoods where the children grew up to test for potential neighborhood effects on education, economic activity, and teen childbearing. The outcomes examined include high school graduation, choice of additional schooling, years of school completed, economic inactivity, and (for females) the occurrence of an out-of-wedlock birth while a teenager.

Implicit in each of these empirical works is the question of which aspects of neighborhood quality matter. Crane's work implies the percent employed in high status neighborhoods is the most relevant. Haveman and Wolfe's results have the opposite sign for this indicator; they find only a significant relationship in the hypothesized direction for the percent of young adult dropouts. Clark's results suggest a different pattern of relationships for the indicators and that the percent below poverty has a stronger relationship with children's outcomes.

Conflicting empirical results—and the reason Evans, Oates, and Schwab find insignificant coefficient estimates on neighborhood quality in their simultaneous equation model—may occur because neighborhoods do not affect children. If the estimated effects of single equation models of children's outcomes are due to the endogenous nature of neighborhood choice (or characteristics of the children affecting the observed neighborhood characteristics in the case of the cross section analyses), there is no reason for changes in neighborhood quality from one period to the next to be related. If this is true, estimated coefficients of changes in the indicators from 1970 to 1980 in equations predicting changes in the indicators from 1980 to 1990 will be statistically insignificant.

Other researchers have studied census tract characteristics over time; however, there is no prior work that analyses the relationship between the changes in particular characteristics across periods. For example, John Kasarda (1993) finds for the largest 100 central cities in the U.S. the concentration of urban poverty worsened from 1980 to 1990, even in areas where there had been improvements from 1970 to 1980. This finding does not answer the question of whether the neighborhoods that had improved in the 1970s were hit less harshly, i.e., whether positive feedback loops induced by improvements in the 1970s reduced the effects of other factors in the 1980s. It only suggests that poor neighborhoods fared poorly in the 1980s. We should be able to see the difference by including the 1970 level of the neighborhood quality indicators and the change from 1970 to 1980 among the explanatory variables in a model designed to explain changes from 1980 to 1990. Other research on neighborhoods that analyzes data over time across census tracts includes Jargowsky (1995) and Abramson and Tobin (1994). Both find increasing economic segregation in U.S. metropolitan areas which is consistent with the Durlauf and the Crane models.

In probit and tobit regression analysis the variables are the percent of young adult dropouts, the percent of families in the neighborhood with female heads, and the percent of adults in the neighborhood employed in high status jobs (professional, executive, technical or managerial positions). The first two are included to control for the potential influence of negative role models, and the third controls for potential positive role models or connections to the job market. Their results suggest the percent of dropouts is negatively related to the probability of graduation. Surprisingly, the percent in high status jobs is weakly related to economic inactivity. The authors suggest this may be due to greater incidence of nonwork among spouses of high earners. The percent of female-headed households is not significant in any of the outcome equations.

3. Data

The data are from census extract files for 1970 and 1980,[14] 1990 Census Bureau STF3A files, and *County and City Data Book* 1983, 1988, and 1994 files. Census tracts are parts of counties identified by local census statistical area committees as approximating neighborhoods.[15] Approximately 26,000 tracts matched across the 1970, 1980, and 1990 files. To match more tracts over time the Census Bureau's *Tiger/Census Tract Comparability* file is used to match 1990 tracts to their 1980 numbers; the Census Bureau's *1970 Pre-1980 Tract Comparability* file is used to match 1980 tracts to 1970 numbers. Thus, the 31,957 tracts included are approximately equivalent to their 1970 geographic definitions. Tracts that were split in 1980 and 1990 have had their characteristics summed and statistics recalculated to represent information for the same geographic area as the 1970 tracts. Approximately 70 percent of the U.S. population lived in these tracts in 1970. Because about 73 percent of the population in 1970 lived in tracted areas, this represents the majority of neighborhoods for which information is available over this period.[16] Approximately 98 percent of these tracts are in metropolitan statistical areas, 56 percent in central cities, and 42 percent in suburban areas.[17]

Table 1 presents the means and standard deviations for the variables used: changes in the indicator variables from 1970 to 1980 and 1980 to 1990; the levels of the indicators in 1970, 1980, and 1990; control variables based on other hypotheses in the literature; and local government fiscal variables. Dollar amounts such as real mean family income, per capita taxes, and education expenditures are expressed in thousands of 1976 dollars.

---

[14] The 1970 and 1980 files were developed at the University of Michigan and are available through the ICPSR.

[15] They generally have populations between 2,500 and 8,000 persons with relatively homogeneous characteristics, economic status and living conditions. Boundaries are based on geographic landmarks maintained over long periods of time. Changes such as road or highway construction, new developments, or large changes in population can lead to redefinition of tracts.

[16] Block numbering areas (BNAs) are similar to tracts but are delineated by state agencies and the Census Bureau in areas where local census statistical area committees have not yet delineated tracts. I tried unsuccessfully to match data on BNAs from the 1970, 1980, and 1990 censuses. More tracts may be replacing BNAs over time.

[17] There are also 540 tracts for which at least one of the six indicators is missing in 1970, 1980, or 1990. The Census Bureau suppresses some information in small areas to protect privacy. These 540 tracts are much smaller (1970 average population of 1,280), have more poor persons (24 percent versus 13 percent in the tracts matched over time), but slightly higher real mean family income ($19,000 versus $18,400 in 1976 dollars), have more young adult dropouts (28 percent versus 14 percent in the tracts used), and are more likely to be part of a central city (75 percent versus 56 percent in the tracts used). Their exclusion implies a potential selection problem. If imputed values were used and their inclusion affected the results, I would have little faith in the imputations given the relatively small percentage of observations. Also, the best source for the imputation algorithm is based on the data for the other 31,957 tracts.

Table 1. Statistics for variables on census tract data set (N = 31,957)

Variable	Mean	Standard deviation
Indicator change variables		
Δ real* mean family income 1980-1990	1.003	5.002
Δ real* mean family income 1970-1980	0.272	3.454
Δ % income below poverty line 1980-1990	1.674	6.655
Δ % income below poverty line 1970-1980	0.906	7.189
Δ % families with female head 1980-1990	3.324	6.941
Δ % families with female head 1970-1980	5.428	7.031
Δ % young adult dropouts 1980-1990	-1.805	12.278
Δ % young adult dropouts 1970-1980	-0.266	11.124
Δ adult unemployment rate 1980-1990	0.445	4.533
Δ adult unemployment rate 1970-1980	2.705	4.254
Δ % high status occupations 1980-1990	4.118	6.103
Δ % high status occupations 1970-1980	1.958	6.298
Δ neighborhood quality principal component 1980-1990	0.005	0.475
Δ neighborhood quality principal component 1970-1980	-0.192	0.454
Indicator level variables		
Real* mean family income 1970	18.133	7.203
% persons w/income < poverty line 1970	12.145	11.249
% families with female head 1970	11.898	8.371
% young adult dropouts 1970	14.514	11.280
Adult unemployment rate 1970	4.461	2.925
% high status occupations 1970	23.113	13.160
Neighborhood quality principal component 1970	0.126	0.809
Real* mean family income 1980	18.404	7.506
% persons w/income < poverty line 1980	13.051	11.999
% families with female head 1980	17.326	12.460
% young adult dropouts 1980	14.248	12.454
Adult unemployment rate 1980	7.166	4.905
% high status occupations 1980	25.071	12.748
Neighborhood quality principal component 1980	-0.066	0.978
Real* mean family income 1990	19.407	10.639
% persons w/income < poverty line 1990	14.725	14.016
% families with female head 1990	20.650	14.733
% young adult dropouts 1990	12.443	11.956
Adult unemployment rate 1990	7.611	6.059
% high status occupations 1990	29.189	13.708
Neighborhood quality principal component 1990	-0.060	1.168
Controls based on literature		
Central city dummy	0.563	0.496
Suburban dummy	0.420	0.494
Log population metro/peer area 1980	14.162	1.306
% population nonwhite 1980	78.986	28.894
Δ % population nonwhite 1980-1990	-52.992	58.217
West region dummy	0.196	0.397
North east region dummy	0.288	0.453
North central region dummy	0.255	0.436
% population age 16-24 1980	17.006	6.515
Δ % population age 16-24 1980-1990	-3.723	3.665
% clerical/service employment 1980	32.369	8.380
Δ % clerical/service employment 1980-1990	-0.660	6.221
% manufacturing employment 1980	22.380	11.351
Δ % manufacturing employment 1980-1990	-5.548	6.209
% housing units vacant 1980	6.062	5.406
Δ % housing units vacant 1980-1990	1.466	5.247
Unemployment in state in 1980	6.615	1.479
Real* mean family income in state in 1980	18.502	1.594
Δ state adult unemployment rate 1980-1990	-0.269	1.393
Δ state real* mean family income 1980-1990	1.293	1.847

Table 1 (cont.). Statistics for variables on census tract data set (N = 31,957)

Variable	Mean	Standard deviation
Local government fiscal variables		
Ratio of local government debt to revenue 1981	0.858	0.799
Real local taxes per capita* 1981	0.128	0.183
Disparity local/peer tax per capita* 1981	-0.174	0.135
Real local educational expenditures per capita* 1981	0.250	0.116
Δ ratio local government debt to revenue 1981-1985	0.468	0.733
Δ real local tax per capita* 1981-1991	0.342	2.054
Δ disparity local tax per capita* 1981-1987	0.301	0.682
Δ real local educational expenditures per capita* 1981-1991	0.053	0.048

* All monetary variables are in thousands of 1976 dollars

The local government fiscal variables are based on city data; if city data are not available they are based on county data for the closest time period available.[18] Some variables also use data on the surrounding community (such as the log of the population of the metropolitan area or peer area, disparity between local and surrounding area per capita taxes, and change in disparity between local and surrounding area per capita taxes). For the majority of the tracts these data are based on the metropolitan statistical area or primary metropolitan statistical area in which the tract is located as defined in 1990.[19]

4. Results

4.1. How have the distributions changed over time?

The distributions of quality indicators reveal how neighborhoods have changed over time. For example, what is a high level of real mean family income? How have the distributions of indicators changed?

Figures 1 through 6 depict the approximate distributions of the neighborhood quality indicators. The distributions generally are skewed such that the means are closer to the minimums than the maximums. Reference lines have been drawn at the 5th and 95th percentiles. These figures indicate that in most cases the distributions have become more disparate. Not only has the percent of observations around the

[18] The latest data on local government debt are from 1985 and are only available for cities. The data closest to 1990 for local education expenditures are for 1991, and these data also are reported only on the city file. The missing values for the change in the ratio of local government debt to revenue and change in local education expenditures per capita are assigned the means of the other tracts.

[19] For approximately 2 percent of tracts not part of metropolitan areas, similar data are constructed based on peer groups of counties in the area. Peer groups are counties within 50 miles of the county in which the tract is located based on the longitude and latitude of the centers of the counties and the great circle distance formula: $69.17 \times \text{Arc}^{-1}(\text{Sin}(\text{latitude1}) \times \text{Sin}(\text{latitude2}) + \text{Cos}(\text{latitude1}) \times \text{Cos}(\text{latitude2}) \times \text{Cos}(\text{longitude1-longitude2}))$ as suggested by James Walker. For four counties in New Mexico and two in Hawaii the distance is extended to 100 and 200 miles to ensure at least one other peer.

Figure 1. Distribution of neighborhoods by real mean family income (1976 $)

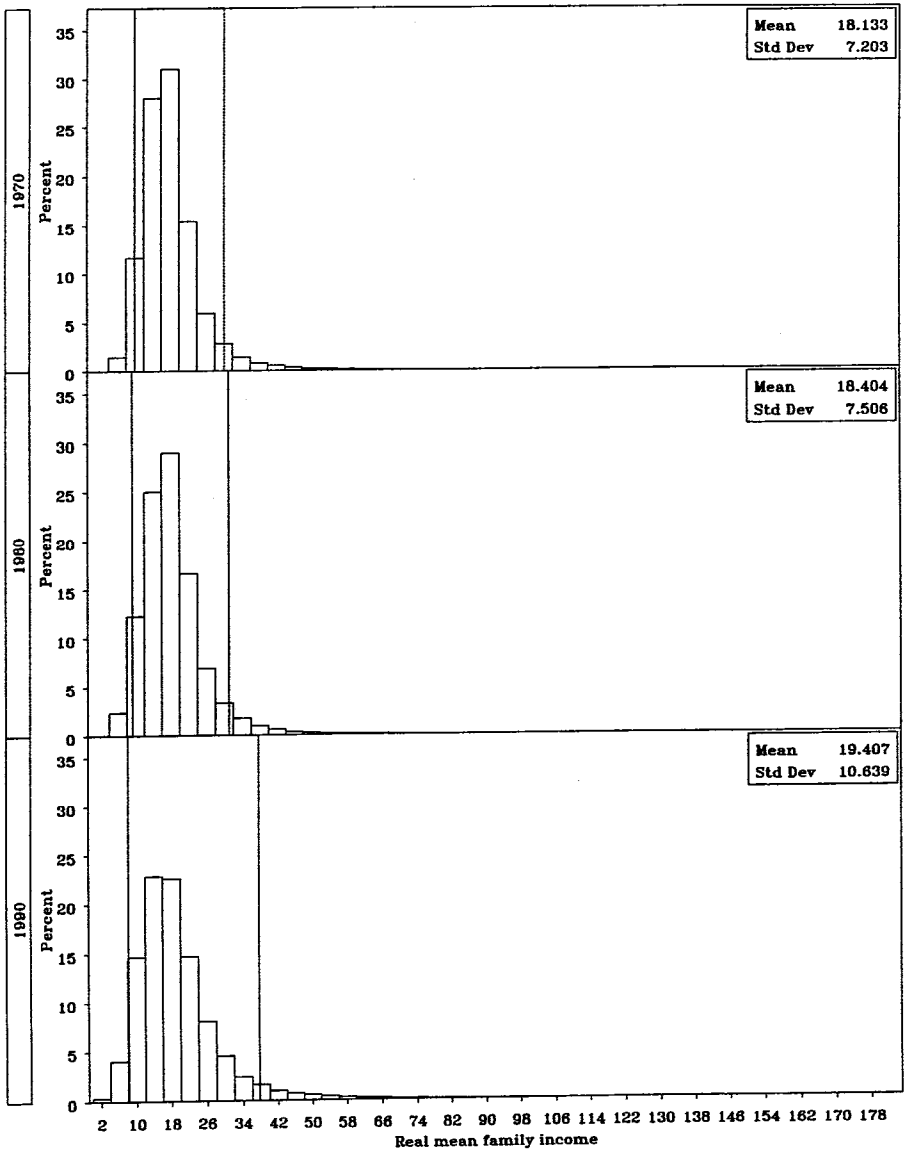


Figure 2. Distribution of neighborhoods by percent of persons below poverty

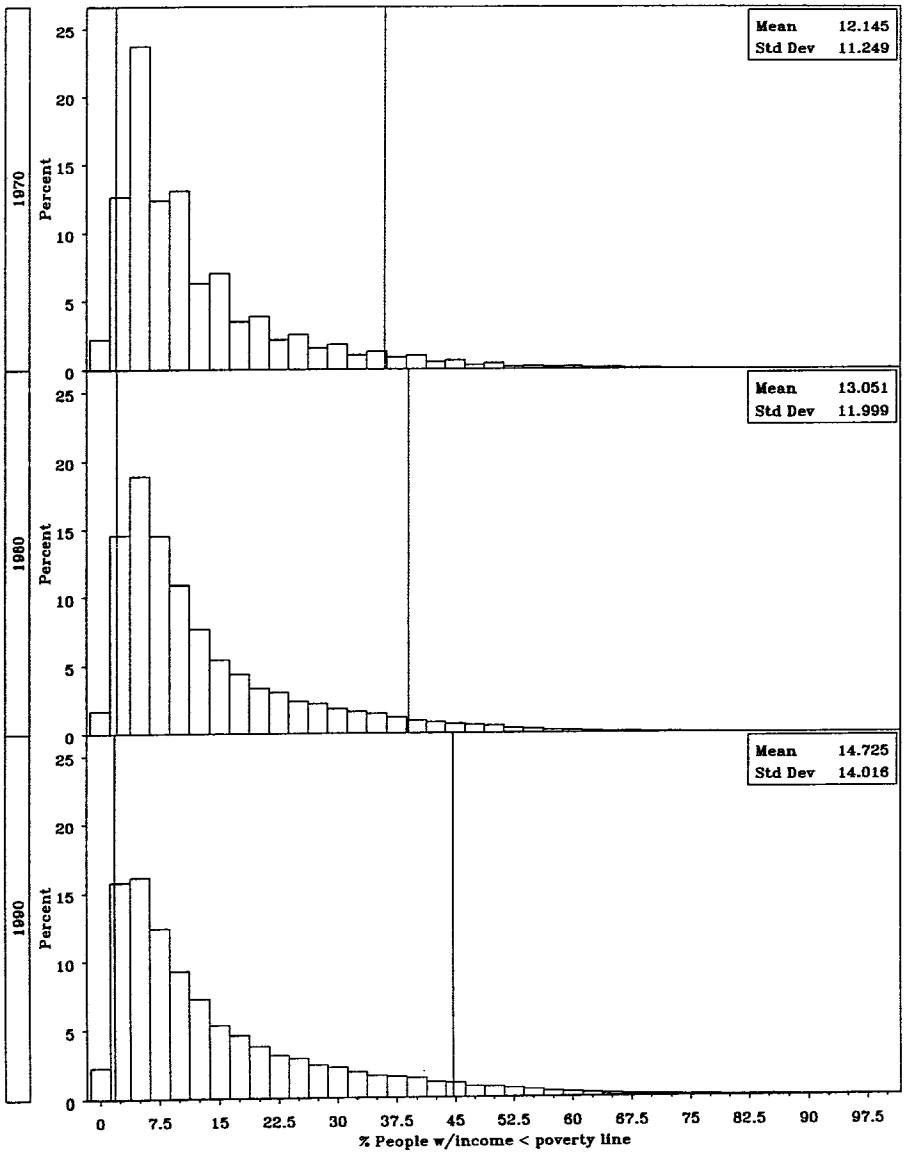


Figure 3. Distribution of neighborhoods by percent of families with female heads

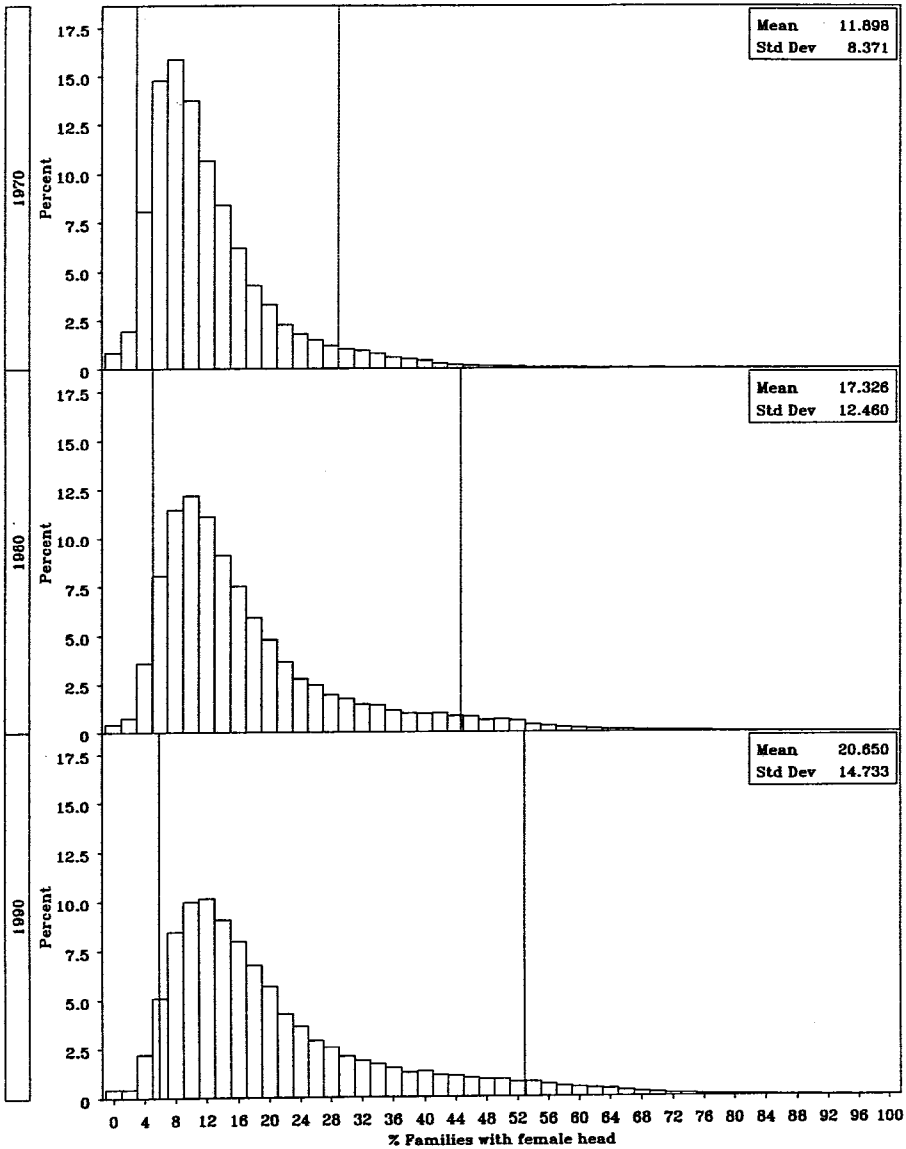


Figure 4. Distribution of neighborhoods by percent of young adult dropouts

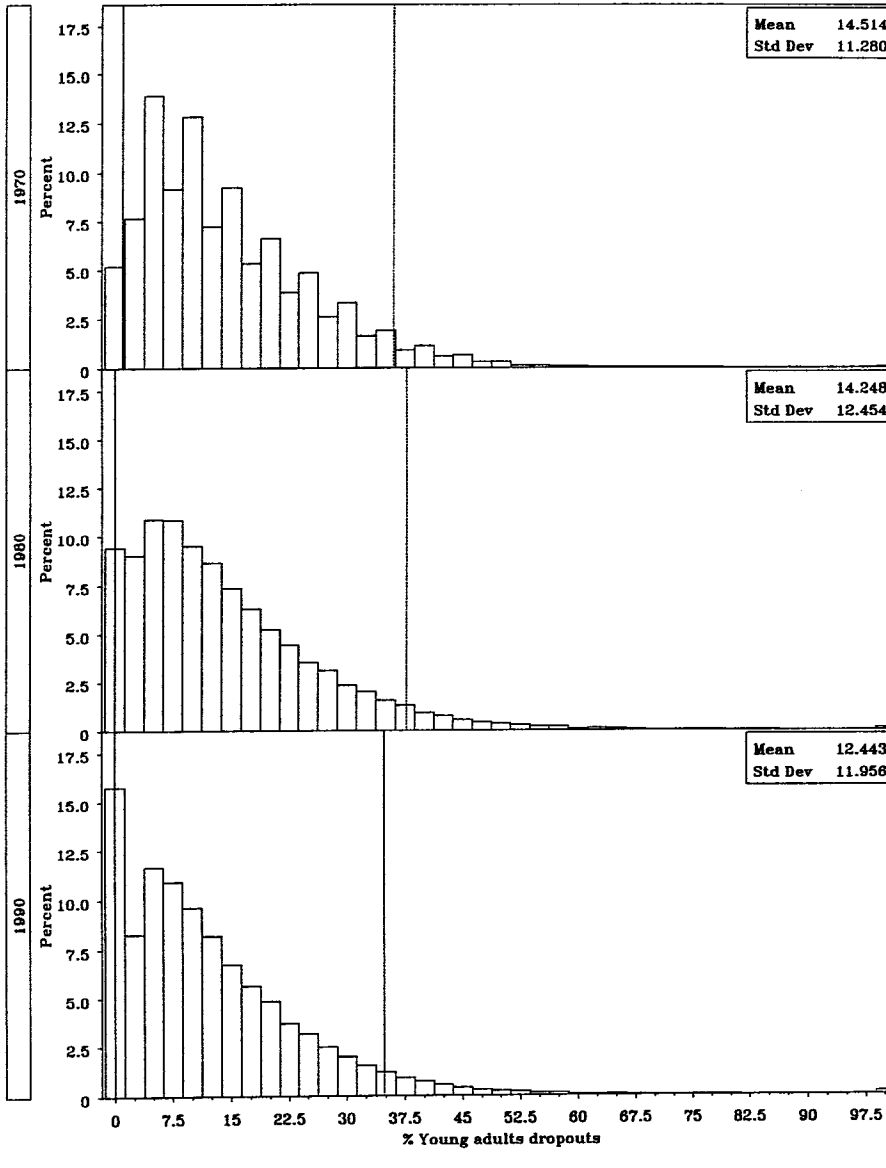


Figure 5. Distribution of neighborhoods by adult unemployment rate

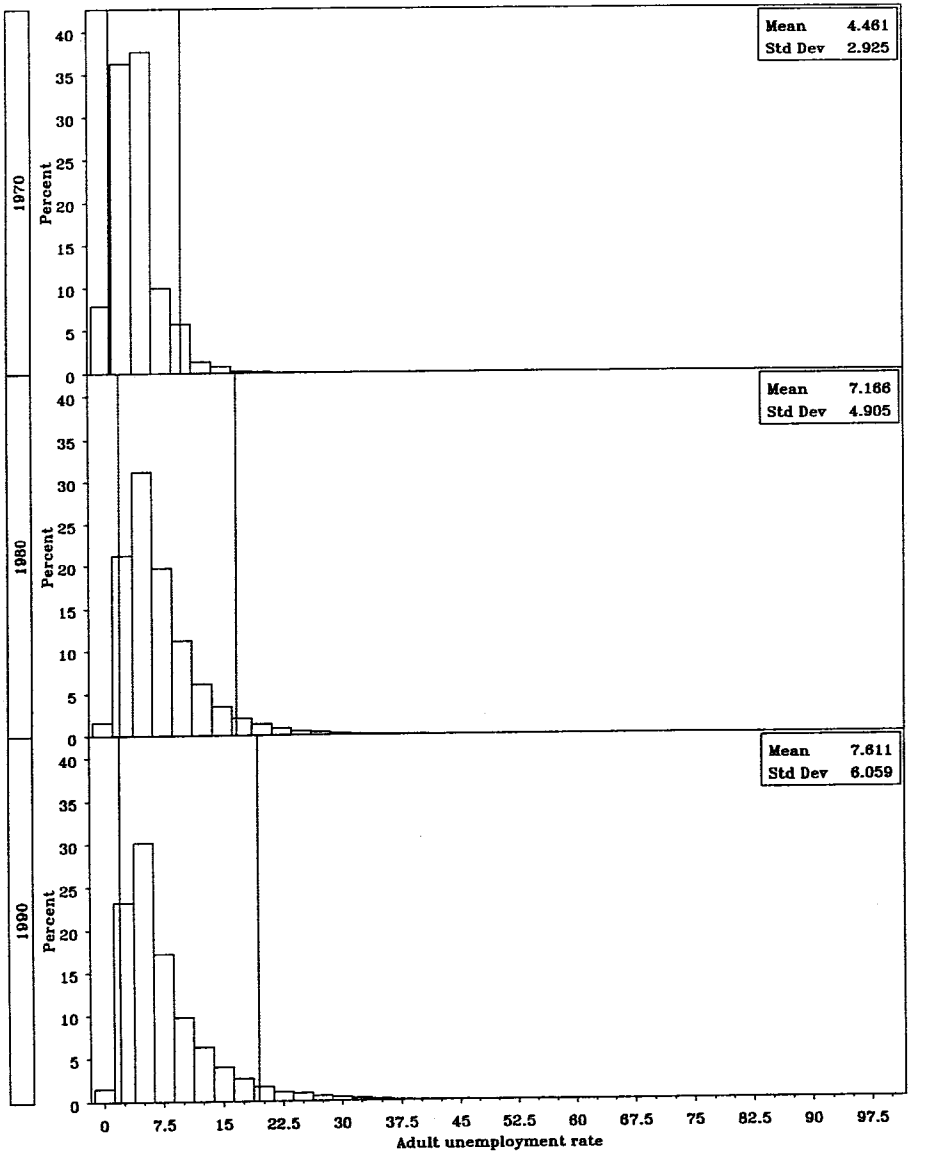
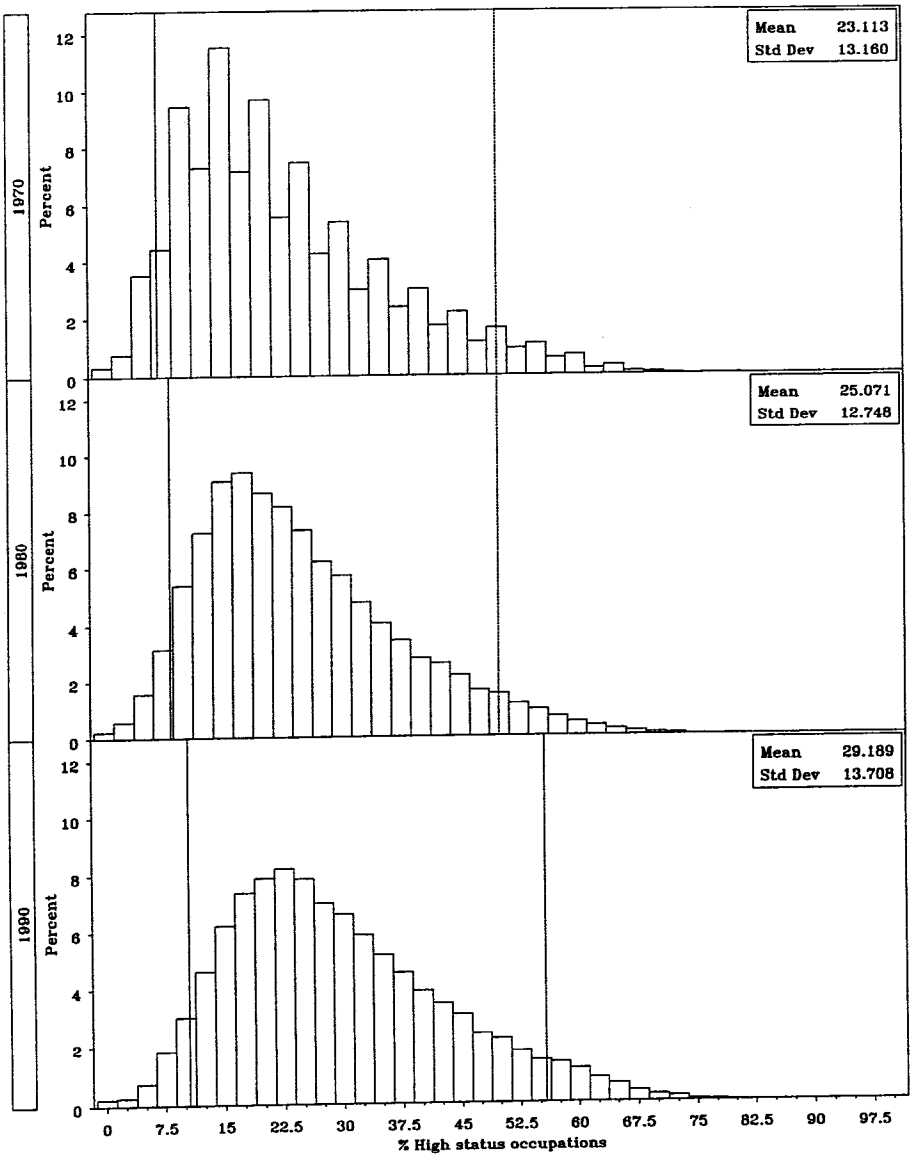


Figure 6. Distribution of neighborhoods by percent high status occupations



means decreased over time, but the gaps between the 5th and 95th percentiles have increased, as have the standard deviations.

The increasing disparity for most of the indicators is consistent with self-reinforcing changes in neighborhood quality.[20] Increasing disparity alone only weakly supports self-reinforcing changes in quality. Many other forces could lead to increasing disparity. For example, overall growth at the same percentage rate would increase the disparity between the tops and bottoms of the distributions, and the means of most of the indicators have been increasing. Hence, I examine these changes using regression analyses and including controls for other factors.

Table 2 summarizes Figures 1 through 6. In 1970 a high level of real mean family income for a neighborhood is $30,100 (in 1976 dollars) using the 95th percentile as a benchmark. By 1990 it takes approximately 25 percent more in real terms for a neighborhood to have higher mean family income than 95 percent of the neighborhoods—$37,700. A low level of real mean family income for a neighborhood in 1970 is $9,900 or less, but by 1990 to be in the bottom 5 percent a neighborhood needs $8,200 or less. Both the mean and the standard deviation of neighborhood real mean family income have increased.

Table 2 also presents the gaps between the 5th and 95th percentiles and the growth rates of the 5th and 95th percentile levels for the six direct indicators of neighborhood quality. The difference in the real mean family income at the 95th and 5th percentiles has increased. For example, the gap in 1970 is only $20,200 while by 1990 the gap is $29,500, an increase in disparity of about 46 percent. The increase is partially due to a drop in the real mean family income at the 5th percentile in both decades (from $9,900 to $9,300 to $8,200) and increases in the real mean family income at the 95th percentile in both decades (from $30,100 to $31,000 to $37,700). The 5th percentile declined at an increasing rate (-6 percent followed by -11 percent) while the 95th percentile increased at an increasing rate (3.2 percent followed by 21.5 percent). The increasing gap due to the drop in the 5th percentile is consistent with Crane. The increasing difference due to higher growth rates in real mean family income at the 95th percentile is consistent with Durlauf.

For the percent of persons below the poverty line, 2 percent is low, i.e., only about 5 percent of neighborhoods have less than 2 percent of persons below the poverty line in 1970, 1980, and 1990. A poverty rate of 36 percent or more in 1970 means a neighborhood has more poor persons than 95 percent of the neighborhoods. By 1990 a poverty rate greater than 44.7 percent indicates a higher percentage of poor persons than 95 percent of the neighborhoods.[21] The mean, standard deviation, and range of the percent of persons below the poverty line in neighborhoods have increased. The 95th percentile for persons below the poverty line has grown at an

[20] To the extent this increasing disparity has been noticed, it may suggest that neighborhoods are sorting into higher and lower quality levels and that feedback effects in neighborhood quality may exist.

[21] The definition of a poor neighborhood also has changed in the literature. With the 1970 census data the Census Department put out special data sets on poverty areas, i.e., tracts where more than 20 percent are poor. Wilson (1987) defines underclass neighborhoods as those where more than 30 percent are poor. Jargowsky and Bane (1990) define ghetto poverty as areas where more than 40 percent are poor.

Table 2. Distribution statistics for neighborhood quality indicators

Neighborhood quality indicator	1970	1980	1990	% growth 1970-1980	% growth 1980-1990
Real mean family income					
Mean	18.1	18.4	19.4	1.7	5.4
Standard deviation	7.2	7.5	10.6	4.2	41.3
High level (95th percentile)	30.1	31.0	37.7	3.0	21.6
Low level (5th percentile)	9.9	9.3	8.2	-6.1	-11.8
Gap between high and low level	20.2	21.7	29.5	7.4	35.9
% persons w/income < poverty line					
Mean	12.1	13.1	14.7	8.3	12.2
Standard deviation	11.2	12.0	14.0	7.1	16.7
High level (95th percentile)	36.0	39.0	44.7	8.3	14.6
Low level (5th percentile)	2.0	2.1	1.8	5.0	-14.3
Gap between high and low level	34.0	36.9	42.9	8.5	16.3
% families with female head					
Mean	11.9	17.3	20.7	45.4	19.7
Standard deviation	8.4	12.5	14.7	48.8	17.6
High level (95th percentile)	29.0	44.7	52.9	54.1	18.3
Low level (5th percentile)	3.0	5.1	5.9	70.0	15.7
Gap between high and low level	26.0	39.6	47.0	52.3	18.7
% young adult dropouts					
Mean	14.5	14.2	12.4	-2.1	-12.7
Standard deviation	11.3	12.5	12.0	10.6	-4.0
High level (95th percentile)	36.0	37.7	34.8	4.7	-7.7
Low level (5th percentile)	1.0	0.0	0.0	-100.0	n.a.
Gap between high and low level	35.0	37.7	34.8	7.7	-7.7
Adult unemployment rate					
Mean	4.5	7.2	7.6	60.0	5.6
Standard deviation	2.9	4.9	6.1	69.0	24.5
High level (95th percentile)	10.0	16.8	19.4	68.0	15.5
Low level (5th percentile)	1.0	2.1	2.0	110.0	-2.3
Gap between high and low level	9.0	14.7	17.4	63.3	18.4
% high status occupations					
Mean	23.1	25.1	29.2	8.7	16.3
Standard deviation	13.2	12.7	13.7	-3.8	7.9
High level (95th percentile)	50.0	50.0	55.7	-0.0	11.4
Low level (5th percentile)	7.0	8.4	10.5	20.1	25.0
Gap between high and low level	43.0	41.6	45.2	-3.3	8.7

increasing rate (8.3 percent followed by 14.7 percent) while the 5th percentile has been relatively stable at about 2 percent and declined slightly from 1980 to 1990. These data are generally consistent with self-reinforcing neighborhood quality, i.e., neighborhoods with high poverty rates tend toward higher poverty rates and neighborhoods with low poverty rates reach lower poverty rates.

The mean, standard deviation, and range of the percentage of families with female heads have increased. In 1970 a neighborhood with more than 29 percent of families with female heads has a higher rate of female headship than 95 percent of the neighborhoods. By 1990, 29 percent is less than one standard deviation from the mean percentage of families with female heads. In 1990 a neighborhood needs over 52.9 per-

cent female-headed families to have a higher rate of female headship than 95 percent of neighborhoods. The magnitude of this shift in the percent of families with female heads suggests nationwide forces are driving these changes. The growth rates are not consistent with self-reinforcing trends.

The only neighborhood quality indicator for which the gap between the 5th and 95th percentiles has not increased is the percent of young adult dropouts. The entire distribution of this variable shifted by 1990. The percent of young adult dropouts is generally lower, and more neighborhoods have low (close to 0) percentages of young adult dropouts. Because this represents a shift in the overall distribution, it is likely nationwide forces also are driving these changes. The gap between the 5th and 95th percentiles has shrunk as both the 5th and 95th percentiles have declined. The rates of decline have been much greater for the 5th percentile.[22]

The mean, standard deviation, and the range of the adult unemployment rates have increased. In 1970 a neighborhood with more than 10 percent adult unemployment has a higher adult unemployment rate than 95 percent of the neighborhoods. By 1990, 10 percent is less than one standard deviation from the mean adult unemployment rate. A neighborhood's unemployment rate needs to have almost doubled to over 19 percent to have a higher rate than 95 percent of these neighborhoods in 1990. Again this shift suggests nationwide forces are driving these changes and that growth rates are not consistent with self-reinforcing trends.

The percentage of adults in the neighborhood in high status occupations has increased at both ends of the distribution. This shift suggests nationwide forces are driving these changes and that growth rates do not appear consistent with self-reinforcing trends.

For five of the six indicators the gaps between high and low levels have increased. For two of these five indicators growth rates of high and low percentile levels are consistent with self-reinforcing trends. For the other three indicators the growth rates are not consistent with self-reinforcing trends. National trends or changes may better explain the increasing disparity.

4.2. How has the relative distribution of neighborhoods changed?

Looking at percentile levels means the same neighborhoods are not necessarily being compared over time. I drop the assumption that individuals are able to move and form neighborhoods instantaneously. Instead I study individual neighborhoods over time. *Ceteris paribus*, if there are positive feedback effects to neighborhood quality we would expect little relative mobility among neighborhoods based on the quality indi-

[22] As the dropout level of the 5th percentile reached 0 in 1980 the decline (negative growth) from 1980 to 1990 is missing, but similar patterns and further decline in dropouts exist when comparing 10th percentile and 90th percentile levels. This greater decline in the percent of young adult dropouts in better neighborhoods supports the Durlauf model. The declines in the dropout rate are part of a national phenomenon which makes interpretation of these results in neighborhood level changes precarious.

Table 3. Real mean family income transition matrix for neighborhoods from 1970 to 1980

Frequency
Percent
Row percent
Col percent

Decile of mean family income 1970	Decile of mean family income 1980									
	1	2	3	4	5	6	7	8	9	10
1	2088	700	231	82	43	19	11	10	5	7
	6.53	2.19	0.72	0.26	0.13	0.06	0.03	0.03	0.02	0.02
	65.33	21.90	7.23	2.57	1.35	0.59	0.34	0.31	0.16	0.22
	65.35	21.90	7.23	2.57	1.35	0.59	0.34	0.31	0.16	0.22
2	747	1119	640	367	170	66	41	22	18	6
	2.34	3.50	2.00	1.15	0.53	0.21	0.13	0.07	0.06	0.02
	23.37	35.01	20.03	11.48	5.32	2.07	1.28	0.69	0.56	0.19
	23.38	35.01	20.03	11.48	5.32	2.07	1.28	0.69	0.56	0.19
3	225	767	897	643	332	187	80	40	21	5
	0.70	2.40	2.81	2.01	1.04	0.59	0.25	0.13	0.07	0.02
	7.04	23.99	28.06	20.11	10.38	5.85	2.50	1.25	0.66	0.16
	7.04	24.00	28.07	20.12	10.39	5.85	2.50	1.25	0.66	0.16
4	65	368	746	800	564	358	169	85	30	9
	0.20	1.15	2.33	2.50	1.76	1.12	0.53	0.27	0.09	0.03
	2.04	11.52	23.36	25.05	17.66	11.21	5.29	2.66	0.94	0.28
	2.03	11.51	23.34	25.03	17.65	11.20	5.29	2.66	0.94	0.28
5	28	140	400	689	796	560	363	149	58	12
	0.09	0.44	1.25	2.16	2.49	1.75	1.14	0.47	0.18	0.04
	0.88	4.38	12.52	21.56	24.91	17.53	11.36	4.66	1.82	0.38
	0.88	4.38	12.52	21.56	24.91	17.52	11.36	4.66	1.81	0.38
6	15	58	170	375	718	823	600	302	99	34
	0.05	0.18	0.53	1.17	2.25	2.58	1.88	0.95	0.31	0.11
	0.47	1.82	5.32	11.74	22.48	25.77	18.79	9.46	3.10	1.06
	0.47	1.81	5.32	11.73	22.47	25.75	18.77	9.45	3.10	1.06
7	13	17	70	140	357	749	919	652	248	33
	0.04	0.05	0.22	0.44	1.12	2.34	2.88	2.04	0.78	0.10
	0.41	0.53	2.19	4.38	11.16	23.42	28.74	20.39	7.75	1.03
	0.41	0.53	2.19	4.38	11.17	23.44	28.75	20.40	7.76	1.03
8	4	12	32	68	165	316	732	1078	692	98
	0.01	0.04	0.10	0.21	0.52	0.99	2.29	3.37	2.17	0.31
	0.13	0.38	1.00	2.13	5.16	9.88	22.90	33.72	21.65	3.07
	0.13	0.38	1.00	2.13	5.16	9.89	22.90	33.73	21.65	3.07
9	2	12	6	17	42	96	243	769	1497	510
	0.01	0.04	0.02	0.05	0.13	0.30	0.76	2.41	4.68	1.60
	0.06	0.38	0.19	0.53	1.31	3.01	7.61	24.08	46.87	15.97
	0.06	0.38	0.19	0.53	1.31	3.00	7.60	24.06	46.84	15.96
10	8	3	4	15	8	22	38	89	528	2481
	0.03	0.01	0.01	0.05	0.03	0.07	0.12	0.28	1.65	7.76
	0.25	0.09	0.13	0.47	0.25	0.69	1.19	2.78	16.52	77.63
	0.25	0.09	0.13	0.47	0.25	0.69	1.19	2.78	16.52	77.65

cators. The self-reinforcing nature of neighborhood quality should perpetuate the relative positions of neighborhoods.

Transition matrices[23] and mobility indices can be used to analyze the relative mobility of neighborhoods. For example, Table 3 shows the transition matrix for neighborhood decile rankings for real mean family income in 1970 and 1980. The rows indicate the relative decile ranking in 1970 while the columns indicate the ranking in 1980. Because the greatest frequencies for each ranking are at the same ranking

[23] This technique has been used in previous work to examine the mobility of individuals and families in income and wealth; see, for example, Steckel and Krishnan (1992).

ten years later, the matrix is diagonally dominant, as are the transition matrices for the other indicators. In general, the greater the magnitude of the difference in the 1970 and 1980 rankings, the more rare the transition. Large changes in relative rankings, however, do occur. For example, the top right corner of Table 3 indicates seven neighborhoods that are in the bottom decile in 1970 are in the top decile in 1980. We do not know if these are cases of gentrification or of dramatic improvements for real mean family income.

Bartholomew and Shorrocks have developed measures for relative mobility. These are given in Table 4 for each of the six indicators of neighborhood quality. Both measures use cell proportions from transition matrices. Shorrocks measure is:

$$\frac{n - \text{trace}(P)}{n - 1}$$

where:

P = A diagonally dominant matrix; and

n = The number of ranks in the transition matrix.

Shorrocks' measure captures the proportion of neighborhoods that change relative rank.

Bartholomew's measure is:

$$\sum_i p_i \sum_j p_{ij}|i - j|$$

where:

p_i = Row proportions; and

p_{ij} = Cell proportions.

Bartholomew's measure captures the average change in rank between the two periods of the transition matrix.

Table 4 shows the relative mobility of neighborhoods is lowest based on real mean family income for either index. The highest relative mobility from 1970 to 1980 is for the unemployment rate, while the highest from 1980 to 1990 is for the percent of young adult dropouts. The relative mobility of neighborhoods is increasing over time based on income, female-headed families, and the dropout rate, but decreasing based on the other three primary indicators.

For all of the indicators over half the neighborhoods change their relative decile rank. The lowest value in Table 4 for Shorrock's measure, approximating the proportion of neighborhoods that changes relative rank, is .677. Based on Bartholomew's measure the approximate average change in rank over a decade ranges from 1.182 to 2.005.

This degree of relative mobility is inconsistent with strong self-reinforcing feedback effects. Self-reinforcing feedback effects would increase the effects of perturbations to some neighborhoods, however. Other changes that affect neighborhoods

Table 4. Relative mobility indices of neighborhoods from 1970 to 1990

Indicator	Shorrock's mobility index[1]			Bartholomew's mobility index[2]		
	1970-1980	1980-1990	1970-1990	1970-1980	1980-1990	1970-1990
Real mean family income	0.677	0.691	0.753	1.182	1.284	1.379
% persons w/income < poverty	0.775	0.733	0.811	1.459	1.372	1.545
% families w/female head	0.774	0.719	0.805	1.445	1.295	1.513
% young adult dropouts	0.877	0.880	0.910	1.730	1.804	1.969
Adult unemployment rate	0.937	0.867	0.946	1.959	1.765	2.005
% high status occupations	0.704	0.684	0.769	1.286	1.230	1.417

[1]Shorrock's mobility index = $\frac{n\text{-trace}(P)}{n - 1}$, where P is a diagonally dominant transition matrix

[2]Bartholomew's mobility index = $\sum_i p_i \sum_j p_{ij}|i - j|$

could lead to false conclusions regarding feedback effects; therefore, we turn to regression analysis that includes controls for other factors affecting neighborhoods.

4.3. Does regression analysis support feedback loops for neighborhood quality?

Regression analysis can test for feedback effects both with and without controls for other characteristics and changes. The relationship between later changes in neighborhood quality and prior changes in neighborhood quality is a measure of the potential feedback effect. If the estimates of this relationship are positive, this is evidence of positive feedback effects. An estimated relationship near zero is evidence of no relationship, no long-term feedback effects, and no neighborhood effects. A negative relationship implies that self-restraining forces act on neighborhood quality.

If positive feedback loops are operating, neighborhood characteristics should show trends. In regression analyses these trends should be distinguishable from national trends or shifts captured by the intercept. These feedback loop trends also should be distinguishable from regional and statewide trends because they imply different patterns for different neighborhoods. For example, we can use ordinary least squares (OLS) to test whether neighborhoods where mean family income declined from 1970 to 1980 are more likely to decline from 1980 to 1990 while controlling for statewide economic conditions such as unemployment and income levels and changes in state unemployment and income levels from 1980 to 1990.

Whether feedback effects exist at the tails of the distribution is of particular interest. If the estimated coefficient on prior change in neighborhood income is positive for low quality neighborhoods, this lends support to the Crane concept of epidemics that lead to ghetto formation. Similarly, high quality neighborhoods that improved in the 1970s should be more likely to improve in the 1980s if the self-reinforcing human capital investment process Durlauf posits exists.

Other control variables are included to distinguish explanations of the rise or decline of neighborhoods and to avoid omitted variable bias. For example, Wilson

(1987) suggests that social problems are greatest in large northern cities with high minority populations, where the middle class has left, where the population age profile is younger (due to migration or rapid increases in births), and where there have been structural shifts in the labor market from manufacturing to administration, information, and services production. Variables that attempt to control for these factors include:

- Regional dummies;
- Central city and suburban dummies;
- Log of population of metropolitan or peer area;
- Percent of neighborhood nonwhite;
- Change in percent of the neighborhood nonwhite;
- Percent of housing units vacant;
- Change in percent of housing units vacant;
- Percent of the neighborhood population between the ages of 16 and 24;[24]
- Change in percent of the neighborhood population between the ages of 16 and 24;
- Percent of persons employed in manufacturing;
- Change in percent of persons employed in manufacturing;
- Percent of persons employed in clerical or service sector;
- Change in percent of persons employed in clerical or service sector.

Some researchers suggest that local conditions such as employment, local government fiscal distress, disparity between local and surrounding communities, or increasing divergence between local and surrounding communities have led to urban decline and the plight of central city (ghetto) neighborhoods (Downs 1981; Bradbury, Downs, and Small 1982; Oakland 1979). Some indicators and controls such as unemployment and changes in the percent employed in manufacturing and services and the percent of vacancies may capture some signs of distress. Additional controls to proxy for these factors include local government fiscal variables:

- Ratio of local government debt to revenue;
- Change in the ratio of local government debt to revenue;
- Real local taxes per capita;
- Change in real local taxes per capita;
- Real local education expenditures per capita;
- Change in local education expenditures per capita;

[24] William Julius Wilson quotes James Wilson as hypothesizing "that an abrupt rise in the number of young persons has an 'exponential effect on the rate of certain social problems'" including "'crime, addiction and welfare dependency'" (p. 38). A simple pooled OLS regression using county data to estimate the relationship between the crime rate, an intercept, the six indicators but at the county level, time dummies, and the percent of persons between age 16 and 24 supports this possibility. The estimated coefficient on the percent of persons between age 16 and 24 is positive and highly significant. The crime rate is not used in this study because crime data are not generally available at the census tract level. Crime data exist at the tract level for four metropolitan areas for some years and could be useful for future research.

- Disparity between local and metropolitan area or peer county taxes per capita; and
- Change in disparity between local and metropolitan area or peer county taxes per capita.

Regressions initially are run with no controls. Then regressions are run adding sets of control variables systematically. The controls are added in the following groups:

- A control for the 1970 level of the indicator;
- Controls for the 1980 levels of the other five indicators;
- State real mean family income and unemployment levels;
- Changes from 1980 to 1990 in state real mean family income and unemployment levels;
- The controls suggested by Wilson's hypotheses; and
- Controls for local government fiscal conditions.

As there are theoretical reasons to believe each of these sets of control variables could be related to both later and earlier changes in the indicators, omission of these variables could bias the estimated relationships between later and earlier changes in the neighborhood quality indicators. Regressions without the full set of controls are run to test for robustness. They indicate the signs of the estimated relationships between later changes in neighborhood quality and earlier changes in neighborhood quality are robust. These results are available from the author.[25]

Estimations including dummy variables indicating observations at the tails of the distributions are run because of our special interest in these neighborhoods. The estimates suggest potentially important differences. Therefore, three separate regressions estimating equations for the best 5 percent, worst 5 percent, and the remaining 90 percent of neighborhoods are run.[26] Tests of the hypothesis that the parameter estimates in the separate equations are significantly different suggest highly significant differences.[27] This implies potentially different relationships between changes in neighborhood quality indicators and factors affecting those changes at the tails of the

---

[25] Five of the indicators are percent variables that cannot go below 0 or exceed 100. If the indicator in 1990 had a value 0 or 100 it is possible the propensity of the neighborhood to change from 1980 to 1990 is censored. Censored regression analyses of these indicators yield identical results, with the exception of occasional third decimal place differences in standard errors. These results are omitted, but are available from the author.

[26] The best 5 percent of neighborhoods based on real mean family income is defined as the highest 5 percent in 1970. Similarly the best 5 percent for the percent employed in high status occupations is the highest 5 percent in 1970. Because the other indicators generally represent social problems the lowest 5 percent in 1970 is defined as the best 5 percent and the highest 5 percent as the worst 5 percent in these analyses.

[27] All the χ^2 statistics exceed the critical χ^2 value at the 1 percent level and are listed in Appendix A. The critical χ^2 value is approximately 19.27 at the 1 percent level. Tests for significant improvement in fit between the equation using just the dummy and dummy interaction variables and separate equations for best, worst, and other neighborhoods also suggest a better fit with the separate equations. The χ^2 statistics are 2233.0 for the real mean family income equations, 728.4 for the percent below poverty, 835.51 for the percent of female-headed families, 441.51 for the percent of young adult dropouts, 886.0 for unemployment, and 1179.0 for the percent employed in high status occupations.

distributions. Table 5 presents the coefficients for the primary relationships in each of these estimations.[28]

The estimated long-term feedback effects for the six quality indicators are presented in Table 5. These estimates are based on regressions using the full set of controls. They generally suggest that changes in neighborhood quality indicators are negatively associated with prior changes in the same indicators, and that this relationship is statistically significant. This suggests dampening effects or self-restraining processes exist. For all of the indicators except real mean family income the results are the same sign and significance for each of the subsamples, but the magnitudes of the coefficients differ substantially.

The estimated coefficient on change in real mean family income is positive and statistically significant for the 5 percent of neighborhoods with the highest initial real mean family incomes. This suggests that for high income neighborhoods there are positive feedback effects to the evolution of real mean family income, consistent with Durlauf's model.

The estimated coefficients for the 5 percent of neighborhoods with the lowest real mean family incomes and for the other 90 percent of neighborhoods, however, are negative and significant. The estimated coefficient for the worst 5 percent of neighborhoods is -.484 compared to -.121 for the other 90 percent of neighborhoods. The worst 5 percent of neighborhoods in real mean family income face dramatically stronger self-restraining forces than do most neighborhoods.[29] This is inconsistent with the Crane and Durlauf models and suggests that changes in real mean family income have different effects at different ends of the distribution.

The estimated coefficients on change in percent of persons below the poverty line are all negative and statistically significant, but the magnitude of the estimated coefficient for the best neighborhoods (where poverty is lowest) is substantially larger than for the worst neighborhoods (-.794 versus -.453). The self-restraining forces acting on change in the poverty rate are stronger in the best neighborhoods.

The estimated coefficients on change in families with female heads are negative and significant, but the estimated coefficient for the best neighborhoods (where female headship is lowest) is substantially larger than for the worst neighborhoods (-.607 versus -.490). The self-restraining forces acting on change in the percent of families with female heads are stronger in the better neighborhoods, i.e., those with few female-headed families.

The estimated coefficients on change in percent of young adult dropouts are negative and significant and are not significantly different from each other.

The estimated coefficients on change in the unemployment rate are negative and statistically significant, but the magnitude of the estimated coefficient for the best neighborhoods (where unemployment is lowest) is substantially larger than for the

[28] The results of these regressions and the results of the regressions with pooled observations are presented in Appendix A.

[29] Public policies that provide a social safety net may contribute to these stronger self-restraining forces for the worst 5 percent of neighborhoods by increasing assistance in response to adverse changes and reducing assistance in response to improvements. The data do not reveal whether this is true.

Table 5. Change in neighborhood quality indicators from 1980 to 1990 estimations

Variable / Tracts:	All coefficients (std. error)	Worst 5% coefficients (std. error)	Best 5% coefficients (std. error)	Other coefficients (std. error)
Δ real mean family income 1970-1980	0.017**	-0.484***	0.116***	-0.121***
	(0.007)	(0.039)	(0.031)	(0.009)
Δ % people below poverty line 1970-1980	-0.393***	-0.453***	-0.794***	-0.402***
	(0.007)	(0.032)	(0.024)	(0.007)
Δ % families with female head 1970-1980	-0.452***	-0.490***	-0.607***	-0.444***
	(0.007)	(0.033)	(0.020)	(0.007)
Δ % young adult dropouts 1970-1980	-0.766***	-0.793***	-0.777***	-0.772***
	(0.006)	(0.024)	(0.028)	(0.006)
Δ adult unemployment rate 1970-1980	-0.713***	-0.693***	-0.924***	-0.729***
	(0.006)	(0.027)	(0.023)	(0.007)
Δ % high status employment 1970-1980	-0.274***	-0.399***	-0.381***	-0.307***
	(0.005)	(0.031)	(0.022)	(0.006)

* Significant at 10 percent level
** Significant at 5 percent level
*** Significant at 1 percent level

worst neighborhoods (-.924 versus -.693). The self-restraining forces' acting on change in unemployment are stronger in better neighborhoods, i.e., those with low unemployment.

The estimated coefficients on change in the percent employed in high status occupations are negative and significant and do not differ significantly.

There are substantial differences in the feedback effects of neighborhood change at the tails of the distributions of the neighborhood quality indicators. With the exception of real mean family income for high income neighborhoods, these findings are inconsistent with positive feedback effects. The results strongly support negative feedback effects, implying self-restraining forces exist.

4.4. Does the relationship between changes in neighborhood quality indicators represent regression toward the mean?

The increasing disparity discussed in section 4.1 indicates that neighborhoods are not moving toward a mean level of neighborhood quality. The negative feedback effects, however, raise the question of whether observations over time fall around a neighborhood-specific mean. Regression toward this neighborhood-specific mean would be a name for such self-restraining force. If neighborhoods have some level of quality around which periodic observations fall, other theories of neighborhood change have not accounted for this characteristic. Naming this self-restraining process does not explain why it exists.

If each neighborhood has some level of quality around which the observations made in 1970, 1980, and 1990 will fall, then the best estimate of that level of a particular indicator in 1990 is the average of the values in 1970 and 1980. If the 1990

value tends toward this value, the expected coefficient estimating the relationship between later and earlier changes in the indicators would be -1/2.[30]

In Table 5 the estimated coefficients on prior change in real mean family income, percent of persons that have incomes below the poverty line, and percent of families with female heads for the worst 5 percent of neighborhoods are not significantly different from -1/2. This suggests some support for the hypothesis that the worst neighborhoods may be moving toward some mean level; however, the reasons behind the pattern remain unclear. The differences between these coefficients and the estimated coefficients for other groups suggest other feedback processes also are operating. Fifteen of the 18 coefficients are significantly different from -1/2 which suggests other feedback processes probably are operating.

4.5. Can positive feedback effects be detected with alternative subsamples?

Because positive feedback effects are not found for most of the indicators, a secondary question is whether we are using the proper subsamples. For example, suburban and central city neighborhoods may evolve so differently that they should be examined using separate equations.

Results of separate regressions on suburban, central city, and rural neighborhoods reveal that, collectively, the estimated coefficients for these subsamples are significantly different based on F tests. The estimated coefficients on the variables of interest are negative and significant, but not statistically different for these subsamples, except for the coefficient estimates on real mean family income. The estimated coefficient on prior change in real mean family income is positive (.083) for suburban neighborhoods and negative for central city neighborhoods (-.149). This contradicts Crane's model for feedback loops because ghettos are more likely to be found in central cities. The signs are consistent with the earlier evidence suggesting positive feedback effects to change in real mean family income in higher income neighborhoods, as suburban neighborhoods tend to have higher incomes than do central city neighborhoods. Given the change sign when the top 5 percent of neighborhoods are included, the positive coefficient for suburban neighborhoods is probably a result similar to the effects in high income neighborhoods.

These results are evidence of self-restraining effects in central cities and positive feedback effects in suburbs. This is not an exception to our basic results, and the overall fit of the model based on the sum of the squared errors declines compared to the fit of the model distinguishing tails of the distributions. These results are available from the author.

---

[30] This follows from simple algebra where I_t is the indicator observed in period t.

$$E(I_{1990}) = (I_{1980} + I_{1970})/2$$
$$E(I_{1990} - I_{1980}) = (I_{1980} + I_{1970})/2 - I_{1980}$$
$$E(I_{1990} - I_{1980}) = I_{1970}/2 - I_{1980}/2$$
$$E(I_{1990} - I_{1980}) = -1/2(I_{1980} - I_{1970})$$

Another possible breakdown of the observations is by performance. To observe long-term feedback effects between periods, the changes in the first period may need to be substantial. We may want to analyze the data using separate regressions for observations based on the distribution of performance, i.e., separate regressions for those neighborhoods improving the most or deteriorating the most in the first decade of the observation period. Results of separate regressions on the best and worst 5 percent based on performance from 1970 to 1980 suggest statistically different coefficients for these neighborhoods. Not surprisingly, based on the overall self-restraining effects found in the other estimations, the estimated coefficients on the prior change for each of the later change in indicators equations are negative and significant, except in the real mean family income estimations. In the real mean family income estimations the estimated coefficients are positive for the neighborhoods that perform the worst in the first period and negative for the best performing neighborhoods. Again the fit for this breakdown is poorer than with the breakdown based on the tails of the distribution. These estimates are available from the author.

Another possible breakdown of the neighborhoods is based on racial mix. In trying to model ghetto neighborhood formation, Crane's model may capture the dynamics of minority neighborhoods. We analyze the data using separate regressions for observations based on the minority population percentage. The neighborhoods that were all white in 1970,[31] the neighborhoods with nonwhite population percentage greater than 95 percent of the neighborhoods,[32] and mixed race neighborhoods between these extremes are examined using separate regressions. The estimated coefficients on prior changes are negative and significant in all estimations except change in real mean family income. In the real mean family income estimations the estimated coefficients on prior change are negative for neighborhoods with the highest percent for nonwhite populations and for all white neighborhoods. The estimated coefficient is positive for mixed race neighborhoods. The fit for this breakdown is poorer than the breakdown based on the tails of the distributions of the indicators. These estimates are available from the author.

These alternative breakdowns do not shed much light on feedback effects, but suggest the overall results are robust.

4.6. Do the estimated coefficients support other theories of neighborhood change?

Wilson argues that social dislocations, such as changes in the urban job structure, affect the magnitudes of social problems in neighborhoods. This analysis supports this argument and the basic argument that local fiscal conditions affect neighborhood quality. All of the control variables have significant coefficients in multiple estimations. This suggests that these factors influence neighborhood change. The estimated

[31] Of the 31,957 neighborhoods examined, 8,910 were all white in 1970.

[32] These neighborhoods had populations that were 85 percent or more nonwhite in 1970.

coefficients do not always have the signs suggested by researchers, however, and some of the coefficients differ at the tails of the distributions.

In the regressions on change in real mean family income from 1980 to 1990 the percent of families with female heads in 1980 has significant estimated coefficients in both the best and worst neighborhoods, but opposite signs (-.049 in the worst neighborhoods and .331 in the best neighborhoods).[33] The incidence of female headship may reduce mean family income in the worst neighborhoods but not in the best neighborhoods. The percent of the population between 16 and 24 has had negative effects on change in real mean family income in the worst neighborhoods, positive effects in the best neighborhoods, and effects with opposite signs for level and change for other neighborhoods.[34]

Analyses of variables that Wilson associates with past social dislocations yield mixed results. For example, northern areas more likely have seen a rise in poverty and unemployment. Northern areas also have had a rise in real mean family income, a decline in the percent of female-headed families in the north east, declines in the percent of young adult dropouts, and increases in the percent employed in high status occupations. More populated areas have had more increases in the percent of young adult dropouts, but also have had income rise, poverty decline, the percent female-headed families decline, unemployment decline, and the percent employed in high status occupations increase. Neighborhoods with higher or increasing minority populations have increasing problems based on these six indicators. Higher and increasing housing vacancy generally are associated with increases in all the indicators except occasionally at the tails; vacancy is associated with both good and bad changes.

The percent of the population between 16 and 24 gives conflicting results for the best and worst neighborhoods. The results for the worst neighborhoods are consistent with Wilson's views, but the results for the best neighborhoods conflict. These conflicting signs for the best and worst neighborhoods persist except for the change in persons below poverty and those employed in high status occupations. For the percent of persons below poverty the estimated effect of population between 16 and 24 is consistently positive (which makes sense because most persons are poorest when young). For the change in employment in high status occupations the estimated effect of the population between 16 and 24 is consistently negative (which also makes sense because few youths are employed in high status jobs).

---

[33] The signs on the estimated coefficients for young adult dropouts conflict, although the coefficient for the worst 5 percent of neighborhoods is not significant. The estimated coefficient on the suburban dummy is positive for 90 percent of neighborhoods, but negative for the neighborhoods at the tails (although insignificant).

[34] The conflicting signs on the percent of the population age 16 to 24 may represent the conflicting influences of this group on resources invested in young persons. The larger the group, the more likely such investments would be favored, but also the greater the strain on resources. For example, in high income neighborhoods a greater percentage of youths may imply more parents voting in favor of these investments, while in poorer neighborhoods the increased strain on resources may dominate. Assuming (as in the Durlauf model) these investments affect the youths' human capital formation, they also could affect real mean family income in the next period.

Rather than the neighborhood declines with shifts from manufacturing to clerical and service employment that Wilson suggests, changes in these two variables have similar effects. Both higher percentages of workers employed in manufacturing and higher percentages of workers employed in clerical and service industries are associated with lower real mean family income, higher poverty, higher percent of young adult dropouts, lower unemployment, and lower percent occupied in high status occupations.

Increases in state real mean family income and unemployment generally have the expected signs, except in the change in percent employed in high status occupations where the effects are more strongly related to the state level of income and unemployment.

The additional controls used to proxy for fiscal distress and disparity are significant in more than one of the estimations. High local debt to revenue is associated with declining real mean family income and increasing poverty. Increasing local debt to revenue is associated with increasing real mean family income, declining percentages of families with female heads, declining percentages of young adult dropouts in the worst neighborhoods, and declining unemployment.

Increases in local per capita taxes are negatively related to changes in real mean family income, but tax levels are positively related to changes in real mean family income. Both are negatively related to change in poverty and change in the percent of young adult dropouts, but have mixed results for the other indicators.

Education expenditures are negatively related to changes in real mean family income, positively related to changes in poverty, positively related to changes in the percent of female-headed families, negatively related to change in the percent of young adult dropouts, negatively related to the change in unemployment, and positively related to the change in high status occupations.

The disparity between local taxes and taxes in the metropolitan area or peer area is positively related to changes in real mean family income, negatively related to the change in the percent of families with female heads, and negatively related to the change in unemployment. Generally each of these changes would be considered improvements in neighborhood quality; however, they need to be weighed against relationships that, while not significant, suggest potentially deleterious effects. For example, tax disparity is positively related to changes in the poverty rate and the percent of young adult dropouts and negatively related to changes in high status employment.

The associations of these local fiscal variables with changes in the indicators suggest local policy makers face tradeoffs in their attempts to influence the quality of the local community. That these tradeoffs should exist rather than particular fiscal choices having unilaterally beneficial or detrimental effects is not surprising.

The main focus of these analyses is not to test Wilson's theories. To test Wilson's theories, future research could focus on underclass neighborhoods where poverty rates exceed 30 percent or neighborhoods where manufacturing was prevalent in 1970. To test fiscal distress theories, future research could compare neighborhoods in areas with high fiscal distress or local tax disparity levels that have received state or federal aid to neighborhoods that have not received outside aid.

4.7. How would a single indicator of neighborhood quality summarize the overall patterns?

The analyses of changes in the six indicators give a sense of the variation in the relationships affecting changes in neighborhood quality. The volume of information provided by these indicators is almost too great to answer basic questions and understand overall patterns.

Multiple indicators generate voluminous information. What we want to capture is the quality of the neighborhoods and how it varies as the indicators vary. To capture the maximum variation of these indicators in a single indicator I estimate a principal components measure of neighborhood quality.[35]

To construct a principal components measure of neighborhood quality, data on the six indicators for 1970, 1980, and 1990 are pooled. The measure should capture variation across neighborhoods and across time.[36] The six variables used in the principal components construction are real mean family income, the percent of the population not below poverty, the percent of male-headed families, the percent of young adult high school graduates, the employment rate, and the percent employed in high status occupations. The eigen vector weights for the centered values for these variables are .4336, .4597, .4222, .3352, .4115, and .3875. The greatest weights are on the percent of persons above poverty and the real mean family income. This principal component captures 58.7 percent of the generalized variance in the indicators. Table 1 shows that average neighborhood quality has declined since 1970 based on this measure.[37]

Table 6 presents regression results from the principal components measure of neighborhood quality. Overall change is negatively and significantly related to prior change in neighborhood quality. These negative feedback effects are approximately 30 percent stronger in the worst 5 percent of neighborhoods. The initial level is also negatively related to changes in neighborhood quality except for the best 5 percent of neighborhoods.

Contrary to Wilson's suggestions, neighborhoods in large metropolitan areas are more likely to improve in quality; moreover, increases in manufacturing employment share are associated with declines in neighborhood quality. The results based on the principal components measure are consistent with Wilson's views regarding central city versus suburban neighborhoods, the effects of increasing percentages of minority and youth populations, and neighborhoods in northern regions being more likely to decline.

---

[35] Principal components analysis finds the linear combination of a set of variables that has the greatest variance of any standardized length combination. Thus, it may proxy the quality we are trying to capture.

[36] If separate principal components measures were used, it would imply different weights on the six indicators in the different periods. To facilitate interpretation, some of the indicators first are used to construct variables positively associated with quality.

[37] The minimum and maximum values in 1990 are further apart than in 1970, consistent with the distributional findings of Figures 1 through 6 and Table 2.

Table 6. Change in neighborhood quality principal components measure from 1980 to 1990 estimations

Variable / Tracts:	All coefficients (std. error)	Worst 5% coefficients (std. error)	Best 5% coefficients (std. error)	Other coefficients (std. error)
Δ principal component 1970-1980	-0.266***	-0.365***	-0.244***	-0.249***
	(0.006)	(0.028)	(0.027)	(0.006)
Principal component 1970	-0.077***	-0.013	0.025	-0.089***
	(0.004)	(0.044)	(0.028)	(0.005)
Central city dummy	-0.041**	-0.043	0.037	-0.044**
	(0.017)	(0.153)	(0.133)	(0.016)
Suburban dummy	0.041**	0.058	0.073	0.040**
	(0.017)	(0.163)	(0.133)	(0.016)
Log population of metro/peer area 1980	0.035***	0.033	0.051***	0.034***
	(0.002)	(0.022)	(0.010)	(0.002)
% nonwhite 1980	-0.022***	-0.032***	-0.026***	-0.022***
	(0.000)	(0.003)	(0.004)	(0.000)
Δ % nonwhite 1980-1990	-0.013***	-0.020***	-0.013***	-0.013***
	(0.000)	(0.002)	(0.002)	(0.000)
North central region dummy	-0.032***	-0.095	0.054	-0.029***
	(0.009)	(0.086)	(0.033)	(0.009)
North east region dummy	-0.005	0.038	0.008	-0.004
	(0.009)	(0.081)	(0.032)	(0.009)
West region dummy	0.049***	0.113	0.092***	0.040***
	(0.008)	(0.075)	(0.031)	(0.008)
% population age 16-24 1980	-0.004***	-0.006	0.005***	-0.004***
	(0.000)	(0.003)	(0.002)	(0.000)
Δ % population age 16-24 1980-1990	-0.006***	-0.008*	-0.002	-0.006***
	(0.001)	(0.004)	(0.003)	(0.001)
% clerical/service employment 1980	-0.021***	-0.030***	-0.032***	-0.019***
	(0.000)	(0.003)	(0.002)	(0.000)
Δ % clerical/service employment 1980-1990	-0.023***	-0.026***	-0.032***	-0.023***
	(0.000)	(0.002)	(0.002)	(0.000)
% manufacturing employment 1980	-0.006***	-0.011***	-0.005***	-0.006***
	(0.000)	(0.002)	(0.002)	(0.000)
Δ % manufacturing employment 1980-1990	-0.005***	-0.007**	0.000	-0.005***
	(0.000)	(0.003)	(0.002)	(0.000)
% housing units vacant 1980	0.001	0.009***	0.008***	-0.001**
	(0.000)	(0.003)	(0.002)	(0.001)
Δ % housing units vacant 1980-1990	-0.006***	0.001	-0.008***	-0.007***
	(0.000)	(0.002)	(0.002)	(0.000)
Unemployment in state 1980	-0.016***	-0.044*	0.004	-0.015***
	(0.003)	(0.025)	(0.010)	(0.002)
Δ state unemployment 1980-1990	-0.054***	-0.106***	-0.011	-0.052***
	(0.003)	(0.025)	(0.010)	(0.003)
Real mean family income in state 1980	-0.010***	-0.021	-0.008	-0.009***
	(0.002)	(0.017)	(0.008)	(0.002)
Δ real mean family income in state 1980-1990	0.045***	0.068**	0.064***	0.042***
	(0.002)	(0.025)	(0.009)	(0.002)
Ratio local govt debt to revenue 1981	-0.004	-0.008	-0.005	-0.004
	(0.003)	(0.023)	(0.018)	(0.003)
Δ ratio local govt debt to revenue 1981-1985	0.009**	0.017	-0.008	0.008**
	(0.003)	(0.024)	(0.015)	(0.003)
Δ local taxes per capita 1981-1991	-0.044	-0.232	0.219*	-0.049
	(0.032)	(0.208)	(0.126)	(0.032)
Real local taxes per capita 1981	0.321***	0.309	0.169	0.304***
	(0.030)	(0.214)	(0.102)	(0.030)
Δ local educ expenditures per capita 1981-1991	-0.029	-0.092	0.120	-0.030
	(0.052)	(0.414)	(0.242)	(0.051)
Real local educ expenditures per capita 1981	-0.088***	-0.073	-0.060	-0.106***
	(0.024)	(0.179)	(0.098)	(0.024)
Δ disparity local/peer taxes per capita 1981-1987	0.116	0.667	-0.654*	0.134
	(0.095)	(0.622)	(0.378)	(0.095)

Table 6 (cont.). Change in neighborhood quality principal components measure 1980 to 1990 estimations

Variable	Tracts: All coefficients (std. error)	Worst 5% coefficients (std. error)	Best 5% coefficients (std. error)	Other coefficients (std. error)
Disparity in local/peer taxes per capita 1981	0.033 (0.111)	1.051 (0.791)	-0.677 (0.420)	0.022 (0.111)
Intercept	1.521*** (0.053)	3.000*** (0.476)	1.309*** (0.302)	1.501*** (0.052)
R-squared	0.356	0.364	0.398	0.346
Adjusted R-squared	0.355	0.352	0.386	0.345
Error degrees of freedom	31926	1566	1566	28732
Number of parameters in model	31	31	31	31
Sum of squared errors	4640	773	153	3619
χ^2 value for test of joint significance of subgroup interactions:	663.09			

* Significant at 10 percent level
** Significant at 5 percent level
*** Significant at 1 percent level

For the principal components measure of neighborhood quality the level of local government debt to revenue has a negative coefficient, while change in this ratio has a positive coefficient. These conflicting signs are plausible, because the results from individual indicators shows that this ratio has both potentially advantageous and disadvantageous effects. The tradeoffs in the increased potential tax burden and the benefits of the expenditures associated with the debt and potential unemployment decreases are depicted in these coefficients. The signs of the coefficients on taxes and changes in taxes also conflict, but the positive coefficient on per capita taxes is much larger and statistically significant. This suggests taxes are positively associated with changes in neighborhood quality. This is consistent with Durlauf's suggestion that persons with high incomes purposely stratify into neighborhoods with higher taxes and greater levels of public services. The negative coefficients on education expenditures conflict with his model.

5. Conclusion

Analyses of 31,957 neighborhoods from 1970 to 1990 show that the disparity in neighborhood quality has increased. Average neighborhood poverty rates have increased. The average percent of families with female heads and the average unemployment rate in neighborhoods also have increased. On a more favorable note, average neighborhood real mean family income has increased, as has the percent of adults employed in high status occupations. The average percent of young adult dropouts has declined. On average, overall neighborhood quality has declined. This conclusion is based on the distributional analyses of the indicators, the magnitudes of their

changes, and the decline in the principal components measure of neighborhood quality.[38]

Changes in neighborhood quality indicators are significantly related to prior changes. Contrary to existing theoretical models of neighborhood change, these analyses generally support long-term negative feedback effects. The exception is neighborhood real mean family income in high income neighborhoods. We find positive feedback effects for this indicator. The results for real mean family income are consistent with Durlauf's model, but his model does not fit well with the other five indicators or with the principal components measure.[39]

The worst neighborhoods appear to face strong negative feedback effects that are about one-third larger than those faced by other neighborhoods based on the principal components measure. For the worst neighborhoods the feedback effects associated with changes in real mean family income, the percent of persons with incomes below the poverty line, and the percent of families with female heads are consistent with regression toward neighborhood-specific mean values.

The changes in indicators between periods do not support the idea that improvements in quality in disadvantaged neighborhoods will have positive multiplier effects (Case and Katz 1991). Large shocks or interventions may diminish the negative feedback effects a disadvantaged neighborhood faces to levels faced by most neighborhoods. These results suggest the long-term effects of small shocks or interventions are likely to be reduced approximately 40 percent to 80 percent by negative feedback effects.

These results suggest additional questions for empirical research and the need for new theories. Do government assistance programs or community development efforts contribute to the negative feedback effects of changes in neighborhood quality, thus limiting the propensity of neighborhoods to improve and the extent to which they deteriorate? How much do neighborhood characteristics such as geography, housing stock quality, zoning restrictions, or capital investments in community resources such as schools, community centers, parks, and churches influence neighborhood change? Are they the fundamental source of negative feedback effects? Could increased capital investments in community resources reduce the ceiling aspects of negative feedback effects faced by the worst neighborhoods?

This analysis is limited by the indicators of neighborhood quality examined. Other indicators of neighborhood quality such as small area crime statistics may shed

---

[38] Properly weighting these changes is a judgment call; however, this conclusion also is supported by the positive significant coefficients on time dummies in the county regressions on crime. This conclusion is also consistent with Jargowsky and Bane's (1990) suggestion that renewed interest in ghetto neighborhoods stems from increased homelessness and increased media coverage of a growing underclass.

[39] The results regarding education expenditures send conflicting messages about Durlauf's model because real mean family income tends to decline as the level of education expenditures rises and with increases in education expenditures, but the percent of young adult dropouts and the unemployment rate also tend to decline. The first seems to conflict with the idea that high income families seek neighborhoods making higher investments in education. The latter two effects suggest education expenditures improve neighborhood quality. Because the results show changes in real mean family income are positively related to the level of taxes necessary to fund education expenditures, this does not conflict with education expenditures as a transmission mechanism for real mean family income over time.

more light on the issues. The author would encourage greater small area-based data gathering on other important indicators of neighborhood quality.

References

Abramson, Alan J., and Mitchell S. Tobin, "The Changing Geography of Metropolitan Opportunity: The Segregation of the Poor in U.S. Metropolitan Areas, 1970 to 1990," Fannie Mae Annual Housing Conference, Washington, D.C., 1994.

Bradbury, Katherine, Downs, Anthony, and Kenneth Small, *Urban Decline and the Future of American Cities* (Washington, D.C.: The Brookings Institution, 1982).

Case, Anne C., and Lawrence F. Katz, "The Company You Keep: The Effects of Family and Neighborhood on Disadvantaged Youths," National Bureau of Economic Research, Working Paper No. 3705 (1991).

Clark, Rebecca, "Neighborhood Effects on Dropping Out of School Among Teenage Boys," Population Studies Center of the Urban Institute, Discussion Paper Series PSC-DSC-UI-13 (December 1992).

Crane, Jonathan, "The Epidemic Theory of Ghettos and Neighborhood Effects on Dropping Out and Teenage Childbearing," *American Journal of Sociology*, 96, no. 5 (March 1991), pp. 1226-1259.

Downs, Anthony, *Neighborhoods and Urban Development* (Washington, D.C.: The Brookings Institution, 1981).

Durlauf, Steven N., "A Theory of Persistent Income Inequality," National Bureau of Economic Research, Working Paper No. 4056 (April 1992).

Durlauf, Steven N., "Neighborhood Feedbacks, Endogenous Stratification, and Income Inequality," Theoretical Economics Conference on New Theories of Inequality (August 24, 1993).

Durlauf, Steven N., "Spillovers, Stratification, and Inequality," *European Economic Review*, 38 (1994), pp. 836-845.

Evans, William N., Wallace E. Oates, and Robert M. Schwab, "Measuring Peer Group Effects: A Study of Teenager Behavior," *Journal of Political Economy*, 100, no. 5 (1992), pp. 966-991.

Haveman, Robert and Barbara Wolfe, "The Determinants of Children's Attainments: A Review of Methods and Findings," *Journal of Economic Literature*, 33 (December 1995), pp. 1829-1878.

Haveman, Robert and Barbara Wolfe, *Succeeding Generations: On the Effects of Investments in Children* (NY, NY: Russell Sage Foundation, 1994).

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

Jargowsky, Paul A., and Mary Jo Bane, "Ghetto Poverty: Basic Questions," in Laurence E. Lynn, Jr., and Michael G.H. McGeary (eds.), *Inner-City Poverty in the United States* (Washington, D.C.: National Academy Press, 1990).

Jencks, Christopher, and Susan E. Mayer, "The Social Consequences of Growing Up in a Poor Neighborhood," in Laurence E. Lynn, Jr., and Michael G.H. McGeary (eds.), *Inner-City Poverty in the United States* (Washington, D.C.: National Academy Press, 1990).

Johnstone, John W.C., "Social Class, Social Areas and Delinquency," *Sociology and Social Research*, 63 (1978), pp. 49-72.

Ludwig, Jens, "Do Youths in Urban Poverty Neighborhoods Underestimate the Returns to Education?" Ph.D. dissertation, Duke University (1995).

Manski, Charles, "Identification of Endogenous Social Effects: The Reflection Problem," *Review of Economic Studies*, 60, paper 639/1 (1993).

Oakland, William, "Central Cities: Fiscal Plight and Prospects for Reform," in Peter Mieszkowski and Mahlon Straszheim (eds.), *Current Issues in Urban Economics* (Baltimore, MD: The John Hopkins University Press, 1979).

Rao, C.R., "The Use and Interpretation of Principal Component Analysis in Applied Research," *Sankhya A*, 26 (1964), pp. 329-358.

Shorrocks, A.F., "The Measurement of Mobility," *Econometrica*, 46, no. 5 (September 1978), pp. 1013-1024.

Steckel, Richard and Jayanthi Krishnan, "Wealth Mobility in America: A View From the National Longitudinal Survey," National Bureau of Economic Research, Working Paper No. 4137 (August 1992).

Tietenberg, Tom, *Environmental and Natural Resource Economics* (New York, NY: Harper Collins, Publishers, 1992).

Wilson, James Q., *Thinking About Crime* (New York: Basic Books, 1975).

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

Appendix A—Full regression estimations for neighborhood quality indicators

Table A1. Change real mean family income 1980 to 1990 estimations

Variable	Tracts: All coefficients (std. error)	Worst 5% coefficients (std. error)	Best 5% coefficients (std. error)	Other coefficients (std. error)
Δ real mean family income 1970-1980	0.017**	-0.484***	0.116***	-0.121***
	(0.007)	(0.039)	(0.031)	(0.009)
Real mean family income 1970	0.217***	-0.557***	0.296***	-0.049***
	(0.005)	(0.085)	(0.024)	(0.009)
% persons w/income < poverty line 1980	0.092***	0.013	0.319***	0.049***
	(0.004)	(0.009)	(0.084)	(0.004)
% families with female head 1980	0.005	-0.049***	0.331***	-0.014***
	(0.004)	(0.008)	(0.049)	(0.004)
% young adult dropouts 1980	0.011***	-0.008	0.065*	0.003
	(0.002)	(0.005)	(0.032)	(0.002)
Adult unemployment rate 1980	-0.042***	-0.034**	-0.247*	-0.051***
	(0.007)	(0.013)	(0.140)	(0.006)
% high status occupations 1980	0.047***	0.091***	0.017	0.089***
	(0.003)	(0.012)	(0.040)	(0.003)
Central city dummy	-0.007	0.153	-0.689	0.201
	(0.166)	(0.450)	(8.806)	(0.145)
Suburban dummy	0.339*	-0.083	-0.337	0.616***
	(0.167)	(0.475)	(8.827)	(0.145)
Log population metro/peer area 1980	0.361***	0.366***	1.391***	0.404***
	(0.024)	(0.093)	(0.274)	(0.021)
% nonwhite 1980	-0.132***	-0.136***	-0.424***	-0.123***
	(0.005)	(0.013)	(0.091)	(0.004)
% nonwhite change 1980-1990	-0.069***	-0.074***	-0.245***	-0.062***
	(0.002)	(0.007)	(0.041)	(0.002)
North central region dummy	0.326***	-0.147	0.326	0.361***
	(0.091)	(0.385)	(0.967)	(0.080)
North east region dummy	0.559***	0.111	0.646	0.444***
	(0.086)	(0.390)	(0.882)	(0.076)
West region dummy	0.650***	-0.073	1.425	0.522***
	(0.080)	(0.314)	(0.903)	(0.070)
% population age 16-24 1980	-0.013***	-0.040***	0.087**	-0.022***
	(0.004)	(0.009)	(0.036)	(0.003)
Δ % population age 16-24 1980-1990	0.026***	-0.075***	0.115*	0.022***
	(0.006)	(0.015)	(0.067)	(0.005)
% clerical/service employment 1980	-0.141***	-0.050***	-0.474***	-0.134***
	(0.004)	(0.011)	(0.074)	(0.004)
Δ % clerical/service employment 1980-1990	-0.148***	-0.085***	-0.278***	-0.156***
	(0.004)	(0.009)	(0.054)	(0.004)
% manufacturing employment 1980	-0.040***	-0.020*	-0.031	-0.036***
	(0.003)	(0.010)	(0.049)	(0.003)
Δ % manufacturing employment 1980-1990	-0.027***	-0.015	-0.017	-0.031***
	(0.005)	(0.011)	(0.070)	(0.004)
% housing units vacant 1980	0.059***	0.049***	0.159***	0.044***
	(0.005)	(0.011)	(0.052)	(0.005)
Δ % housing units vacant 1980-1990	0.030***	0.023**	0.056	0.011**
	(0.004)	(0.009)	(0.062)	(0.004)
Unemployment in state 1980	-0.028	0.113	0.059	-0.030
	(0.025)	(0.100)	(0.297)	(0.022)
Δ state adult unemployment rate 1980-1990	-0.088***	-0.010	-0.064	-0.129***
	(0.027)	(0.107)	(0.310)	(0.024)
Real mean family income in state 1980	-0.226***	-0.150**	-0.031	-0.125***
	(0.020)	(0.071)	(0.214)	(0.018)
Δ state real mean family income 1980-1990	0.850***	0.563***	1.712***	0.768***
	(0.023)	(0.108)	(0.256)	(0.020)

Table A1 (cont.). Change real mean family income 1980 to 1990 estimations

Variable / Tracts:	All coefficients (std. error)	Worst 5% coefficients (std. error)	Best 5% coefficients (std. error)	Other coefficients (std. error)
Ratio of local govt debt to revenue 1981	-0.104***	-0.191*	-0.143	-0.083***
	(0.028)	(0.100)	(0.541)	(0.025)
Δ ratio local govt debt to revenue 1981-1985	0.053*	0.042	-0.386	0.017
	(0.031)	(0.078)	(0.554)	(0.028)
Δ real local tax per capita# 1981-1991	-0.807**	-0.607	0.737	-0.725**
	(0.309)	(0.867)	(3.506)	(0.275)
Real local taxes per capita# 1981	1.603***	0.448	0.280	2.001***
	(0.295)	(1.002)	(2.822)	(0.264)
Δ local educ. expenditures per capita# 1981-1991	-2.386***	1.667	-7.381	-1.571***
	(0.510)	(1.797)	(6.198)	(0.444)
Real local educ expenditures per capita# 1981	-0.785***	-0.715	-2.586	-0.692***
	(0.233)	(0.765)	(2.663)	(0.206)
Δ disparity local tax per capita# 1981-1987	2.282**	1.702	-2.303	2.083**
	(0.927)	(2.598)	(10.513)	(0.823)
Disparity local/peer tax per capita# 1981	1.520	-0.115	-5.892	0.955
	(1.082)	(3.145)	(11.815)	(0.966)
Intercept	4.311***	11.145***	-1.899	5.772***
	(0.531)	(2.035)	(11.644)	(0.472)
R-squared	0.447	0.328	0.405	0.404
Adjusted R-squared	0.447	0.313	0.391	0.404
Error degrees of freedom	31921	1563	1561	28725
Akaike's information criterion	84021	3380	6938	64919
Number of parameters in model	36	36	36	36
Sum of squared errors	442004	12656	117626	274155
χ^2 value for test of joint significance of subgroup interactions:	2958.4			

* Significant at 10 percent level
** Significant at 5 percent level
*** Significant at 1 percent level
North central region includes OH, IN, IL, MI, WI, MN, IA, MO, ND, SD, NE, KS; north east region includes ME, NH, VT, MA, RI, CT, NY, NJ, PA; west region includes MT, ID, WY, CO, NM, AZ, UT, NV, WA, OR, CA, AK, HI
#In thousands of 1976 dollars

Table A2. Change % persons w/income < poverty line 1980 to 1990 estimations

Variable / Tracts:	All coefficients (std. error)	Worst 5% coefficients (std. error)	Best 5% coefficients (std. error)	Other coefficients (std. error)
Δ % persons w/income < poverty line 1970-1980	-0.393*** (0.007)	-0.453*** (0.032)	-0.794*** (0.024)	-0.402*** (0.007)
% persons w/income < poverty line 1970	-0.219*** (0.006)	-0.458*** (0.038)	-0.686*** (0.118)	-0.193*** (0.007)
Real mean family income 1980	0.025*** (0.008)	-0.201** (0.094)	-0.002 (0.013)	0.017** (0.008)
% families with female head 1980	0.148*** (0.006)	0.218*** (0.028)	0.110*** (0.018)	0.135*** (0.006)
% young adult dropouts 1980	0.045*** (0.003)	0.045** (0.019)	0.007 (0.010)	0.047*** (0.003)
Adult unemployment rate 1980	0.204*** (0.010)	0.122** (0.050)	0.075** (0.029)	0.228*** (0.011)
% high status occupations 1980	-0.002 (0.005)	-0.049 (0.039)	-0.041*** (0.010)	0.003 (0.005)
Central city dummy	-0.045 (0.250)	2.175 (1.823)	0.233 (1.167)	-0.085 (0.245)
Suburban dummy	-1.392*** (0.250)	0.163 (1.892)	-0.752 (1.164)	-1.405*** (0.244)
Log population metro/peer area 1980	-0.482*** (0.036)	-0.429 (0.338)	-0.138 (0.093)	-0.444*** (0.036)
% nonwhite 1980	0.319*** (0.007)	0.373*** (0.053)	0.111*** (0.020)	0.335*** (0.007)
% nonwhite change 1980-1990	0.164*** (0.004)	0.189*** (0.028)	0.066*** (0.009)	0.170*** (0.004)
North central region dummy	0.668*** (0.137)	2.079 (1.371)	-0.696** (0.274)	0.832*** (0.137)
North east region dummy	0.569*** (0.129)	-0.598 (1.350)	-0.341 (0.294)	0.613*** (0.129)
West region dummy	0.234* (0.120)	1.068 (1.166)	-0.592** (0.279)	0.409*** (0.119)
% population age 16-24 1980	0.144*** (0.005)	0.142*** (0.026)	0.095*** (0.020)	0.155*** (0.006)
Δ % population age 16-24 1980-1990	0.182*** (0.009)	0.206*** (0.055)	0.112*** (0.020)	0.181*** (0.009)
% clerical/service employment 1980	0.094*** (0.007)	0.223*** (0.041)	0.013 (0.017)	0.092*** (0.007)
Δ % clerical/service employment 1980-1990	0.100*** (0.006)	0.247*** (0.032)	0.046*** (0.015)	0.084*** (0.007)
% manufacturing employment 1980	0.021*** (0.005)	0.070* (0.040)	0.010 (0.011)	0.020*** (0.005)
Δ % manufacturing employment 1980-1990	-0.026*** (0.007)	0.119*** (0.043)	0.029 (0.019)	-0.045*** (0.007)
% housing units vacant 1980	0.041*** (0.007)	-0.134*** (0.042)	0.218*** (0.027)	0.054*** (0.007)
Δ % housing units vacant 1980-1990	0.113*** (0.007)	-0.046 (0.032)	0.199*** (0.025)	0.130*** (0.007)
Unemployment in state 1980	0.254*** (0.038)	0.061 (0.371)	0.073 (0.087)	0.244*** (0.038)
Δ state adult unemployment rate 1980-1990	0.793*** (0.041)	1.252*** (0.384)	0.183* (0.095)	0.749*** (0.041)
Real mean family income in state 1980	0.160*** (0.030)	0.037 (0.262)	0.069 (0.074)	0.136*** (0.030)
Δ state real mean family income 1980-1990	-0.797*** (0.035)	-1.649*** (0.391)	-0.234*** (0.082)	-0.803*** (0.035)
Ratio of local govt debt to revenue 1981	0.112** (0.043)	0.198 (0.365)	0.166 (0.123)	0.096** (0.042)
Δ ratio local govt debt to revenue 1981-1985	0.089* (0.047)	0.356 (0.290)	0.082 (0.143)	0.042 (0.048)

Table A2 (cont.). Change % persons w/income < poverty line 1980 to 1990 estimations

Variable	Tracts: All coefficients (std. error)	Worst 5% coefficients (std. error)	Best 5% coefficients (std. error)	Other coefficients (std. error)
Δ real local tax per capita# 1981-1991	-0.545	4.941	-2.154	-0.487
	(0.465)	(3.902)	(1.481)	(0.455)
Real local taxes per capita# 1981	-2.987***	1.517	-1.185	-2.880***
	(0.444)	(3.675)	(1.183)	(0.440)
Δ local educ expenditures per capita# 1981-1991	-0.744	-3.508	-0.270	-0.003
	(0.767)	(5.788)	(2.173)	(0.757)
Real local educ expenditures per capita# 1981	1.413***	4.025	0.927	1.280***
	(0.351)	(2.816)	(0.924)	(0.347)
Δ disparity local tax per capita# 1981-1987	1.784	-14.08	6.263	1.552
	(1.392)	(11.691)	(4.439)	(1.364)
Disparity local/peer tax per capita# 1981	1.028	-24.42	6.590	1.317
	(1.625)	(14.820)	(4.779)	(1.600)
Intercept	-19.31***	-13.92*	-2.544	-20.80***
	(0.813)	(7.162)	(2.430)	(0.829)
R-squared	0.296	0.289	0.417	0.319
Adjusted r-squared	0.295	0.273	0.408	0.318
Error degrees of freedom	31921	1530	2281	28038
Akaike's information criterion	110017	7480	5473	92567
Number of parameters in model	36	36	36	36
Sum of squared errors	997038	177511	23840	757118
χ^2 value for test of joint significance of subgroup interactions:	1281.6			

* Significant at 10 percent level
** Significant at 5 percent level
*** Significant at 1 percent level
#In thousands of 1976 dollars

Table A3. Change % families with female head 1970 to 1980 estimations

Variable	Tracts: All coefficients (std. error)	Worst 5% coefficients (std. error)	Best 5% coefficients (std. error)	Other coefficients (std. error)
Δ % families with female head 1970-1980	-0.452***	-0.490***	-0.607***	-0.444***
	(0.007)	(0.033)	(0.020)	(0.007)
% families with female head 1970	-0.203***	-0.392***	-0.368***	-0.199***
	(0.008)	(0.043)	(0.115)	(0.010)
Real mean family income 1980	0.003	-0.149	-0.001	-0.005
	(0.008)	(0.157)	(0.019)	(0.008)
% persons w/income < poverty line 1980	0.057***	0.140***	-0.045**	0.049***
	(0.006)	(0.035)	(0.020)	(0.007)
% young adult dropouts 1980	0.009**	0.006	-0.056***	0.017***
	(0.003)	(0.022)	(0.011)	(0.003)
Adult unemployment rate 1980	0.151***	0.033	-0.028	0.201***
	(0.011)	(0.047)	(0.032)	(0.012)
% high status occupations 1980	0.023***	0.049	-0.049***	0.041***
	(0.005)	(0.046)	(0.012)	(0.005)
Central city dummy	1.353***	3.144	1.066	1.230***
	(0.260)	(5.206)	(0.732)	(0.257)
Suburban dummy	0.603**	3.363	-0.014	0.555**
	(0.260)	(5.366)	(0.727)	(0.257)
Log population metro/peer area 1980	-0.327***	-0.099	0.083	-0.315***
	(0.038)	(0.337)	(0.126)	(0.038)
% nonwhite 1980	0.294***	0.448***	0.147***	0.288***
	(0.008)	(0.052)	(0.036)	(0.008)
% nonwhite change 1980-1990	0.193***	0.285***	0.117***	0.189***
	(0.004)	(0.028)	(0.017)	(0.004)
North central region dummy	0.175	-0.587	-1.687***	0.305**
	(0.142)	(1.241)	(0.419)	(0.143)
North east region dummy	-0.350**	-4.497***	-1.193**	-0.125
	(0.134)	(1.107)	(0.465)	(0.136)
West region dummy	-1.873***	-8.983***	-1.742***	-1.653***
	(0.125)	(1.369)	(0.388)	(0.124)
% population age 16-24 1980	-0.031***	0.120**	-0.070***	-0.021***
	(0.006)	(0.048)	(0.012)	(0.006)
Δ % population age 16-24 1980-1990	-0.019**	0.218***	-0.053**	-0.035***
	(0.009)	(0.056)	(0.025)	(0.010)
% clerical/service employment 1980	0.263***	0.365***	0.201***	0.274***
	(0.007)	(0.045)	(0.017)	(0.008)
Δ % clerical/service employment 1980-1990	0.218***	0.286***	0.178***	0.214***
	(0.006)	(0.031)	(0.019)	(0.007)
% manufacturing employment 1980	0.028***	-0.013	0.077***	0.032***
	(0.005)	(0.043)	(0.015)	(0.005)
Δ % manufacturing employment 1980-1990	-0.041***	-0.072*	0.170***	-0.047***
	(0.007)	(0.041)	(0.023)	(0.008)
% housing units vacant 1980	0.027***	-0.087**	0.052**	0.033***
	(0.007)	(0.041)	(0.020)	(0.008)
Δ % housing units vacant 1980-1990	0.040***	-0.038	-0.039*	0.053***
	(0.007)	(0.032)	(0.019)	(0.008)
Unemployment in state 1980	0.124***	0.429	-0.022	0.112***
	(0.039)	(0.400)	(0.120)	(0.039)
Δ state adult unemployment rate 1980-1990	0.092**	0.014	-0.049	0.105**
	(0.042)	(0.384)	(0.138)	(0.042)
Real mean family income in state 1980	-0.063*	0.194	0.055	-0.086***
	(0.031)	(0.268)	(0.103)	(0.031)
Δ state real mean family income 1980-1990	-0.213***	0.083	-0.126	-0.219***
	(0.037)	(0.365)	(0.121)	(0.036)
Ratio of local govt debt to revenue 1981	-0.034	0.117	0.234*	-0.072
	(0.045)	(0.538)	(0.125)	(0.044)
Δ ratio local govt debt to revenue 1981-1985	-0.176***	-0.350	0.136	-0.176***
	(0.049)	(0.442)	(0.184)	(0.049)

Table A3 (cont.). Change % families with female head 1970 to 1980 estimations

Tracts: / Variable	All coefficients (std. error)	Worst 5% coefficients (std. error)	Best 5% coefficients (std. error)	Other coefficients (std. error)
Δ real local tax per capita# 1981-1991	1.348*** (0.484)	5.040* (2.542)	-7.093*** (2.435)	1.241** (0.497)
Real local taxes per capita# 1981	-2.439*** (0.462)	-2.671 (2.559)	2.631 (1.883)	-3.070*** (0.481)
Δ local educ expenditures per capita# 1981-1991	0.330 (0.799)	11.262* (5.904)	2.930 (4.079)	-0.178 (0.787)
Real local educ expenditures per capita# 1981	1.380*** (0.365)	-2.269 (2.749)	1.643 (1.477)	1.297*** (0.366)
Δ disparity local tax per capita# 1981-1987	-3.935** (1.450)	-15.06* (7.614)	21.112*** (7.296)	-3.606** (1.490)
Disparity local/peer tax per capita# 1981	-3.421* (1.692)	-14.50 (10.050)	20.612** (7.767)	-2.566 (1.734)
Intercept	-11.45*** (0.829)	-27.23*** (9.166)	-3.539 (2.888)	-12.26*** (0.845)
R-squared	0.298	0.310	0.474	0.303
Adjusted r-squared	0.297	0.294	0.464	0.302
Error degrees of freedom	31921	1498	1825	28526
Akaike's information criterion	112601	7139	5764	97069
Number of parameters in model	36	36	36	36
Sum of squared errors	1.08E6	153667	39629	852446
χ^2 value for test of joint significance of subgroup interactions:	1074.0			

* Significant at 10 percent level
** Significant at 5 percent level
*** Significant at 1 percent level
#In thousands of 1976 dollars

Table A4. Change in % young adult dropouts 1980 to 1990 estimations

Variable	Tracts: All coefficients (std. error)	Worst 5% coefficients (std. error)	Best 5% coefficients (std. error)	Other coefficients (std. error)
Δ % young adult dropouts 1970-1980	-0.766*** (0.006)	-0.793*** (0.024)	-0.777*** (0.028)	-0.772*** (0.006)
% young adult dropouts 1970	-0.601*** (0.008)	-0.602*** (0.047)	-1.316** (0.507)	-0.606*** (0.010)
Real mean family income 1980	-0.038*** (0.013)	-0.234 (0.169)	0.027 (0.031)	-0.062*** (0.015)
% persons w/income < poverty line 1980	0.065*** (0.010)	0.114** (0.053)	0.071* (0.039)	0.064*** (0.011)
% families with female head 1980	0.085*** (0.010)	0.008 (0.046)	0.131*** (0.043)	0.086*** (0.011)
Adult unemployment rate 1980	-0.045** (0.018)	-0.277*** (0.082)	-0.048 (0.090)	-0.013 (0.019)
% high status occupations 1980	-0.105*** (0.008)	-0.210*** (0.061)	-0.184*** (0.029)	-0.084*** (0.009)
Central city dummy	2.933*** (0.437)	7.818** (3.286)	-0.585 (2.099)	2.730*** (0.430)
Suburban dummy	1.294*** (0.437)	5.785* (3.342)	-1.186 (2.132)	1.067** (0.430)
Log population metro/peer area 1980	0.101 (0.063)	0.179 (0.542)	-0.336 (0.277)	0.153** (0.063)
% nonwhite 1980	0.165*** (0.013)	0.359*** (0.069)	0.181*** (0.060)	0.137*** (0.013)
% nonwhite change 1980-1990	0.069*** (0.006)	0.153*** (0.037)	0.088*** (0.030)	0.054*** (0.006)
North central region dummy	-1.006*** (0.239)	-3.234 (2.055)	-0.905 (0.934)	-1.139*** (0.239)
North east region dummy	-1.610*** (0.227)	1.673 (1.861)	-1.733* (0.965)	-1.946*** (0.228)
West region dummy	1.045*** (0.212)	4.281** (1.832)	-1.862** (0.877)	1.033*** (0.210)
% population age 16-24 1980	-0.057*** (0.009)	0.416*** (0.105)	-0.128*** (0.024)	-0.046*** (0.011)
Δ % population age 16-24 1980-1990	-0.038** (0.016)	0.250** (0.105)	0.087* (0.044)	-0.072*** (0.017)
% clerical/service employment 1980	0.055*** (0.012)	0.149** (0.064)	-0.011 (0.051)	0.067*** (0.012)
Δ % clerical/service employment 1980-1990	0.040*** (0.011)	-0.111** (0.052)	0.071 (0.043)	0.078*** (0.011)
% manufacturing employment 1980	0.069*** (0.008)	0.058 (0.051)	0.049 (0.040)	0.076*** (0.008)
Δ % manufacturing employment 1980-1990	0.088*** (0.012)	0.034 (0.057)	0.157*** (0.052)	0.094*** (0.013)
% housing units vacant 1980	0.107*** (0.013)	0.054 (0.068)	0.065 (0.046)	0.114*** (0.013)
Δ % housing units vacant 1980-1990	0.098*** (0.012)	0.052 (0.056)	0.162*** (0.045)	0.097*** (0.012)
Unemployment in state 1980	-0.090 (0.066)	-0.484 (0.615)	0.133 (0.274)	-0.090 (0.065)
Δ state adult unemployment rate 1980-1990	-0.110 (0.071)	-1.469** (0.622)	-0.165 (0.305)	-0.054 (0.070)
Real mean family income in state 1980	0.125** (0.052)	0.389 (0.397)	-0.023 (0.251)	0.142** (0.052)
Δ state real mean family income 1980-1990	0.203*** (0.061)	-1.154* (0.567)	0.373 (0.257)	0.244*** (0.061)
Ratio of local govt debt to revenue 1981	0.055 (0.075)	-1.052 (0.739)	0.227 (0.266)	0.067 (0.074)
Δ ratio local govt debt to revenue 1981-1985	-0.042 (0.083)	-1.304** (0.627)	0.588 (0.404)	-0.035 (0.081)

Table A4 (cont.). Change in % young adult dropouts 1980 to 1990 estimations

Tracts: / Variable	All coefficients (std. error)	Worst 5% coefficients (std. error)	Best 5% coefficients (std. error)	Other coefficients (std. error)
Δ real local tax per capita[#] 1981-1991	-0.469	6.013	-4.128	-0.701
	(0.811)	(6.427)	(3.182)	(0.810)
Real local taxes per capita[#] 1981	-1.356*	-8.830	1.149	-1.084
	(0.774)	(6.940)	(3.248)	(0.766)
Δ local educ expenditures per capita[#] 1981-1991	-4.247***	-5.564	1.346	-4.232***
	(1.339)	(9.759)	(5.368)	(1.338)
Real local educ expenditures per capita[#] 1981	-0.527	-6.562	-0.490	-0.238
	(0.612)	(4.727)	(2.734)	(0.608)
Δ disparity local tax per capita[#] 1981-1987	1.483	-17.93	12.840	2.143
	(2.431)	(19.250)	(9.533)	(2.427)
Disparity local/peer tax per capita[#] 1981	1.346	-9.460	10.237	1.655
	(2.837)	(24.535)	(10.894)	(2.825)
Intercept	-8.752***	-23.45**	7.251	-9.452***
	(1.396)	(10.833)	(6.411)	(1.405)
R-squared	0.369	0.426	0.358	0.363
Adjusted r-squared	0.368	0.414	0.344	0.362
Error degrees of freedom	31921	1634	1621	28594
Akaike's information criterion	145642	9466	7402	126788
Number of parameters in model	36	36	36	36
Sum of squared errors	3.04E6	463045	138220	2.39E6
χ^2 value for test of joint significance of subgroup interactions:	481.6			

* Significant at 10 percent level
** Significant at 5 percent level
*** Significant at 1 percent level
[#]In thousands of 1976 dollars

Table A5. Change in adult unemployment rate 1980 to 1990 estimations

Variable	Tracts: All coefficients (std. error)	Worst 5% coefficients (std. error)	Best 5% coefficients (std. error)	Other coefficients (std. error)
Δ adult unemployment rate 1970-1980	-0.713***	-0.693***	-0.924***	-0.729***
	(0.006)	(0.027)	(0.023)	(0.007)
Adult unemployment rate 1970	-0.543***	-0.577***	-1.224***	-0.589***
	(0.009)	(0.045)	(0.146)	(0.013)
Real mean family income 1980	0.054***	0.100*	-0.003	0.053***
	(0.005)	(0.057)	(0.009)	(0.005)
% persons w/income < poverty line 1980	0.139***	0.200***	0.081***	0.130***
	(0.003)	(0.019)	(0.011)	(0.004)
% families with female head 1980	0.072***	0.101***	0.062***	0.062***
	(0.003)	(0.018)	(0.010)	(0.004)
% young adult dropouts 1980	0.004*	0.006	0.016***	0.005**
	(0.002)	(0.011)	(0.005)	(0.002)
% high status occupations 1980	-0.060***	-0.107***	-0.028***	-0.065***
	(0.003)	(0.021)	(0.007)	(0.003)
Central city dummy	0.325**	0.716	-0.290	0.465***
	(0.150)	(1.287)	(0.438)	(0.147)
Suburban dummy	-0.081	0.758	-0.440	0.004
	(0.150)	(1.300)	(0.437)	(0.147)
Log population metro/peer area 1980	-0.061***	-0.367**	0.105	-0.055**
	(0.022)	(0.177)	(0.070)	(0.021)
% nonwhite 1980	0.103***	0.177***	-0.005	0.103***
	(0.004)	(0.026)	(0.015)	(0.004)
% nonwhite change 1980-1990	0.067***	0.113***	0.016**	0.068***
	(0.002)	(0.014)	(0.007)	(0.002)
North central region dummy	1.087***	4.000***	0.586**	1.014***
	(0.082)	(0.735)	(0.229)	(0.082)
North east region dummy	0.896***	3.300***	0.402*	0.943***
	(0.078)	(0.788)	(0.203)	(0.077)
West region dummy	-0.209***	1.842**	-0.635***	-0.081
	(0.075)	(0.673)	(0.276)	(0.074)
% population age 16-24 1980	-0.022***	-0.050**	0.028***	-0.017***
	(0.003)	(0.021)	(0.009)	(0.003)
Δ % population age 16-24 1980-1990	0.043***	0.045	0.059***	0.047***
	(0.005)	(0.034)	(0.014)	(0.006)
% clerical/service employment 1980	0.016***	0.019	0.033***	0.015***
	(0.004)	(0.022)	(0.010)	(0.004)
Δ % clerical/service employment 1980-1990	0.053***	0.103***	0.080***	0.041***
	(0.004)	(0.020)	(0.010)	(0.004)
% manufacturing employment 1980	-0.002	-0.069***	0.006	0.004
	(0.003)	(0.018)	(0.008)	(0.003)
Δ % manufacturing employment 1980-1990	-0.018***	-0.012	0.006	-0.023***
	(0.004)	(0.022)	(0.012)	(0.004)
% housing units vacant 1980	0.002	-0.086***	-0.003	0.022***
	(0.004)	(0.023)	(0.013)	(0.004)
Δ % housing units vacant 1980-1990	0.054***	0.008	-0.001	0.063***
	(0.004)	(0.017)	(0.013)	(0.004)
Unemployment in state 1980	0.404***	0.761***	0.412***	0.407***
	(0.023)	(0.177)	(0.073)	(0.023)
Δ state adult unemployment rate 1980-1990	0.806***	1.470***	0.718***	0.779***
	(0.024)	(0.202)	(0.071)	(0.024)
Real mean family income in state 1980	0.180***	0.238	0.092*	0.169***
	(0.018)	(0.147)	(0.050)	(0.018)
Δ state real mean family income 1980-1990	-0.176***	-0.600***	0.018	-0.173***
	(0.021)	(0.155)	(0.063)	(0.021)
Ratio of local govt debt to revenue 1981	-0.007	-0.001	0.041	0.000
	(0.026)	(0.142)	(0.104)	(0.026)
Δ ratio local govt debt to revenue 1981-1985	-0.125***	-0.061	-0.204**	-0.097***
	(0.028)	(0.226)	(0.089)	(0.028)

Table A5 (cont.). Change in adult unemployment rate 1980 to 1990 estimations

Variable / Tracts:	All coefficients (std. error)	Worst 5% coefficients (std. error)	Best 5% coefficients (std. error)	Other coefficients (std. error)
Δ real local tax per capita# 1981-1991	0.568*	4.016**	0.222	0.276
	(0.279)	(1.803)	(1.072)	(0.274)
Real local taxes per capita# 1981	-1.518***	-1.549	-0.464	-1.477***
	(0.266)	(2.036)	(0.904)	(0.261)
Δ local educ expenditures per capita# 1981-1991	-1.116**	-1.184	-4.358**	-0.952**
	(0.460)	(3.008)	(1.828)	(0.450)
Real local educ expenditures per capita# 1981	-0.461**	-1.579	-0.413	-0.218
	(0.211)	(1.348)	(0.731)	(0.209)
Δ disparity local tax per capita# 1981-1987	-1.609*	-11.89**	-0.571	-0.751
	(0.836)	(5.408)	(3.209)	(0.821)
Disparity local/peer tax per capita# 1981	-1.873*	-19.01***	0.058	-0.483
	(0.975)	(6.440)	(3.535)	(0.963)
Intercept	-7.370***	-11.57***	-0.582	-7.160***
	(0.478)	(3.512)	(1.476)	(0.480)
R-squared	0.453	0.473	0.490	0.471
Adjusted r-squared	0.452	0.462	0.482	0.471
Error degrees of freedom	31921	1784	2474	27591
Akaike's information criterion	77403	6625	5243	61859
Number of parameters in model	36	36	36	36
Sum of squared errors	359328	66638	19697	258599
χ^2 value for test of joint significance of subgroup interactions:	1329.1			

* Significant at 10 percent level
** Significant at 5 percent level
*** Significant at 1 percent level
#In thousands of 1976 dollars

Table A6. Change in % high status occupations 1980 to 1990 estimations

Variable	Tracts: All coefficients (std. error)	Worst 5% coefficients (std. error)	Best 5% coefficients (std. error)	Other coefficients (std. error)
Δ % high status occupations 1970-1980	-0.274*** (0.005)	-0.399*** (0.031)	-0.381*** (0.022)	-0.307*** (0.006)
% high status occupations 1970	-0.200*** (0.004)	-0.245** (0.120)	-0.329*** (0.026)	-0.242*** (0.005)
Real mean family income 1980	0.039*** (0.007)	0.268*** (0.088)	-0.030** (0.011)	0.131*** (0.010)
% persons w/income < poverty line 1980	0.009* (0.005)	-0.007 (0.023)	0.198*** (0.027)	0.012** (0.005)
% families with female head 1980	0.044*** (0.005)	0.036* (0.021)	0.029 (0.023)	0.059*** (0.005)
% young adult dropouts 1980	-0.028*** (0.003)	0.003 (0.012)	-0.077*** (0.016)	-0.028*** (0.003)
Adult unemployment rate 1980	-0.133*** (0.009)	0.005 (0.029)	-0.389*** (0.060)	-0.139*** (0.010)
Central city dummy	0.528** (0.218)	-0.225 (1.641)	-3.175** (1.285)	0.703*** (0.217)
Suburban dummy	0.737*** (0.218)	0.637 (1.652)	-3.142** (1.301)	0.800*** (0.217)
Log population metro/peer area 1980	0.345*** (0.032)	0.404* (0.206)	-0.015 (0.123)	0.362*** (0.032)
% nonwhite 1980	-0.139*** (0.006)	-0.145*** (0.028)	-0.086* (0.043)	-0.138*** (0.006)
% nonwhite change 1980-1990	-0.075*** (0.003)	-0.089*** (0.015)	-0.032 (0.019)	-0.073*** (0.003)
North central region dummy	0.465*** (0.119)	0.516 (0.808)	-1.242*** (0.419)	0.682*** (0.122)
North east region dummy	1.050*** (0.113)	0.683 (0.718)	0.156 (0.395)	1.331*** (0.116)
West region dummy	0.156 (0.105)	-1.564** (0.731)	-0.771** (0.375)	0.312*** (0.107)
% population age 16-24 1980	-0.060*** (0.005)	-0.161*** (0.028)	-0.120*** (0.018)	-0.028*** (0.005)
Δ % population age 16-24 1980-1990	-0.129*** (0.008)	-0.078** (0.036)	-0.070** (0.027)	-0.126*** (0.008)
% clerical/service employment 1980	-0.213*** (0.006)	-0.075*** (0.024)	-0.395*** (0.035)	-0.273*** (0.007)
Δ % clerical/service employment 1980-1990	-0.561*** (0.005)	-0.321*** (0.021)	-0.926*** (0.025)	-0.594*** (0.006)
% manufacturing employment 1980	-0.144*** (0.004)	-0.155*** (0.018)	-0.022 (0.020)	-0.170*** (0.005)
Δ % manufacturing employment 1980-1990	-0.305*** (0.006)	-0.288*** (0.025)	0.067** (0.030)	-0.323*** (0.007)
% housing units vacant 1980	0.031*** (0.006)	0.094*** (0.030)	-0.090*** (0.025)	0.026*** (0.007)
Δ % housing units vacant 1980-1990	-0.021*** (0.006)	0.020 (0.023)	-0.107*** (0.028)	-0.022*** (0.006)
Unemployment in state 1980	0.117*** (0.033)	-0.029 (0.224)	0.222* (0.124)	0.120*** (0.034)
Δ state adult unemployment rate 1980-1990	0.065* (0.035)	0.120 (0.244)	-0.038 (0.128)	0.073* (0.036)
Real mean family income in state 1980	0.110*** (0.026)	-0.017 (0.163)	0.451*** (0.103)	0.048* (0.027)
Δ state real mean family income 1980-1990	-0.015 (0.031)	0.112 (0.228)	-0.186 (0.122)	0.025 (0.031)
Ratio of local govt debt to revenue 1981	-0.007 (0.037)	-0.311 (0.203)	-0.046 (0.213)	0.012 (0.038)
Δ ratio local govt debt to revenue 1981-1985	0.019 (0.041)	-0.133 (0.255)	-0.193 (0.145)	0.042 (0.042)

Table A6 (cont.). Change in % high status occupations 1980 to 1990 estimations

Variable / Tracts:	All coefficients (std. error)	Worst 5% coefficients (std. error)	Best 5% coefficients (std. error)	Other coefficients (std. error)
Δ real local tax per capita# 1981-1991	0.104	3.339	-0.478	-0.377
	(0.405)	(2.549)	(1.609)	(0.413)
Real local taxes per capita# 1981	1.991***	6.281**	1.107	1.778***
	(0.387)	(2.351)	(1.259)	(0.404)
Δ local educ expenditures per capita# 1981-1991	-1.924***	-1.315	0.293	-2.463***
	(0.669)	(4.242)	(3.090)	(0.676)
Real local educ expenditures per capita# 1981	-1.074***	-3.052*	-1.401	-0.926***
	(0.306)	(1.719)	(1.169)	(0.315)
Δ disparity local tax per capita# 1981-1987	-0.372	-9.701	1.797	1.004
	(1.214)	(7.641)	(4.820)	(1.236)
Disparity local/peer tax per capita# 1981	0.337	-13.47	1.457	2.424
	(1.417)	(9.565)	(5.387)	(1.447)
Intercept	15.986***	12.201***	30.982***	17.774***
	(0.694)	(4.221)	(4.072)	(0.720)
R-squared	0.363	0.337	0.585	0.382
Adjusted r-squared	0.363	0.321	0.576	0.381
Error degrees of freedom	31921	1439	1590	28820
Akaike's information criterion	101248	5517	4607	89524
Number of parameters in model	36	36	36	36
Sum of squared errors	757779	59144	26441	640508
χ^2 value for test of joint significance of subgroup interactions:	1389.9			

* Significant at 10 percent level
** Significant at 5 percent level
*** Significant at 1 percent level
#In thousands of 1976 dollars