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Economic Development and Black Economic Success

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AND BLACK ECONOMIC SUCCESS***

Upjohn Institute Technical Report No. 93-001

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Final Report prepared for

U.S. Department of Commerce
Economic Development Administration
Technical Assistance and Research Division

January, 1993

The statements, findings, conclusions, and recommendations in this report are those of the author and do not necessarily reflect the views of the Economic Development Administration.

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ECONOMIC DEVELOPMENT ADMINISTRATION

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ABSTRACT

This report examines how the earnings of blacks are affected by their metropolitan area's employment growth and mix of industries. I find that faster metropolitan area growth has large positive effects on black earnings. Blacks tend to live in slow-growth metropolitan areas (MSAs); over the 1973-89 period, if blacks had lived in MSAs with the same average growth as whites, black earnings in 1989 would have been 5% higher than the actual black earnings level in 1989. I also find that in MSAs that attract more "high wage premium industries"—industries that pay well relative to education requirements—black earnings increase faster than in the average MSA. A one percent increase in an MSA's "average wage premium," due to shifts in the MSA's mix of industries, will increase black earnings by over 6 percent, whereas white earnings will increase by around 2 percent.

EXECUTIVE SUMMARY

This report examines how the real earnings and poverty rate of blacks are affected by their metropolitan area's employment growth and mix of industries. This report's findings are relevant to two policy debates. First, the report provides evidence from metropolitan labor markets on whether black poverty can be reduced by stronger labor demand. Some poverty researchers have claimed that poverty in modern U.S. society is determined by cultural and psychological forces, and is little affected by demand conditions. Second, the report provides evidence on whether state and local economic development policies that increase local job growth can help minorities and the poor. Some critics of state and local economic development policies have claimed that the attraction of new jobs is more likely to help in-migrants, local landowners, and highly skilled and educated local residents than the poor and the unemployed.

Previous Research

Sixteen previous studies have examined how local labor market conditions in the U.S. affect the economic fortunes of blacks. Fourteen studies find that stronger local labor markets help blacks. Of the nine studies that compare effects on blacks to effects on whites, six find that local labor market conditions have stronger effects on blacks.

Only eight studies have examined the effects of the mix of industries in a local economy on blacks. Six of these studies find some effects of local industrial mix. But three of these six studies have problems with their definition of industrial mix, defining industrial

mix so that it must change if the local economy grows. There is certainly room for additional research that will define "industrial mix" so that a local economy's industrial mix and employment can change independently.

Methodology and Data of This Study

This study uses as dependent variables the year-to-year percentage change in a metropolitan statistical area (MSA) in average economic outcomes for different subgroups of blacks and whites. The independent variables include year-to-year percentage changes in various measures of the MSA's "economic development." The model is estimating pooling data from up to 200 MSAs on percentage changes from 1973-74 to 1988-89. The empirical model controls national time trends. The empirical results reflect how differences in an MSA's economic development trends from the national average affect differences from the national average in the economic fortunes of various groups.

The most important dependent variables in this study are the year-to-year percentage change in the MSA's average real personal earnings for various groups, and the year-to-year change in the MSA average poverty rate for various groups. The most important independent variables in this study are the year-to-year percentage changes in the MSA's total employment, and the year to year change in the MSA's average "industry wage premium." An industry's wage premium is the percentage by which wages paid in the industry exceed what one would expect based on the education, age, and other credentials of the industry's workers. For example, many manufacturing industries, and a few service industries such as the communications and utilities industries, pay well even though their

workers have relatively modest educations. The MSA's average industry wage premium is the average wage one would expect to be paid in the MSA, if all industries followed national wage patterns. The year-to-year change in the MSA's average industry wage premium reflects how shifts in the MSA's industrial mix are affecting whether the MSA offers "good jobs."

Results of the Empirical Analysis

I find that metropolitan employment growth has statistically significant and large positive effects on the economic well-being of blacks. An increase of 10% in a metropolitan area's total employment will increase blacks' average per capita real earnings by over 8%. This increase of 8% in real earnings is mostly due to growth increasing the percentage of weeks during the year that the average black is employed. The black poverty rate will decline by about 4 points (e.g., from 30% poverty rate to 26%). These effects are larger than the effects of MSA growth on whites. A 10% increase in MSA employment will increase white per capita real earnings by about 5%, and will reduce the white poverty rate by less than 1 point. The difference in growth effects on black and white poverty is highly statistically significant, whereas the difference in growth effects on black and white earnings is marginally statistically significant.

The effects of metropolitan employment growth on blacks are large enough that the regional pattern of growth can have significant effects on national trends in black and white earnings. Blacks tend to live in slow-growth MSAs compared to whites. Suppose we consider a hypothetical world in which blacks during the 1973-89 period had lived in MSAs

whose average growth was the same as what prevailed for whites. This hypothetical world could have been achieved either by increasing growth in MSAs with large black populations, or helping blacks move to faster growing MSAs. In this hypothetical world, black real earnings in 1989 would be expected to be 5% greater than they were in the real world.

I also find that increases in an MSA's average industrial wage premium has statistically significant and large effects on average per capita black real earnings. A 1 percent increase in an MSA's average industry wage premium increases average black real earnings by over 6 percent. This 1 percent increase in the MSA wage premium would only increase white real earnings by around 2 percent. These greater effects on blacks appear to be mainly due to greater effects of higher wage premium industries on black wages. A 1 percent increase in the average MSA wage premium increases black weekly earnings by over 6%, whereas white weekly earnings increase by around 1%. A natural interpretation of these results is that "well-paying" industries tend to have narrower racial wage differentials.

Policy Implications

The report's findings suggest general directions for public policy but do not prove the case for any specific policy program. Economic development policies that increase metropolitan growth and attract high wage premium industries can provide important labor market benefits for both white and black residents. But exactly which economic development policies (tax abatements, technology development programs, general tax cuts, improvements in local education, assistance to manufacturers for modernization and exporting, business incubators, entrepreneurial training programs) work best to accomplish these goals is unclear.

National policies that seek to provide blacks with more high wage jobs can make a substantial difference in reducing black poverty and increasing black economic success. But which such black labor demand policies (local economic development policies, helping blacks migrate to healthier metropolitan economies, enterprise zones, public service jobs, wage subsidies for private employment for disadvantaged workers) will be most effective in helping blacks per dollar spent is unclear. The general policy direction of trying to increase demand for black labor in local economies is sound. But much more policy experimentation and research needs to be done to determine how best to improve the local economic climate facing blacks.

I. Introduction

The causes of persistent poverty among blacks in American cities are much debated today. Some researchers argue that the economic problems of blacks can be largely explained by declining demand for less educated labor. Other researchers argue that poverty has been increased by the decline of central city jobs. Still other researchers argue that job availability is not the main problem and that persistent poverty must be explained by cultural forces.

A more longstanding debate has focused on whether local economic development programs can really help the unemployed and the poor. Some argue that any jobs these programs create in a local area will not go to the resident poor but to in-migrants.

Contributing to both these debates, this report offers new empirical evidence on how black economic status is affected by local demand. I find strong evidence that black economic prospects are harmed by slow overall metropolitan employment growth. Blacks are also harmed by a metropolitan area's loss of high wage premium industries—industries that pay well and have modest educational requirements. But black economic status is not strongly affected by shifts in a metropolitan area's industrial mix towards industries with stringent educational requirements.

These findings provide an argument for policies designed to increase the availability of good jobs for blacks. Local economic development is one such policy, but others could be considered, for example, public service jobs or wage subsidies for private jobs. Many issues, such as cost per job created, should be analyzed before any "labor demand" anti-poverty policy is endorsed. Furthermore, the potential benefits of a labor demand policy do

not imply that we should ignore anti-poverty policies dealing with cultural, educational, or family issues.

Increasing Income Inequality and Shifts in Labor Skill Demand and Supply

Rapid secular growth in the relative demand for "more-skilled" workers is a key component of any consistent explanation for rising inequality and changes in the wage structure over the last 25 years...Observed fluctuations in the rate of growth of the relative supply of college graduates combined with smooth trend demand growth in favor of more-educated workers can largely explain fluctuations in the college/high school differentials over the 1963-1987 period. [Katz and Murphy (1992, p. 37)]

Recent economics studies analyze why earnings inequalities between more and less educated individuals in the United States expanded enormously in the 1980s after declining in the 1970s. These wage changes can be largely explained by assuming that demand for more educated workers has grown steadily, but the supply of college educated workers stagnated in the 1980s after expanding rapidly in the 1970s. (Bound and Johnson, 1992; Katz and Murphy, 1992). Because blacks' education levels on average are lower than whites', declining wages for less educated workers may help explain declining black employment and earnings. For example, Juhn (1992) estimates that the decline in wages for low-wage black males explains half of the early 1970s to late 1980s decline in this group's labor force participation.

One limitation of this literature is that it relies less on empirical evidence than on assumptions. The research does not directly estimate how shifts in demand for educated workers affect labor markets, but rather assumes a trend increase in demand for educated workers and assumes how this trend will affect labor markets. As this report will show,

metropolitan area data allows direct estimates of how shifts in skills demand affect local labor markets.

These recent national studies are unable to use decreasing demand for less educated persons to fully explain the economic problems of blacks. As noted above, Juhn finds that half—but only half—of the decline in labor force participation of lower wage black males is explained by declines in this group's wages. Bound and Freeman (1992) find that black high school dropouts' employment rates have dropped relative to whites during the 1970s and 1980s. This decline appears inconsistent with observed changes in the relative supply and demand of these groups.

The Spatial and Skills Mismatch View

The simultaneous, yet conflicting, transformations of the employment and demographic bases of the cities contributed to a number of serious problems, including a widening gap between the skill needs of urban job growth industries and the skill levels of minority resident labor (with correspondingly high rates of localized structural unemployment), greater distances separating inner-city blacks from suburban areas of blue-collar job growth, and increasing levels of urban poverty. [John Kasarda (1990, p. 314)]

Most of the inner-city poor appear able to find jobs, albeit not of the quality they would like. The clamor of immigrants from all over the world to come to the United States strongly suggests that opportunities for the unskilled are still abundant here. To explain nonwork, I see no avoiding some appeal to psychology or culture." [Lawrence Mead (1992, p. 12)]

Perhaps changes in U.S. skills demand can explain black economic problems if one also considers changes in how jobs are spatially distributed. The spatial and skills mismatch hypothesis, most prominently advocated by William Julius Wilson (1987) and John Kasarda (1985, 1989, 1990), is that the decline of manufacturing jobs in cities has hurt black

economic prospects by reducing the number of good jobs to which poor blacks have realistic access, and thereby hurt black economic prospects.¹ Changes in the spatial distribution of jobs may mean that the decline in demand for less educated black labor is worse than assumed by economists relying on national data.

Kasarda has presented evidence that central cities in the North and Midwest have suffered from extensive job loss and that the remaining jobs in central cities tend to require more education than in the past. Because blacks are concentrated in central cities, on average have lower skills, and face difficulties in getting access to suburban housing and better education, it would appear that these shifts in labor demand must adversely affect blacks.

But the labor market effects of labor demand shifts depend on the feasible labor supply shifts of all workers, not just blacks. For example, if some jobs move to the suburbs, there need be no effect on central city wages or employment prospects if a sufficient number of workers can easily shift their residence or commuting patterns. Not all workers must easily make these adjustments, just enough relative to the size of the demand shift to the suburbs. With enough supply adjustment, both central city labor demand and supply will decline equally, which need have no adverse labor market effects on central city blacks even if housing discrimination excludes blacks from the suburbs.² Similarly, if some jobs become more high skill, this need not affect the wages of unskilled workers. Unskilled wages can

¹ Wilson and Kasarda's arguments of course have a number of antecedents. Some of their ideas, for example, were anticipated in Bluestone and Harrison (1982), which discussed the disproportionate effects of plant closings on blacks.

² Mead (1992) makes this point (p. 100).

remain unchanged if a sufficient supply of workers easily shifts from unskilled to skilled jobs, either by acquiring skills or using previously untapped skills. The effects of shifting labor demand can only be determined by empirical analysis, not economic theory.

Metropolitan Growth and Decentralization

Some discussions of the spatial-skills mismatch hypothesis fail to clearly distinguish between trends in overall metropolitan employment growth and employment decentralization.³ A central city may experience slow employment growth because its metropolitan area's employment growth is slow or because employment is shifting from the central city to the suburbs, or because of some combination. These different types of shifts in central city employment demand may have quite different effects. It is harder for labor supply adjustments to offset shifts in labor demand from one metropolitan area to another than shifts in labor demand within one metropolitan area. Adjustment to demand shifts from one metropolitan area to another require migration across metropolitan areas, which involves changing homes, activities, and friends. Demand shifts within a metropolitan area can be accommodated by shifts in commuting patterns; residential shifts that do occur are for shorter distances and are psychologically and financially easier.

This distinction between metropolitan growth trends and decentralization is important because it affects the ease of using labor demand policies to attack poverty. Creating specific

³ As I will discuss below, some empirical tests of the spatial and skills mismatch hypothesis also do not clearly distinguish between shifts in the industrial distribution of demand within a metropolitan area, and shifts in the overall demand for labor in the metropolitan area. See, for example, Eggers and Massey, 1992.

types of jobs at specific locations is harder than creating jobs of any type somewhere within the metropolitan area.

It may not be clear why differences across metropolitan areas in employment growth would affect blacks more adversely than whites. But as this report will show, blacks are concentrated in slower growing metropolitan areas compared to whites. Researchers tend to assume that, because blacks are concentrated in the relatively fast-growing South, blacks must on average benefit from differences in regional, state, and metropolitan area growth. But many southern blacks are in nonmetropolitan areas or in relatively slow-growing southern metropolitan areas, and northern blacks are concentrated in extremely slow growth metropolitan areas.

The Capitalization Hypothesis

The target population, the unemployed labor force, is not always the only—or even the main—beneficiary of new industry. A disproportionately large share of the increased purchasing power goes to the owners of immobile resources other than labor. Real estate owners, banks, retailers, and utilities are surer beneficiaries than are the unemployed coal miners or loggers who are less likely to get the jobs in the new plants than are new in-migrants, younger and with more appropriate skills. [Louis Winnick (1966, p. 280)]

A well-known hypothesis in regional science is that local economic development policies in the long run do not help the poor but are just "capitalized" into increased land values. The argument for this capitalization hypothesis is that any labor market benefits from a metropolitan area's job growth, such as higher wages or lower unemployment, will keep on attracting in-migrants until wages and unemployment return to normal. But land and

housing values will increase because the metropolitan area's population will be higher, and local land supply is fixed.

The capitalization hypothesis would be of little policy relevance if this "long run" were many years away. But American society has enough mobility that the long run might arrive soon. For the average metropolitan area, with zero net migration, over 10 percent of the original population will move out over a five-year period and be replaced by in-migrants (Bartik, 1991, pp. 71, 79). Even a successful economic development policy is unlikely to increase an area's employment, compared to what it otherwise would be, by more than 10 percent over a five-year period. Modest changes in normal in- and out-migration flows would offset the increase in jobs due to a successful economic development policy.

Because of high U.S. mobility rates, some economists have argued that the labor market effects of shocks to local labor demand disappear almost immediately. For example, Stephen Marston argued that "shocks that disturb the steady-state relationship among the unemployment rates of metropolitan areas tend to be eliminated by mobility within a year" (Marston, 1985, p. 74).

If local demand shocks have such transitory effects, then local economic development policies are doomed to fail to achieve their primary goals: reducing unemployment and increasing the earnings of local residents. Furthermore, if Marston's argument is correct, local labor markets would be a poor laboratory for examining the effects of labor demand shifts. Effects of local demand shocks would dissipate too quickly to be observed.

The Implications of Hysteresis Effects and Efficiency Wage Effects

But there are two arguments why local demand shocks may have long run effects. The first argument is that local labor market equilibria may be subject to "hysteresis effects." Hysteresis has long been used by physicists to describe a system whose equilibrium position depends on its history. Hysteresis has recently been adopted by economists to describe a labor market whose long run equilibrium unemployment rate depends on the past history of unemployment in that market (Cross, 1988; Bartik, 1991).

The most plausible cause of hysteresis effects in a local labor market are the effects of increased demand on local residents' human capital accumulation. For example, decreased local employment may cause some local residents to become unemployed in the short-run. Unemployed local residents may lose job skills and opportunities for on-the-job training; their self-confidence may be reduced; finally, their unemployment experience may lead them to be viewed as "damaged goods" by other employers. These events may cause the employability and earnings of these local residents to be lower in the long run. These long run effects may not be overcome even if these local residents move to another metropolitan area.

A second argument is that changes in an area's industrial mix may lead to different average "efficiency wage" premiums in the local area, and these premiums may be relatively insensitive to migration (Bartik, 1990). Recent economic research suggests that industries in the United States and elsewhere pay quite different wages, even when all observable worker characteristics are controlled (Dickens and Katz, 1987; Krueger and Summers, 1988; Katz and Summers, 1989). These industrial wage differentials are consistent across countries and

persistent over time. Various theories have been offered for industry wage differentials, for example, that they occur because employers want to keep worker productivity up by paying a perceived "fair wage." Whatever the theory, these persistent industrial wage differences imply that an area's average wages may be permanently lowered by the loss of "good jobs" (jobs in industries paying well relative to workers' credentials), and permanently increased by economic development efforts that attract "good jobs."

Outline of the Rest of This Report

Section II reviews previous research that has estimated how local economic conditions affect blacks. Section III describes the methodology and data used for this report. Section IV presents a preliminary analysis of trends in these data. Sections V, VI, and VII present new estimates of how MSA growth, the local industrial mix, and MSA decentralization affect blacks and whites. Section VIII states conclusions.

II. Review of Previous Research Related to Local Economic Development and Black Economic Success

Previous studies provide evidence on how local economic development affects economic outcomes. This section reviews three categories of such studies: (1) studies of the general relationship between local growth and economic outcomes, (2) studies with specific evidence on how local growth and local industrial mix affect black economic outcomes, and (3) studies of how access to jobs affects black economic outcomes.

General Studies of Local Growth and Average Economic Outcomes

Bartik (1991) reviews fourteen studies of how local growth affects average economic outcomes for all groups, including both blacks and whites. Five studies provide evidence on how local growth affects unemployment or labor force participation; seven studies provide evidence on how local growth affects wages; and two studies provide evidence on how local growth affects overall earnings or economic well-being.

These previous studies usually find that faster local growth improves local economic outcomes. But there is wide disagreement on the exact magnitude of growth effects. For example, the estimated effects of 1 percent extra growth on unemployment varies from a reduction of 7/100ths of 1 percent (Fleisher and Rhodes, 1976) to a reduction of 43/100ths of 1 percent (Houseman and Abraham, 1990). The estimated effects of 1 percent extra growth on real wages varies from no effect (Roback, 1982) up to a 0.5 percent increase (Rosen, 1979).

The Relationship of Black Economic Outcomes to the Overall Local Economy and the Local Industrial Mix

Table 1 summarizes studies that have estimated how the overall local economy or the local industrial mix affect black economic outcomes.

All except 2 of the 16 studies in the table find some evidence that a stronger local economy improves black economic outcomes. The two studies without this finding (Levy, 1982; Ihlanfeldt and Sjoquist, 1989) illustrate the potential statistical difficulties of estimating the influence of the local economy on economic outcomes. Both Levy and Ihlanfeldt-Sjoquist focus their analysis on how the level of economic outcomes for blacks in a given year is

Table 1

Summary of Previous Research on Black Economic Outcomes,
Overall Local Economic Strength, and Local Industrial Mix

<u>Study</u>	<u>Dependent Variables</u>	<u>Measures of Overall Local Economy</u>	<u>Measures of Local Industrial Mix</u>	<u>Findings</u>
Eggers and Massey (1992)	1970 to 1980 change in 59 SMSAs in: black male/employment/population ratio, black female employment/population ratio, black median family income, and black poverty rate.	Change in SMSA: unemployment rate, ratio of operative and crafts workers to black population, ratio of service workers to operative and crafts workers, manufacturing earnings per employee, service earnings per employee.	All measures of overall local economy (with exception of unemployment rate) really also measure industrial mix.	Lower unemployment consistently improves all measures of black economic status. Measures of operative and services employment have stronger but contradictory effects: shifts towards operative and away from services helps male employment, hurts female employment. But male employment effect dominates in determining overall poverty. Manufacturing earnings increases associated with lower employment but still lower poverty by increasing income; service earnings increases do not have strong effects.
Ihlanfeldt (1992)	1980 employment and school enrollment status of black/white/Hispanic 16-19 year old males and females living with parent(s), in 50 MSAs.	Metropolitan area unemployment rate	Fraction of MSA jobs that are: operator/fabricator/laborer; service; sales; clerical; precision production/craft/repair.	Unemployment rate has statistically significant negative effects on employment rate for all groups; industrial mix rarely has strong expected effect on employment rates for blacks, but does for whites.
Bartik (1991)	Annual weeks in labor force, annual weeks employed, annual real earnings, real wage status of main occupation, and annual average real wage, of black and white males ages 25 to 64. Analysis pools CPS data from 1979 to 1986, and includes dummy variables for each MSA, so analysis is really looking at changes in economic outcome variables.	MSA employment adjusted for MSA boundary changes; because MSA dummy is included, analysis is really focused on changes in MSA employment. Black white differential is determined by interacting MSA employment variable with race of individual, not by separating regressions for each race.	None	MSA employment growth has significantly greater percentage effects on black real earnings than on white real earnings; 1 percent increase in employment increases average real earnings by about 4/10ths of 1 percent, and black real earnings by close to 5/10ths of 1 percent. Most of greater real earnings effect for blacks due to greater growth effect on blacks' ability to move up to higher paying occupations. Growth's effects on black work activity are very similar to growth's effects on whites.

Table 1
(Continued)

<u>Study</u>	<u>Dependent Variables</u>	<u>Measures of Overall Local Economy</u>	<u>Measures of Local Industrial Mix</u>	<u>Findings</u>
Bound and Holzer (1991)	1970 to 1980 changes for 52 SMSAs in employment/population ratios for black males and white males separately, and various subgroups; also weekly wages.	Estimates from Census of total 1970-80 male employment growth in MSA in some regressions; changes in employment/population ratios for 35-54 year old white males in other regressions.	Changes in manufacturing share of employment, weighted by that group's 1970 share of manufacturing employment in that SMSA.	Both older white employment/population ratios and manufacturing share have significant effects on employment/population ratios, effects which are over twice as strong for blacks as for whites. Manufacturing share affects young black high school dropout employment the most. Wage effects generally not significant. Estimated male employment growth does not work very well.
Eggers and Massey (1991)	1980 level for blacks of male employment rate, female employment rate, family income, poverty rate.	Level in SMSA of: unemployment rate, ratio of operative and crafts workers to black population, ratio of service workers to operative and crafts workers, manufacturing earnings per employee, service earnings per employee. Also, state per capita income.	All measures of overall local economy (with exception of unemployment rate and state per capita income) also measure industrial mix.	Increase in unemployment rate, decline in state per capita income, and shifts to services cause deterioration in all measures of black economic status. Shifts away from operatives employment helps male employment, hurts female, but weak overall effect on poverty. Decreases in manufacturing and service earnings do not affect employment rates, but do depress family income and increase poverty. Overall unemployment rate, per capita income, and earnings appear to have strongest effects.
Freeman (1991)	Individual-level data from 1987 and 1983 from CPS and NLSY on black and white male youth unemployment probabilities, employment probabilities, wage rates, and annual earnings. Most analysis focuses on levels in given year; one regression focuses on earnings growth from 1983 to 1987. Sample restricted to out-of-school young men with 12 or less years of education.	MSA unemployment rate. Omitted area effects dealt with in some cases by including lagged MSA unemployment rate as control	None	Both tabulations of dependent variables by MSAs classified by unemployment rates and regression analysis, show that earnings are higher, and unemployment rates are lower, in areas with low overall unemployment. Effects on blacks tend to be greater than for whites, often by magnitude of two or more. Changes in unemployment rate also appear to be associated with greater earnings growth. Magnitude of coefficients are important—a 1 point reduction in unemployment increases black youth employment/population ratio by 2 to 4 rate points, and increases black youth earnings by 7 percent.

Table 1
(Continued)

<u>Study</u>	<u>Dependent Variables</u>	<u>Measures of Overall Local Economy</u>	<u>Measures of Local Industrial Mix</u>	<u>Findings</u>
Ihlanfeldt and Sjoquist (1991)	Probability of employment as of 1980 Census of 16 to 19 year old black or white individuals. Sample restricted to youth living at home and in central cities.	SMSA unemployment rate for white, prime age males.	Proportion of youth jobs in SMSA, based on national figures on youth employment by occupation, and distribution of occupations in SMSA.	Unemployment rate significantly reduces employment probability for both blacks and whites, with effect on whites somewhat greater. Youth job index is insignificant.
Osterman (1991)	Poverty rates for Boston for blacks and whites in 1987, compared to poverty rates for blacks and whites in all central cities in 1988, and also compared to Boston and all central city poverty rates in 1980.	Really just a case study of Boston, which had very strong employment growth 1980 to 1987.	Implicit in case study is that Boston is largely a white-collar city, and did not really have manufacturing boom in 1980s.	Black and white poverty rates declined dramatically in Boston in 1980s, while they went up in other U.S. central cities. Poverty rates in Boston and other central cities were roughly comparable in 1980, but much lower in Boston in 1987. Black poverty rates appeared to go down much more than white poverty rates in "rate points," but not necessarily in percentage.
Cain and Finnie (1990)	Annual hours of work in 1979, black males ages 16-21, in 94 SMSAs; labor force participation in 1980 of black males ages 16-21.	SMSA averages of annual hours worked of young white men; black unemployment rate; wage of young white men; SMSA population change 1970-80.	Percentage of SMSA population employed in "youth-intensive" industries: retail trade, entertainment, and other personal services.	All indicators of improvements of overall local economy increase black youth annual hours and LFP except for SMSA population change, and white wage for LFP. Percentage employed in retail and other "youth industries" also has positive effects.
Moore and Laramore (1990)	1980 black and nonblack, male and female, unemployment and labor force participation rates in 98 central cities; control for 1970 rates makes this really changes regression.	1970-80 percentage change in central city employment	Both 1970 levels and 1970-80 changes in shares (out of central city employment) of manufacturing; distribution-related industries; producer services; personal services; and social and government services. (Manufacturing only entered in changes form.)	Overall employment growth has consistently strong effects on labor force participation rates, stronger for blacks and females than for nonblack males. Effects on unemployment are not significant, although point estimate of growth effect is negative for blacks. Reductions in manufacturing share often significantly reduces labor force participation and increases unemployment. Level of producer services has significant negative effects on unemployment. Unclear how to interpret these estimated industry coefficients because excluded industry category not clear.

Table 1
(Continued)

<u>Study</u>	<u>Dependent Variables</u>	<u>Measures of Overall Local Economy</u>	<u>Measures of Local Industrial Mix</u>	<u>Findings</u>
Welch (1990)	1970-80 change in employment population ratio for black men in 73 SMSAs.	1970-80 change in unemployment rate of white men in SMSA; change in employment/population ratio of white men.	None shown in paper.	Increase in unemployment had significant negative effects on black employment for blacks 16-24 and 25-44, but not 45-64. Industrial mix is reported to have had negative effects on blacks, but unclear how variable defined and size of coefficient.
Hughes (1989)	The number of census tracts in the MSA in 1980 that are "impacted ghettos": exceed twice the SMSA median of female-headed households, male joblessness, welfare receipt, and high school dropouts.	Percentage change in manufacturing employment in central county of MSA from 1972-82.	Same as for overall local economy.	Manufacturing decline in central city county significantly increases number of ghetto tracts.
Ihlanfeldt and Sjoquist (1989)	Annual labor earnings in 1977 of PSID individuals, black and white men and women, minus journey to work costs. Sample restricted to individuals living in central cities with no more than a high school education, and to individuals who were in labor force or were discouraged workers.	1980 SMSA unemployment rate; percentage change in SMSA population from 1970 to 1980.	None.	Higher unemployment associated with significantly higher earnings in MSA for black and white males. Greater population growth associated with marginally significant greater earnings for white males and white females, marginally significant less earnings for black females.

Table 1
(Continued)

<u>Study</u>	<u>Dependent Variables</u>	<u>Measures of Overall Local Economy</u>	<u>Measures of Local Industrial Mix</u>	<u>Findings</u>
Frey and Speare (1988)	1970-80 change in SMSA labor force participation, unemployment; and 1969-79 change in SMSA mean family income, per capita income, and poverty rate; for all races, and for blacks separately.	1970-80 Population Growth	None.	Cross-tabulations show pattern that change in black economic status was much better as one goes from declining SMSAs to slow growth to moderate growth to rapid growth. Differences in changes in economic status across different growth rate SMSAs seem much greater for blacks than for overall population. One interesting difference for poverty: more growth only makes difference as one goes from decline to moderate growth, not from moderate to rapid growth. For other variables, more growth always increases positive effects.
Levy (1982)	Probability of an individual black and white male being employed in 1979, and annual 1978 earnings and poverty status of black and white men and women.	State 1979 unemployment rate; state rate of job growth from 1972 to 1977.	None.	On whole, does not find consistent or strong effects of state variables on these measures of the current level of the individuals' economic status. Statistically significant results (<i>t</i> -statistic greater than 2) for blacks include: 1979 unemployment rate increase of 1 point reduces black male employment rate by over 2 points; increasing job growth associated with lower black male employment probability and lower black married female earnings.
Mooney (1969)	Employment to population ratio of nonwhite males and females in poorest census tracts of 25 large SMSAs in 1960.	SMSA total unemployment rate.	None.	Unemployment rate has large and significant negative effects on E/P ratio of around (-3) to 1; slightly larger effects for females than males.

affected by both local unemployment rates and overall local growth. Focusing on the level of black economic outcomes in a given year can yield biased results. Local economies have many unobserved characteristics. These unobserved characteristics may cause spurious correlations between black economic outcomes and measures of local economic climate. For example, a high wage MSA may have higher unemployment rates, because the high wages make the MSA more attractive to in-migrants; the high wages may increase black earnings, resulting in a spurious negative correlation between higher MSA unemployment rates and black wages or earnings.

In addition, including both local unemployment rates and growth in the same regression creates difficulties of interpretation. Local unemployment rates will drop due to faster growth. Yet the regression estimates (1) the effects of growth, when unemployment is held constant, and (2) the effects of unemployment when growth is held constant. The effects on economic outcomes of one of these variables, when the other is held constant, may not be an interesting issue from a policy perspective: one would usually expect policies that stimulate the local economy to change both variables. In addition, including both variables together may mask the effects on economic outcomes that occur when both variables change together.⁴

The studies in table 1 modestly support the hypothesis that the effect of the overall local economy are greater for blacks, compared to whites. Of the nine studies that consider

⁴ In addition, both Levy and Ihlanfeldt/Sjoquist suffer from timing problems: the year of their dependent variable does not exactly match the year of their measures of the overall local economy. For example, Levy considers 1979 economic outcomes as a function of 1972 to 1977 growth; Ihlanfeldt and Sjoquist consider 1978 economic outcomes as a function of 1980 unemployment and 1970 to 1980 growth.

this issue, six find stronger effects on blacks than on whites (Bound and Holzer; Freeman; Bartik; Frey and Speare; Osterman; Mooney); two find similar effects on blacks and whites (Ihlanfeldt; Welch); and one finds stronger effects on whites (Ihlanfeldt and Sjoquist).

The effects of local industrial mix on black economic outcomes are unclear from previous studies. Six studies find evidence that local industrial mix makes a difference (the two Eggers and Massey studies; Bound and Holzer; Cain and Finnie; Hughes; and Moore and Laramore); two studies do not find significant effects of industrial mix (Ihlanfeldt; Ihlanfeldt and Sjoquist). But 3 of the 6 studies that find industrial mix effects define their industrial mix variables so that a change in the industrial mix variable will change overall MSA employment. These three studies do not hold MSA employment growth constant (the Eggers and Massey studies; Hughes). These three studies' industrial mix effects may actually be due to the effects of faster MSA employment growth. For example, Eggers and Massey (1992) use as an industrial mix variable the 1970-80 change in the ratio of operative and crafts workers to the black population. Increases in operative and crafts workers in the MSA will be associated with greater MSA employment growth, which is not held constant in Eggers and Massey's regressions.

Of the remaining three studies that find industrial mix effects, two (Bound and Holzer; Moore and Laramore) find some negative effects on blacks of a declining manufacturing share. The Cain and Finnie study finds that black youths are helped by increases in an MSA's youth oriented jobs.

The Spatial Mismatch Literature: Effects of Job Access on Black Economic Outcomes

The research literature on the effects on black outcomes of being spatially close to jobs—the "spatial mismatch" literature—has recently been reviewed by Holzer (1991) and Ihlanfeldt (1992). This type of research is hard to conduct, for two reasons. First, job access is hard to measure. Second, the direction of causation between job access and black economic outcomes is unclear. For example, persons who obtain good jobs may move to the suburbs, where there is strong manufacturing growth. Access to manufacturing jobs may appear to cause black economic success when the truth is that black economic success causes improved job access.

Probably the best studies of the spatial mismatch hypothesis have been done by Ihlanfeldt and Sjoquist (1989, 1990, 1991) and Ihlanfeldt (1992). Their studies focus on the economic outcomes of black youths living at home, for whom it is most plausible that residential location is "exogenous", that is that residential location is a cause rather than a result of labor market experiences.⁵ In addition, their studies measure job access in a "neighborhood" using commuting travel times for a large sample of neighborhood residents. Their studies also measure travel time for jobs for which black youth are likely to be qualified. This measure of job access seems superior to alternative measures (jobs within 30 minutes commute, etc.). The Ihlanfeldt and Sjoquist studies find large effects on black youths of spatial accessibility of jobs.

⁵Black youths living at home might be different from other black youths. This raises the possibility of selection bias. But it is unclear why selection bias would lead to biased estimates of the effects of job access. There is no obvious reason for the unobserved attributes of black youths living at home to differ between high-access and low-access neighborhoods.

But it seems premature to declare a consensus on the basis of the findings of one group of researchers. Furthermore, the research by Ellwood (1986) finds the effect of job access on youth employment rates to be small. Ellwood's research also uses travel time as an access measure, and also focuses on youth economic outcomes. Ellwood's research considers only Chicago while Ihlanfeldt and Sjoquist consider more cities, and Ellwood's data and travel time measures may be more subject to measurement error than Ihlanfeldt and Sjoquist's (Ihlanfeldt, 1992; Kasarda, 1989; Leonard, 1986). Still, Ellwood's findings do raise some doubt about whether spatial access to jobs affects black economic outcomes.

III. Methodology and Data

The new research for this report examines how the changes over time in different economic outcomes for different groups of blacks and whites in a metropolitan area are affected by changes in several characteristics of metropolitan economic development. This section outlines the methodology used and describes the construction of the variables used. The technical appendix has more details on the methodology and data.

The methodology and data used here have some advantages over those of previous research. First, the methodology is designed so that estimates will not be biased by unobserved area characteristics that affect the level of economic outcome variables. Unobserved area characteristics can cause spurious correlations between the levels of economic outcome and economic development variables. Second, compared to previous research, the analysis considers more groups and more types of economic outcomes.

Finally, the methodology defines the industrial mix class of economic development variables so that industrial mix and metropolitan growth can change independently. The industrial mix variables all depend on the types of industries in the metropolitan area, not the metropolitan area's size or growth.

Specification of the Estimating Equations

The basic model is a regression model using pooled time series of cross sections. The cases are MSA-year combinations, where "year" refers to one-year periods for which the variables measure percentage change. Many versions of the model are used, one for each dependent variable. In general, the time-series includes 16 periods, ranging from 1973-74 to 1988-89. The number of MSAs included for a given period ranges from 34 in the early 1970s to over 200 in the late 1980s. The model includes a time dummy for each period except the first. Other variables, both dependent and independent, generally measure one-year percentage change in either an MSA mean economic outcome (e.g., average real personal earnings) or some aspect of the MSA's economic climate that might be a causal influence (e.g., manufacturing employment as a percentage of total MSA employment). The dependent variables always describe a specific demographic group (e.g., black high school dropouts). The estimation procedure corrects for both heteroskedasticity and serial correlation. To correct for heteroskedasticity, cases are weighted using weights that are based on the statistical precision with which the percentage change in MSA mean economic outcomes are measured. This report's technical appendix gives more information on the rationale behind pooling and on the validity of the heteroskedasticity corrections.

The basic equation is as follows:

$$\% \Delta Y_{m,t,g} = a + b \text{ TIME} + c(L) \% \Delta \text{DEVELOP}_{m,t} + e_{m,t,g}$$

where $\% \Delta Y$ is the dependent variable, expressed as a one-year percentage change in some demographic group's MSA average economic outcome for the period that the particular MSA-year case represents; *TIME* is a vector of one-year period dummies, one for each period except the first; $\% \Delta \text{DEVELOP}$ is a vector of independent variables, intended to measure changes in various characteristics of the MSAs that describe its economic development, broadly defined; *m* designates a particular MSA; *t* designates the time period; *g* designates the demographic group being considered; *a* is the regression constant; *b* and *c* represent the coefficients on the variables; *c(L)* is notation that indicates that some specifications include lagged as well as current values of the economic development variables, with the coefficients on these lagged variables estimated without constraints; and *e* is the error term.

Controlling time dummies avoids making inferences based on national trends in the economic outcome and economic development variables. These national trends could be spuriously correlated. Instead, this study focuses on explaining differences from one MSA to another in the year to year changes in economic outcomes. These MSA differences in the change in economic outcomes are assumed to be in part caused by differences from one MSA to another in the change in the economic development variables.

This specification has the advantage of eliminating possible biases due to fixed unobserved MSA characteristics. For example, some MSAs may be low-wage areas because they are attractive places to live; some might attract more high technology industries, because

they are attractive places to live. As a result, a high tech MSA industrial structure could be negatively correlated with MSA wages, even though high tech employment does not cause lower wages. But by focusing on year-to-year changes in measuring the dependent and independent variables, the methodology eliminates any unobserved fixed MSA characteristics.⁶

The long-run effect on an economic outcome variable of a permanent change in an MSA economic development variable is the sum of the coefficients on all current and lagged values of that economic development variable. For example, suppose a specification includes the current change in an economic development variable, the once-lagged change in that same economic development variable, and the twice-lagged change. Then the cumulative effect on the level of the economic outcome variable of a permanent 1 percent increase in the economic development variable will at first be given by the coefficient on the current change, after 1 year by the coefficient on the current change plus the coefficient on the lagged change, and after 2 or more years by the sum of all three coefficients.

An important issue in specifying this model is how many lags of the economic development variables to include. As more and more lags are added, estimates become more and more imprecise. To choose an optimal lag length, this report will use Schwartz's Bayesian Criterion (SBC), a standard model selection criterion. Geweke and Meese (1981) present arguments for the superiority of the SBC over other model selection criteria.

⁶ There could of course also be unobserved MSA characteristics that change in some systematic way over the time period being analyzed. These MSA fixed trend effects could cause bias in a changes specification. The technical appendix analyzes this issue further.

The SBC in the current report usually chooses models with only current changes in economic development variables, and no lagged changes, particularly for black groups. The choice of zero lags does not mean that the effects of economic development variables are unchanged over time; it means that any changed effects are modest enough that including them is not statistically optimal. To allow comparison across different groups and outcomes, the emphasis in the report will be on the long-run estimated effects for the zero-lag specification. Results for longer-lag specifications will be mentioned when the longer-lag specification might lead to different inferences.

Dependent Variables

The data on the dependent variables, the percentage change in an MSA's average economic outcomes, are derived from the Annual Demographic File of the Current Population Survey from March 1974 to March 1990. Each Annual Demographic File contains data on the "economic outcomes" (personal earnings, income, work, and so on) of sampled persons and families during the preceding year. My procedure for constructing the dependent variables began by calculating, for each economic outcome variable and demographic group considered, a "regression-adjusted" mean for each identified metropolitan area and each year that controlled the individual's characteristics. Each dependent variable is then simply the percentage change from one year to the next of that "regression-adjusted" MSA mean.⁷

⁷ As noted in Table 2, the actual percentage change numbers used in the regression are calculated using as a base the overall mean of that adjusted economic outcome variable for that demographic group. This base was used because for some MSA-year cases the adjusted

Table 2 describes the dependent variables. Real annual personal earnings is the best measure of a person's economic success. The other variables either measure things that determine personal earnings (weeks worked, weekly earnings, etc.) or measure the person's poverty status, which is strongly influenced by personal earnings. The groups considered permit analysis of how the effects of economic development policies vary by race, education, age, and gender.

The regression adjustment procedure worked as follows. For each year of the Annual Demographic files, a number of regressions were estimated. The observations for each regression were on individuals. The sample for each regression was all persons in identified MSAs in a particular demographic group, such as black males 16 and over (see table 2). Each regression had as a dependent variable some economic outcome measure, such as real personal earnings. Each regression used as independent variables a number of personal characteristics (education, experience, and gender) and a full set of dummy variables identifying the person's metropolitan area. Using these regression coefficients for a given outcome measure, year, and demographic group, I then predicted, for each metropolitan area identified in the CPS in that year, what we would expect that economic outcome variable to be for a person with "mean values" of personal characteristics. The means used for these predictions were usually the mean values for blacks for these personal characteristics in

mean for some economic outcome variables and some demographic groups is less than or equal to zero. Calculating percentage change on a base of last year's value is not a sensible procedure for those cases. The technical appendix further discusses this issue of calculating percentage change. For the poverty rate variable, the "percentage" change in the year-to-year change in the adjusted percentage in poverty in the MSA, not the percentage change in that rate. For example, if black poverty changed from 30% to 27% in an MSA, this would be a decline of 3% and not 10%.

Table 2

Outline of Dependent Variables

TYPES OF DEPENDENT VARIABLES USED

One-year percentage change in MSA's "adjusted mean" of annual real personal earnings

Determinants of personal earnings:

One-year percentage change in MSA's "adjusted mean" of annual weeks worked

One-year percentage change in MSA's "adjusted mean" of annual weeks in labor force

One-year percentage change in MSA's "adjusted mean" of annual weeks worked/weeks in labor force

One-year percentage change in MSA's "adjusted mean" of average real earnings per week

One-year percentage change in MSA's "adjusted mean" of usual hours worked per week

One-year percentage change in MSA's "adjusted mean" of average real earnings per hour worked

Poverty

One-year change in MSA's "adjusted mean" of poverty rate

GROUPS FOR WHICH DEPENDENT VARIABLES ARE CALCULATED

Blacks 16 and over

Whites 16 and over

Black high school dropouts 25 and over

Black high school completers 25 and over

White high school dropouts 25 and over

White high school completers 25 and over

Black youth: 16-24

Black prime-age: 25-54

Black older persons: 55 and over

White youth: 16-24

White prime-age: 25-54

White older persons: 55 and over

Black males 16 and over

Black females 16 and over

White males 16 and over

White females 16 and over

Notes: All real earnings/income figures are adjusted for estimated local prices, as described in technical appendix. Percentage change is calculated by dividing the one-year absolute change in a particular outcome measure by the sample mean of that outcome for that demographic group and then multiplying by 100. MSA means are "adjusted" using regression procedures described in text. High school completion/dropout status based on whether completed 12 years of school. Drop-out and completer groups only include persons 25 and older because younger persons are more likely to still be completing education.

1986.⁸ For example, real personal earnings for whites in New York in 1977 are predicted using the regression coefficients from the 1977 regression for real personal earnings. These predictions estimate what earnings would have been for whites in New York in 1977 if their education, experience, and proportion of each gender were the same as was true of the average black in the U.S. in 1986.

For some groups and characteristics, it makes no sense to hold characteristics constant at the overall black means in 1986. For example, it makes no sense to calculate what a typical white 16 to 24-year old's earnings would have been if his experience had been at the average black's experience level in 1986, or what the average white high school completer's earnings would have been if he had been at the same education level as the 1986 black average. Education by definition varies with status as a high school dropout and completer, and experience by definition varies with the age group. For these groups and characteristics, predictions used the black means for the comparable group in 1986. Thus, the white dropout predictions for 1974 would use the mean education levels of black high school dropouts in 1986, and the white high school completer predictions would use the mean education of black high school completers in 1986; all other individual characteristics would still be kept constant at the overall 1986 black mean.

The dependent variable for each equation is the year to year percentage change in an MSA in the predicted value of one of the economic outcome variables. An alternative would have been to simply use the year to year percentage change in the MSA's mean value of that

⁸ 1986 was somewhat arbitrarily chosen as a reference point, simply because the empirical work began using the March 1987 CPS.

economic outcome variable. I chose to use as dependent variables the changes in predicted values—these "regression adjusted means"—rather than changes in simple MSA means. The reason for this choice is that I want to examine why economic outcomes differ across MSAs, years, and groups for persons who are otherwise similar. For some groups, such as high school dropouts and completers, some characteristics—education in this case—should be allowed to differ between the two groups, but all other characteristics should be held constant to permit a valid comparison.

Independent Variables

Table 3 lists and defines the study's independent variables. To repeat, the independent variables (like the dependent) generally measure one-year percentage changes in some MSA characteristic.⁹ The independent variables are of three types: a measure of metropolitan employment growth, many measures of changes in local industrial mix, a measure of employment decentralization. All of these independent variables can be considered to be "economic development" variables because state and local economic development policies aim directly at influencing these MSA characteristics. State and local economic development policies provide tax breaks, financial assistance, or services directly to individual firms. These policies' immediate goal is to affect local growth, the types of industries in the area, or the geographic distribution of industries within the area.

⁹ These percentage changes, as shown in the table, are generally measured as 100 times the change in some natural logarithm. The only variable not measured in percentage terms is the education variable, which is measured as the annual change in demand for years of education.

Table 3

Description and Definition
of Economic Development Variables

MSA EMPLOYMENT GROWTH:

$[\ln(\text{MSA employment in year } t) - \ln(\text{MSA employment in year } t - 1)]$ times 100.
Employment data uses 1989 MSA definitions and comes from BEA's Regional Economic Information System.

MSA DECENTRALIZATION:

"MSA EMPLOYMENT GROWTH" - $\{[\ln(\text{employment in county containing central city in year } t) - \ln(\text{employment in county containing central city in year } t - 1)] \text{ times } 100\}$.

MSA WAGE PREMIUM CHANGE:

$$\sum_i w_i s_{imt}^* - \sum_i w_i s_{imt-1}^*$$

where w_i is estimated industry i percentage "wage premium" (difference between average wage in industry and what we would expect based on workers' characteristics) from Table II of Krueger and Summers (1988), and s_{imt}^* is estimated share of two-digit industry i in total private non-agricultural employment in MSA m in year t . Krueger and Summers' wage premiums are differences in the logarithm of wages across industries, and are multiplied by 100 before being used in this study.

MSA EDUCATIONAL REQUIREMENTS CHANGE:

$$\sum_i E_i \cdot S_{imt} - \sum_i E_i \cdot S_{imt-1}$$

where E_i is average years of education in 2-digit industry i calculated from March 1990 CPS, and S_{imt} is industry i 's share of total MSA employment.

Table 3
(Continued)

PERCENTAGE CHANGE IN SHARE OF MSA DEMAND FOR DEMOGRAPHIC GROUP j :

$$[\ln(D_{jmt}) - \ln(D_{jmt-1})] \text{ times } 100 \text{ where } D_{jmt} = \sum_i G_{ij} S_{imt},$$

and G_{ij} = proportion of 2-digit industry i 's employment that consists of persons in demographic group j . These proportions are calculated using data from March 1990 CPS on all persons 16 and over. Demographic group variables are defined for all groups listed in Table 2. For drop-outs and completers, G_{ij} calculated based on all individuals 16 and over.

MSA Change in Manufacturing Share

This is simply defined as change from $t - 1$ to t in the percentage of the MSA's total employment in manufacturing industries.

Note: All 2-digit industry numbers come from estimates based on ES-202 industry data and REIS data. Procedure for estimating suppressed industries is described in the technical appendix.

The overall growth and decentralization measures are straightforward. The growth measure is the year to year percentage change in employment in the MSA. This study's calculations of MSA growth use 1990 boundaries of MSAs. The decentralization measure is the difference between the overall percentage growth in the MSA and the percentage employment growth in the county containing the MSA's central city. This difference is also equal to the percentage change in the ratio of MSA employment to employment in the MSA's "central city" county. In MSAs in which employment is more rapidly moving to the suburbs, this variable will take on larger values. If blacks have greater difficulty in getting access, by transportation or information networks, to suburban jobs, then this decentralization variable will be negatively correlated with black access to jobs. This measure of access is crude compared to direct measures of job access, such as average commuting time to jobs. But this decentralization variable is the best reflection of access available on a year-to-year basis for many MSAs.

The local industrial mix variables are all measures of the MSA's "average" value of industry characteristics, based on the MSA's industrial mix and national data on industries. The "wage premium" changes variable measures how MSA wages would change due to changes in the proportion of MSA employment in industries that pay well or poorly relative to the worker's credentials. This calculation uses national data on wage premiums by industry to calculate these changes in the average MSA wage premium. The educational requirement change variable measures changes in the average years of education demanded in the MSA, if each industry demanded workers with the same number of years of education as they typically employ in the nation. The demographic change economic development

variables measure changes in the proportion of metropolitan employment demand for different demographic groups. The calculation for this variable assumes that each industry in the metropolitan area allocates the same proportion of its employment demand to that demographic group as it did in the nation in 1989.

These industry mix variables are all meant to measure different ways in which changes in local industry mix might affect local labor demand. National industry characteristics are used in calculating these industry mix variable to avoid effects of local labor supply conditions on these variables. For example, the percentage of industry employment that goes to a particular demographic group in an MSA would be expected to increase if the local labor supply of that group in the MSA increases.

Table 4 lists how some of these industry characteristics vary across industries. Most industry characteristics vary as one might expect. Some manufacturing industries are high wage premium, but so are certain service industries such as communications and public utilities. Female employment is concentrated in particular service industries and in a few manufacturing industries such as apparel. Educational levels are high in legal services, banking, and civilian government agencies but low in eating and drinking places. Other industry characteristics may be less familiar. The large concentration of black high school completers in government, and in certain quasi-public utilities such as communications is of interest, as is the concentration of black high school dropouts in eating and drinking places and apparel and textiles.

Table 4

Variation of Selected Industry Characteristics
Across Industries

SIC Code	Industry Name	% Wage Premium	% Female Employment Out of Industry Employment	% Youth Employment Out of Industry Employment	Years of Education	% Black High School Dropouts Out of Industry Employment	% Black High School Completers Out of Industry Employment
All industries		0	46.1	18.3	12.9	2.4	8.1
1	Agric. crops	•	21.8	22.3	10.4	4.9	2.4
2	Agric. livestock	•	20.7	15.2	11.2	2.5	0.5
7	Agric. services	•	23.0	33.1	11.2	4.7	3.5
8	Forestry	•	20.5	26.9	11.7	2.1	0.0
9	Fishing	•	22.6	25.0	11.2	7.7	2.1
10	Metal mining	25.3	18.0	2.2	12.7	0.0	0.0
12	Coal mining	25.3	9.4	0.6	12.1	0.0	3.3
13	Oil	25.3	21.4	5.2	13.2	1.3	3.0
14	Minerals	25.3	8.7	15.2	11.6	3.1	7.6
15,16,17	Construction	11.2	9.5	16.5	11.9	2.5	4.6
20	Food products	10.9	36.1	13.8	11.7	6.4	10.9
21	Tobacco products	52.7	37.7	10.5	12.6	4.1	10.9
22	Textiles	2.3	51.2	18.8	11.3	6.0	14.8
23	Apparel	-12.3	77.1	17.6	10.6	5.9	8.6
24	Lumber	3.8	13.2	19.8	11.3	5.7	4.6
25	Furniture	1.4	28.8	18.6	11.5	3.7	4.8
26	Paper	17.8	25.1	9.6	12.3	4.1	6.7
27	Printing	9.5	47.9	15.7	13.1	1.3	5.0
28	Chemicals	26.6	34.6	9.7	13.4	0.8	11.9
29	Petroleum products	61.9	20.3	4.8	14.2	0.0	8.9
30	Rubber/plastics	9.8	37.7	15.8	11.9	1.8	8.2
31	Leather	-6.2	61.9	25.0	11.6	0.6	8.5
32	Stone/clay/glass	13.7	21.8	15.2	11.9	2.7	7.5
33	Primary metals	26.2	15.0	10.7	12.0	2.3	7.6
34	Fabricated metals	13.2	20.9	12.1	12.2	2.3	6.3
35	Industrial machinery	22.1	23.6	10.0	13.0	1.1	3.8

Table 4
(Continued)

SIC Code	Industry Name	% Wage Premium	% Female Employment Out of Industry Employment	% Youth Employment Out of Industry Employment	Years of Education	% Black High School Dropouts Out of Industry Employment	% Black High School Completers Out of Industry Employment
36	Electrical machinery	13.5	42.6	10.8	13.0	0.8	7.2
37	Transport equipment	26.7	22.4	7.7	12.9	1.7	10.8
38	Instruments	16.7	42.6	10.8	13.0	0.8	7.2
39	Misc. manufacturing	3.4	49.2	16.7	11.8	1.0	6.0
40	Railroads	26.8	7.4	0.4	12.3	0.0	8.4
41	Local transit	16.0	33.4	10.6	12.5	3.9	17.0
42	Trucking	16.0	16.2	13.1	12.1	3.0	10.3
44	Water transport	16.0	13.1	15.4	12.7	1.1	11.9
45	Air transport	16.0	32.6	11.3	13.7	0.7	9.0
46	Pipelines	16.0	0.9	0.0	13.9	0.0	0.0
47	Transport services	16.0	61.5	12.6	13.9	0.0	3.3
48	Communications	29.3	50.2	9.6	13.4	0.3	15.2
49	Electric/gas/sanitary svcs	33.6	24.9	5.9	13.3	1.2	12.2
50	Wholesale durables	2.5	28.3	14.3	13.1	1.2	4.1
51	Wholesale nondurables	2.5	30.9	14.2	12.9	2.7	5.9
52	Retail—building materials	-18.6	28.7	25.4	12.4	1.0	2.6
53	Retail—general merchandise	-18.6	72.5	36.5	12.4	2.1	9.2
54	Retail—food stores	-18.6	50.8	41.2	11.8	3.2	6.2
55	Auto dealers/service	-18.6	21.1	20.3	12.3	1.4	4.2
56	Clothing stores	-18.6	76.2	37.6	12.7	2.4	9.2
57	Furniture stores	-18.6	36.3	23.0	13.0	1.6	4.4
58	Eating/drinking estab.	-21.9	57.5	49.4	11.7	5.0	6.1
59	Misc. retail	-18.6	59.5	26.2	12.9	1.1	5.5
60,61	Banking	9.2	69.4	15.4	13.7	0.4	9.0
62	Stockbrokers	9.2	43.2	11.7	15.2	0.4	6.9
63,64,65,66	Insurance/real estate	7.5	54.9	12.5	13.6	0.7	6.3
70	Hotels	-19.4	63.0	19.7	12.0	4.4	8.2
72	Personal services	-19.4	69.6	20.5	12.2	3.5	7.9
73	Business services	-3.1	48.6	16.4	13.8	1.8	7.8
75	Auto repair/services	-8.7	14.3	20.6	11.8	3.0	6.5

Table 4
(Continued)

SIC Code	Industry Name	% Wage Premium	% Female Employment Out of Industry Employment	% Youth Employment Out of Industry Employment	Years of Education	% Black High School Dropouts Out of Industry Employment	% Black High School Completers Out of Industry Employment
76	Misc. repair	-8.7	16.0	13.8	12.0	1.4	5.0
78	Motion pictures	-16.3	48.6	16.4	13.8	1.8	7.8
79	Amusement	-16.3	43.6	39.5	12.5	2.4	5.5
80	Health	-1.4	79.6	13.1	13.7	2.9	10.7
81	Legal services	2.3	55.8	12.0	15.4	0.4	4.9
82	Education services	-21.6	63.6	19.1	14.9	1.8	8.4
83	Social services	-33.0	81.4	18.7	13.1	3.1	11.5
84	Museums	2.3	60.1	22.0	13.2	7.2	4.8
86	Associations	2.3	52.5	10.5	14.1	2.5	5.2
87	Engineering services	-51.7	48.6	16.4	13.8	1.8	7.8
88	Private household services	2.3	85.5	27.2	10.5	14.6	8.0
89	Services, n.e.c.	2.3	48.6	16.4	13.8	1.8	7.8
100	Federal civilian	•	42.8	8.8	13.8	1.7	16.4
101	Federal military	•	7.8	27.7	13.5	0.0	17.2
102	State/local government		56.7	10.5	14.2	2.1	11.4

Note: Wage premium numbers come from Krueger and Summers (1988), Table II. These "percentage wage differential" are actually 100 times the change in the log of the total compensation differential. Note that some of their categories include several 2-digit industries here. Other numbers are calculated from March 1990 CPS. To avoid problems of SIC definitional change, some SIC codes are combined: (36, 38); (60, 61); (63, 64, 65, 66); and (73, 78, 87, 89).

The Direction of Causation Issue

The policy issue motivating this report is the effect of changes in MSA economic climate on persons' economic outcomes. The coefficients on the economic development variables could be interpreting as reflecting this direction of cause and effect, from change in MSA economic development to changes in economic outcomes. But causation could also go in the reverse direction, from changes in persons' economic outcomes to changes in MSA economic development. This reverse direction of causation biases the estimated coefficients. For example, MSA employment growth would be expected to increase wages, contributing to a positive correlation between growth and wage increases. But MSA wage increases may discourage employment growth, contributing to a negative correlation between growth and wage increases. In an equation with MSA wage change as a dependent variable, the coefficients on MSA employment growth may reflect both directions of causation. The coefficients may be biased estimates of the true effects of MSA employment growth on wages.

This report does not attempt to untangle the direction of causation between MSA economic development and economic outcomes. But previous research has suggested that this theoretical econometric issue may not be of large practical importance. For example, estimates in Bartik (1991) and Blanchard and Katz (1992) suggest that the biases caused by ignoring the "endogeneity" of MSA economic development are modest.

IV. Preliminary Analysis of Trends in Dependent and Independent Variables

National Trends in "Regression-Adjusted" Personal Earnings for Large MSAs

To get a sense of the overall economic differences between blacks and whites, and to get a sense of the effects of "regression adjustment," figures 1 and 2 show national average trends for real personal earnings for blacks and whites. The national average personal earnings numbers in figures 1 and 2 use only persons in the 33 metropolitan areas that are consistently identified in the CPS from 1973 to 1989. Figure 1 shows simple weighted national means over these 33 MSAs for each year; figure 2 shows weighted regression adjusted means.

As shown in the regression adjusted figure 2, when education, age, and gender are controlled, black earnings shows ups and downs but no strong consistent trend for the overall 1973-89 period. The overall black real earnings trend was slightly downward, with a decline of 2.5% from 1973 to 1989. White earnings, with characteristics controlled, also showed no strong trend for this period; there was just a slight increase of 0.1 percent from 1973 to 1989. Both black and white earners suffered large earnings losses during this period's two recessions, in the mid-1970s and the early 1980s.

A comparison of figures 1 and 2 suggests that the regression adjustment procedure has two main effects. First, the adjustment reduces the black-white differential, because whites on average have better educations than blacks. But even after the adjustment—even when we are comparing blacks and whites with similar characteristics—blacks still earn considerably less than whites. Second, the adjustment eliminates almost all of 1973-89's

Figure 1: Trends in Black and White
Real Personal Earnings, 1973-89

Note: Figures are weighted means for 33 MSAs, in 1989 dollars.

Figure 2: Trends in Black and White
Real Predicted Personal Earnings, 1973-89,
Holding Constant Individual Characteristics

Note: Figures are weighted, regression adjusted means for 33 MSAs, in 1989 dollars.

observed real earnings growth. The average education and experience of both blacks and whites grew during the 1970s and 1980s, increasing both black and white earnings. By controlling education and experience, we compare blacks in 1989 with blacks in 1973 who had similar characteristics, and the same holds true for whites. Once we control education and experience, there is no significant growth in real earnings for blacks or whites from 1973-89.

Table 5 reports the percentage growth in adjusted real earnings for various black and white subgroups. Among blacks, many subgroups did especially poorly: dropouts, young persons, older persons, and males. Among whites, the subgroups that did relatively poorly included dropouts, older persons, and males. When we compare blacks and whites, blacks did more poorly than whites among all subgroups, and considerably more poorly than whites (8 percent or more "earnings growth" gap) among all subgroups except prime-age persons and high school completers. These estimated trends seem generally consistent with those found in other recent research. The other research shows widening of the black-white earnings gap among various subgroups of blacks and whites (e.g., Bound and Freeman's (1992) analysis of earnings trends for black and white younger males).

Differences in Economic Trends Across MSAs

These national trends conceal large differences in economic outcome trends in different MSAs. The pattern of variation across MSAs differs between blacks and whites. Figure 3 shows the percentage growth in adjusted personal earnings for blacks and whites for

Table 5

Estimated Percentage Change in Regression-Adjusted
Real Personal Earnings, 1973-89,
Weighted Average Over 33 MSAs Consistently in CPS

	<u>Blacks</u>	<u>Whites</u>
Overall	-2.5%	0.1%
High School Dropouts	-33.7%	-21.4%
High School Completers	3.6%	5.4%
Youth 16-24	-9.5%	2.7%
Prime Age 25-54	-3.7%	2.3%
Older GE 55	-16.4%	-3.6%
Males	-22.7%	-13.9%
Females	26.4%	41.6%

Notes: Although percentage change numbers for sub-groups may seem inconsistent with overall numbers, note that overall percentage change should at best only approximately be weighted sum—using initial earnings shares of sub-groups as weights—of subgroup percentage changes. So, for example, overall white percentage change puts greater weight on white males than on white females because white male earnings average much more than white female earnings. This is also true for blacks, but to a lesser extent. This approximate summation will also be inexact because: adjusted numbers for each sub-group and overall numbers are based on separate regressions, and adjustment procedure calculates adjusted means at different mean values of some individual characteristics; the education sub-groups only include individuals 25 and over, while all other groups and overall numbers are based on all individuals 16 and over.

Figure 3: Percentage Growth in Real Regression Adjusted Personal Earnings
for Blacks and Whites, 10 Large MSAs, Late 1970s to Late 1980s

Note: Percentage growth is calculated from 1976-79 average to 1986-89 average. Standard errors of percentage growth are in parentheses. Technical appendix describes construction of standard errors.

10 large MSAs from the late 1970s to the late 1980s. Although black earnings overall may be stagnant, black earnings increased greatly in Newark, Washington, D.C., and Los Angeles; black earnings enormously decreased in Chicago, Detroit, and Houston. Furthermore, although there is some correlation between black and white earnings trends, whites did much better than blacks in some cities (e.g., Baltimore, Detroit, Houston, Miami, and New York), whereas black earnings growth exceeded white earnings growth in Los Angeles and Washington, D.C. I calculated the simple correlation between black and white real earnings growth from the late 1970s to the late 1980s for all 44 MSAs included in the CPS in both years. The estimated correlation between black and white earnings growth by metropolitan area was positive and significant (probability=.082), but at a surprisingly modest magnitude ($r=.27$).

This enormous variety of trends across MSAs may be surprising. But it is consistent with the findings of some previous research. For example, Jargowsky and Bane's analysis (1991) of ghetto poverty trends from 1970 to 1980s revealed that "ghetto poverty increased dramatically in large northern cities, and decreased equally dramatically in many southern cities" (p. 269).

This variation across metropolitan areas is consistent with the premise of this research that trends in black poverty may be in part explained by local economic forces. At least there is some variation across metropolitan areas that can potentially be statistically explained; whether this explanation can give clues to the overall national trends depends on what metropolitan variables do the best job of explaining differences in metropolitan economic outcomes.

National Trends in Economic Development Variables

The national trends in these metropolitan industry mix variables generally are what one would expect. The female and youth employment demand variables show increases over time due to the shift to services. Average educational requirements have gone up as the economy has shifted to higher education industries. Figure 4 shows the trends in a less familiar variable, the wage premium variable. This variable has declined considerably, dropping about one-and-a-half percent from the late 1970s to the late 1980s.

The trends in the black employment demand variables are more surprising. The black high school completer demand variable has declined over time, while the black high school dropout demand variable has increased (Figures 5 and 6). Black high school completer demand appears to have stagnated in large part because of sluggish employment growth in government and the quasi-government communication industry. These industries employ large shares of black high school completers.

Black high school dropout demand has held up due to increased demand for employment in eating and drinking establishments and private household services. These are industries in which black high school dropouts have particularly large shares.¹⁰ In the overall economy, employment is shifting towards industries that employ more high school completers compared to high school dropouts. But the industry distribution of blacks by educational level differs greatly from that of whites. Industry shifts are not increasing the

¹⁰ These statements about the causes of these trends are based on a decomposition of the causes of these trends by industry, which is presented in the technical appendix.

Figure 4: Trends in Average MSA Industry Wage Premiums,
All MSAs

Average MSA Industry Wage Premium (Percent)

Note: All numbers are averages over 316 MSAs
weighted by MSA total employment.

Figure 5: Trends in Average Industry Mix
Prediction of Proportion of Employment Demand
for Black High School Completers, All MSAs

Demand Share for Black High School Completers (Percent)

Note: All numbers are averages over 316 MSAs
weighted by MSA total employment.

Figure 6: Trends in Average Industry Mix
Prediction of Proportion of Employment Demand
for Black High School Dropouts, All MSAs

Demand Share for Black High School Dropouts (Percent)

Note: All numbers are averages over 316 MSAs
weighted by MSA total employment.

demand for black high school completers compared to black high school dropouts. This surprising trend has previously been noted by Bound and Freeman (1992).

Variations in Economic Development Trends Across MSAs

The change across MSAs in these measures of economic development shows considerable diversity across MSAs, and the different economic development measures show some independence. Table 6 shows the 1979-89 change in selected economic development variables for 11 large MSAs. These MSA include the 10 MSAs for which economic outcome changes were previously presented in figure 3; Boston is included as a well-known case in which metropolitan growth was quite healthy from 1979 to at least 1988. Although the qualitative trends are often similar, the magnitude of these economic development trends often differ considerably. For example, most MSAs tended to suffer from a reduced average wage premium, but in MSAs such as Detroit the decline was worse. There is also some independence of the measures; for example, Boston suffered from considerable deindustrialization, yet its wage premium during the 1980s stayed almost the same.

The interrelationship among a number of these variables is further explored in table 7, which provides a correlation matrix across MSAs for the 1979-89 changes in many of these variables. Growth tends to be strongly positively correlated with change in the wage premium, and strongly negatively correlated with change in female labor demand. The wage premium variable is strongly positively correlated with growth and increases in the manufacturing share; it is negatively correlated with changes in female and youth demand. The education and high school dropout variables are not strongly correlated with any other

Table 6

1979-89 Change in Selected Economic Development
Variables for 11 Large MSAs

MSA	Employment Growth	% Change in Manufacturing Share	% Change in Wage Premium	% Change in Decentralization	% Change in Black Share	% Change in Female Share	% Change in Youth Share	% Change in Dropout Share
Baltimore	21.9	-47.4	-1.9	17.6	-2.5	3.9	3.7	-1.0
Boston	23.0	-35.1	-0.8	11.2	-2.8	0.9	1.1	-3.4
Chicago	11.1	-40.5	-1.9	6.2	-0.2	3.5	3.3	-2.4
Detroit	7.9	-33.2	-3.1	19.7	-1.5	6.2	5.1	-2.0
Houston	17.0	-43.3	-2.4	1.6	4.1	9.4	3.5	-4.1
Los Angeles	20.6	-23.8	-1.5	•	0.1	2.3	2.4	0.0
Miami	25.5	-33.0	-0.6	•	-1.1	2.2	0.2	-3.7
New York	11.4	-45.4	-1.3	1.4	-1.4	1.6	0.7	-4.8
Newark	14.3	-40.4	-1.4	8.9	-0.2	2.8	2.1	-2.5
Philadelphia	16.7	-38.0	-1.5	19.6	-1.8	2.7	2.1	-3.4
Washington, DC	34.7	0.6	0.6	24.1	-5.4	0.7	3.6	3.9

Notes: Percentage change numbers are actually 100 times change in natural logarithm.

Means, Standard Deviations, and Correlations of
Changes in Selected Economic Development Variables, 1979-89

[illegible]

Table 7
(Continued)

Notes: All statistics are unweighted. "% changes" are really 100 times changes in natural logarithm of each variable. For correlation table, number in parentheses is probability of correlation that large in absolute value under null hypotheses that correlation is zero. Correlation based on 314 MSAs, except for those involving decentralization, which are based on 140 MSAs.

variables, but are so strongly correlated with each other (negatively) that one variable clearly can serve as a proxy for the other one. The change in black labor demand is most strongly positively correlated with changes in female labor demand.¹¹

These correlations are high enough to reemphasize that these different economic development variables should not be looked on as independent of one another. These economic development variables are probably causally linked. For example, growing MSAs may tend to have predictable changes in industrial mix, and certain types of changes in industrial mix may be favorable towards growth.¹² On the other hand, the correlations are not large enough to prevent possible inferences about which economic development characteristics have the most powerful effects on black and white economic outcomes.

I also used some regressions to describe the pattern of change in these economic development variables across different regions and MSA sizes (table 8). These regressions each used the 1979-89 percentage change in one of the economic development variables for an MSA as the dependent variable. The independent variables were different polynomials in the 1979 employment size of the MSA, and dummy variables for the MSA's regions. Larger size is associated with greater employment growth for MSAs near in size to the mean MSA, although increased size decreases growth for the largest MSAs.¹³ Larger MSAs also

¹¹ These statements about "strong" correlations somewhat arbitrarily consider a "strong" correlation to be one that is greater than 0.5 in absolute value.

¹² In Section VI, I present some evidence that growth and increases in the wage premium have a mutual cause-and-effect relationship, and discuss some reasons for such a relationship.

¹³ The MSA with the mean natural log of employment in 1979 has employment around 144,000. The derivative of 1979-89 growth with respect to 1979 size is positive up to about 6.4 times the size of the mean MSA, or up to around 922,000 in MSA employment. Only a few MSAs have total employment exceeding 922,000.

Estimates of How 1979-89 Changes in MSA Economic Development Variables Are Related to 1979 MSA Size and Region of MSA

[illegible]

Table 8
(Continued)

Note: All estimates are based on 314 MSAs. Dependent variable is 100 times change from 1979 to 1989 in natural logarithm of each variable, except for education, which is in years. *t*-statistics are in parentheses. F-test probabilities are probabilities of F-test statistic for a group of variables under null hypothesis that all coefficients in that group are zero. Employment deviation variable defined as [100 times ln(1979 MSA employment)] minus mean of that variable over all MSAs. So, elasticity at mean with respect to 1979 employment is given by deviation coefficient. Region dummies are constrained so that their weighted sum, using number of MSAs in each region as weight, is zero. As discussed by Kennedy (1986), this implies that each region coefficient is the difference of that region from the national average.

have a greater tendency to lose manufacturing and decentralize, as well as a greater tendency to lose industries that employ a great many blacks. The regional pattern is somewhat more complicated. Generally, there was more growth in Sunbelt states, with the exception of some of the "Oil Patch" states in the Southwest. Deindustrialization was particularly pronounced in the Northeast, but New England MSAs were able to keep their wage premium relatively stable. The Midwestern MSAs did not lose as much manufacturing share as the national average but tended to lose high wage premium industries.

Finally, I examined how the economic development variables changed in MSAs with relatively large black populations, compared to other MSAs. Table 9 reports the weighted average changes for all MSAs, from 1973 to 1979 and from 1979 to 1989, in various economic development variables, using as weights the black population shares in each MSA, or the white population shares in MSAs. The most noticeable difference is that blacks tended to be concentrated in MSAs that exhibited relatively slow employment growth. This black concentration in slow-growth MSAs was especially pronounced in the 1973-79 period. This pattern of black concentration in slow growth metropolitan areas was previously noted by Frey and Speare (1988) and Moore and Laramore (1990).

V. Effects of MSA Growth on Black and White Economic Success

I now present estimates of the effects of changes in MSA economic development variables on changes in black and white economic outcomes. As a reminder, the dependent variables in this study are various types of year to year changes in MSA mean economic outcomes—such as the year to year change in real personal earnings—for different

Table 9

Comparison of Average Change Across All MSAs
in Selected Economic Development Variables,
Using Black or White Population Weights

	1973-79		1979-89	
	<u>Black Weights</u>	<u>White Weights</u>	<u>Black Weights</u>	<u>White Weights</u>
% Employment Growth	12.7 %	15.8 %	21.1 %	22.4 %
Change in Percentage Wage Premium	NA	NA	-1.5 %	-1.5 %
Change in Educational Requirements	NA	NA	+ .070 years	+ .067 years
% Change in Black Share of Employment Demand	NA	NA	-1.0 %	-0.7 %
% Change in Female Share	NA	NA	+3.7 %	+3.9 %
% Change in Youth Share	NA	NA	+2.8 %	+2.7 %

Notes: All numbers are based on 314 MSAs. Weights used are sum of black or white March 1990 CPS weights for each MSA.

demographic groups. These MSA mean economic outcomes are "regression-adjusted" means: the means control education, experience, and other personal characteristics so that we are comparing average economic outcomes over time and from one MSA to another for persons with the same characteristics. The independent variables include time dummies, and year to year changes in various MSA characteristics. These changes in MSA characteristics include MSA employment growth, changes in MSA industrial mix, and changes in MSA decentralization. All of these changes in MSA characteristics can be considered to be changes in MSA economic development, broadly defined: an MSA economic development policy that aids particular firms will have as its immediate goal affecting the growth of the MSA, the types of industries in the MSA, or the spatial distribution of industries in the MSA. In addition to including current values of these changes in MSA economic development variables as independent variables, some specifications also include as independent variables some lagged values of changes in economic development variables.

The present section, section V, begins with models in which the only economic development variable among the independent variables is MSA employment growth. All models include the time dummies. Section VI will present slightly more complex models that also include as independent variables various types of MSA industrial mix variables, in addition to MSA employment growth and the time dummies. Section VII will present even more complex models that also include as an independent variable the decentralization variable, in addition to MSA employment growth, an MSA industrial mix variable, and the time dummies.

Several rationales can be offered for this estimation strategy of starting with simple models before adding in more economic development variables. First, there are many changes in MSA economic development variables that are potential independent variables. Including all or even most of these variables in a model results in multicollinearity and imprecise estimates. Being selective in what variables to include is essential to obtain meaningful results. Second, as argued in section III, the MSA decentralization variable is a crude measure of MSA job access or the within-MSA spatial distribution of industry. The crudeness of this variable justifies initially excluding it from the estimated models. Third, more time periods of data are available for the MSA employment growth variable than for the MSA industrial mix variables. Data on employment growth are available back to 1969-70. Data on changes in MSA industrial mix are available back to 1975-76.¹⁴ Models that only include MSA employment growth and time dummies as independent variables can be estimated using a larger sample than models that also include MSA industrial mix variables. Fourth, I would argue that local employment growth is the most important goal of most economic development policymakers. A change in MSA industrial mix is only sometimes a secondary goal. Policymakers might be interested in knowing the effects of MSA employment growth, without control of changes in MSA industrial mix. Such estimates are obtained in the present section.

¹⁴ The technical appendix gives more information on how these data are derived and the sources of these limitations.

Estimated Long-Run Effects of MSA Growth on Black and White Personal Earnings

Figure 7 reports estimated long-run effects of a 1 percent once-and-for-all increase in MSA employment (compared to what it otherwise would have been) on black and white real personal earnings. The model on which these estimates are based has as a dependent variable the year to year change in average black (or white) real personal earnings in the MSA. This MSA average controls education, experience, and other personal characteristics. The figure 7 estimates are for a model in which the only independent variable, other than time dummies, is the current year-to-year employment growth of the MSA. For blacks, this "zero-lag" model is preferred applying Schwartz's Bayesian Criterion to 10 alternative models that include various lag lengths in MSA employment growth. These 10 alternative models also include, in addition to time dummies and current growth, from one to ten lags in MSA employment growth. For example, the 2-lag model includes as independent variables the time dummies, current employment growth, once-lagged employment growth, and twice-lagged employment growth. For whites, the "once-lagged" model is preferred by the Schwartz' Bayesian criterion. But figure 7 reports the zero-lag model for whites to make the results comparable to those for blacks. The sensitivity of results to alternative lag lengths will be considered further below.

As shown in figure 7, a 1 percent increase in MSA employment is estimated to increase black real personal earnings by about 8/10ths of 1 percent and white real personal earnings by about 5/10ths of 1 percent. The difference between these effects for blacks and whites has a t-statistic value of 1.61. The probability of such a t-value occurring by chance, when there is no true difference between effects on blacks and whites, is .107.

**Figure 7: Long Run Effects of a 1 Percent Increase in MSA Employment
on Black and White Regression Adjusted Real Personal Earnings
Zero-Lag Specification**

Percent Effects on Adjusted Real Personal Earnings

Notes: Standard errors are in parentheses. Both coefficients are clearly statistically significant at all conventional significance levels. Reported percent effect is coefficient on the percentage change in MSA employment in equations with percentage change in real personal earnings of blacks or whites as dependent variables. Both equations include time dummies. Estimates span 1973-74 to 1988-89, and include 1234 observations for blacks and 1432 observations for whites. As discussed in technical appendix, all estimates correct for heteroskedasticity and serial correlation. Zero-lag specification is optimal lag length for black model, based on Schwartz's Bayesian Criterion (SBC). One-lag specification is optimal for whites. For both blacks and whites, lag lengths from 0 to 10 years were tested. Long-run growth effect on white personal earnings is .477(.096) in one-lag specification.

Figure 8 shows alternative estimates of these "long-run" growth effects in a 10-lag specification. Long-run effects do tend to decline somewhat in a 10-lag specification, to perhaps half the estimated long-run effects in the zero-lag specification. But growth effects on both black and white real earnings are still statistically significant for at least nine years after the employment change, and there is still some tendency for growth effects on black real earnings to exceed those on white real earnings.

Figure 9 shows how MSA growth affects the various determinants of earnings. The figure allows an evaluation of the relative contribution of these determinants to growth's effect on earnings. Personal earnings is the product of annual weeks worked and average earnings per week. Therefore, the percentage effect of growth on earnings will approximately equal the sum of (a) the percentage effect of growth on annual weeks worked and (b) the percentage effect of growth on average earnings per week. In turn, the percentage effect of growth on annual weeks worked will approximately equal the sum of (a) the percentage effect of growth on annual weeks in the labor force and (b) the percentage effect of growth on the ratio of weeks employed to weeks in the labor force. Also, the percentage effect of growth on earnings per week is approximately the sum of (a) the percentage effect of growth on earnings per hour and (b) the percentage effect of growth on hours per week. The purpose of this decomposition is to get some idea of whether growth affects earnings by increasing work or increasing pay. Increasing work increases the size of

Figure 8
Comparison of Alternative Estimates
of "Long-Run" Effects of a 1% Increase
in MSA Employment on Black and White
Regression-Adjusted Real Personal Earnings

Notes: Standard errors are in parentheses. All effects except 10-lag effect for blacks are statistically significant at all conventional significance levels. 10-lag specification, in addition to having more lags, has fewer observations because observations can only start with 1979-80 as BEA's MSA employment data starts in 1969. Number of observations in 10-lag specification is 1002 for blacks and 1200 for whites. All models also include time dummies.

Figure 9
A Decomposition of the Estimated Effects of
a 1 % Increase in MSA Employment on Personal Earnings
Into Its Effects on Components of Earnings

Notes: All estimates come from zero-lag specifications with different percentage change dependent variables, and same independent variables (time dummies and percentage change in MSA employment).

Standard errors in parentheses. *, **, and *** indicate statistical significance at 15%, 10% and 5% level for 2-tail test. Note that summations of percentage effects only approximately hold. Number of MSA-year observations is 1234 for blacks, 1432 for whites.

the market economy; increasing pay transfers resources from employers to employees.¹⁵

Although earnings per hour is in the abstract the best measure of pay, this variable is quite imprecisely measured in the CPS: the CPS only has a rough measure of average weekly hours worked. Hence, earnings per week is a useful alternative measure of average pay.

The decomposition in figure 9 suggests that most of growth's effects on black personal earnings are due to effects on work-related activities—labor force participation and unemployment—rather than effects on pay levels.¹⁶ There is some uncertainty about estimated growth effects on black pay levels, but it is highly unlikely the effects on black pay levels are as great as effects on black work activity. For whites, effects of growth on personal earnings are about half due to effects on work activity and half due to effects on pay rates. Growth helps blacks get into the labor market. Growth does that for whites too, but apparently also helps whites move up to higher paying jobs.

Consequences for Poverty Rates of Growth's Effects on Personal Earnings

Figure 10 shows the effects of growth on black and white poverty rates. The effect of growth on black poverty rates is over four times as great as the effect of growth on white

¹⁵ In turn, increasing pay may result in increasing prices, transferring resources from consumers to businesses. The point remains that wage increases by themselves simply lead to some redivision of the total economic pie. The exact redivision depends on what happens to consumer prices, but it still just a redivision of the same pie. Increases in labor force participation or employment rates can expand the size of the economic pie.

¹⁶ Note that this conclusion differs somewhat from Bartik (1991), which concluded that most of the black/white differences in growth effects on earnings were due to differential effects of growth on promotion to higher paying jobs. The reasons for the different conclusions in the two studies are unclear.

Figure 10: Estimated Long Run Reduction in Black and White Poverty Rate Due to 1 Percent Increase in MSA Employment, Zero-Lag Specification

Reduction in Poverty Rate (in Rate Points)

Notes: Standard errors are in parentheses. Both coefficients are clearly statistically significant at all conventional significance levels. ".398" coefficient is interpreted as implying that a 1 percent increase in MSA employment, in an MSA with 30 percent black poverty rate, would lower rate to about 29.6 percent. Estimates are based on 1234 MSA-time period observations for blacks, and 1432 MSA-time period observations for whites. Zero-lag specification is optimal according to SBC for both blacks and whites.

poverty rates. The black-white difference is highly significant statistically (probability = .004). The greater effect of growth on black poverty rates compared to white poverty rates in part reflects the greater effects of growth on black personal earnings vis-a-vis white personal earnings. But the greater effect also reflects higher black poverty rates and generally lower black personal earnings. With more blacks than whites close to the poverty line, a given increase in personal earnings for blacks will tend to have greater effects on poverty rates than a similar increase in earnings for whites.

Effects of Growth on the Earnings of Various Subgroups of Blacks and Whites

Figures 11, 12, and 13 present the estimated effects of growth on various subgroups of blacks and whites, differentiated by education, age, and gender. In general, effects of growth do not differ much among different groups of blacks. But growth effects for whites are stronger for high school dropouts than for completers, and stronger for youths than for prime-age and older persons. The black-white differential in growth effects is most statistically significant for high school completers, prime-age persons, and females. In all these cases growth effects for blacks are stronger than for whites.

One interpretation of these findings is that growth most strongly affects groups with the weakest position in the labor market, such as high school dropouts, youths, and blacks. These marginal groups are most dependent on a tight local economy to allow them to get better jobs or indeed any jobs at all.

Figure 11

Estimated Long-Run Percentage Effects
on Real Personal Earnings of 1% Increase
in MSA Employment, Blacks and Whites
Differentiated by Education

Notes: Standard errors are in parentheses. All effects are statistically significant at 5% level, 2-tail test. t -stats on selected comparisons have following probabilities of occurring by chance if true difference is zero: BD vs. BC: .744; WD vs. WC: .083; BD vs. WD: .859; BC vs. WC: .047. All models also include time dummies. Number of observations for different groups is as follows: BD, 1023; WD, 1432; BC, 1175; WC, 1432. Results reported are for zero-lag specifications. Zero-lag is optimal specification, according to SBC, among lag lengths from 0 to 10 years, for all groups except white completers, for whom optimal SBC lag length is one. One-lag estimates of LR growth effects for white completers is .348 (.100).

Figure 12

Estimated Long-Run Percentage Effects
on Real Personal Earnings of 1% Increase
in MSA Employment, Blacks and Whites
Differentiated by Age

Notes: Standard errors are in parentheses. All effects except for B55 group are statistically significant at 5% level, 2-tail test. *t*-stats on selected comparisons have the following probabilities of occurring by chance when the true difference is zero: B16 vs. B25: .668; B25 vs. B55: .864; W16 vs. W25: .157; W25 vs. W55: .796; B16 vs. W16: .800; B25 vs. W25: .075; B55 vs. W55: .827. All models also include time dummies. Number of observations for different groups is: B16, 1011; W16, 1432; B25, 1193; W25, 1432; B55, 982; W55, 1432. Reported estimates are for zero-lag specification. Zero-lag is optimal lag length according to SBC, among all lag lengths from 0 to 10 years, for all groups except whites 25-54 (W25), for whom one lag is optimal SBC lag length. For W25 group, LR growth effect in 1-lag specification is .357 (.119).

Figure 13: Estimated Long Run Effects of 1 Percent Increase in MSA Employment on Real Personal Earnings, Blacks and Whites Differentiated by Gender

Notes: Standard errors are in parentheses. All effects are statistically significant at 5% level, 2-tail test. *T*-stats on selected comparisons have following probabilities: black males vs. black females: .864; white males vs. white females: .356; black males vs. white males: .419; black females vs. white females: .133. Estimates are based on following number of MSA-year observations: black males – 1166; white males – 1432; black females – 1192; white females – 1432. Zero-lag specification is optimal lag length, among lag lengths from 0 to 10 years, for all these groups except white males. For white males, a lag length of one is optimal. Estimated long-run effect of growth on white male earnings in one-lag specification is .464 (.112). All estimated models include time dummies.

Effects of Evening Out Growth

As pointed out above, the average black, compared to the average white, tends to live in MSAs with slower employment growth. Table 10 uses the estimated earnings effects of growth to calculate how much more black personal earnings would have increased from 1973 to 1989 if blacks had lived in MSAs with the same average growth as whites. This hypothetical change could have occurred either through increased job growth in MSAs with a large black percentage (bringing jobs to people) or through migration of blacks to MSAs like those of whites (bringing people to jobs).

Table 10 shows that evening out MSA growth among blacks and whites over the 1973-89 period would have increased the earnings of different black groups by 3 to 7 percent, or by 0.2 percent to 0.4 percent per year. This increase is large enough to be important, but not large enough to explain all of the trends in black economic status. As table 10 shows, the different MSA economic trends faced by blacks and whites can explain a considerable portion, but not all, of the widening black-white earnings differentials in various subgroups.¹⁷

¹⁷ Also, it should be noted that these long-run effects of evening out growth might be cut in half if we relied on point estimates from a 10-lag specification rather than a zero-lag specification (e.g., Figure 8). However, 10-lag specification estimates are not precise enough to rule out the estimated effects presented in Table 10.

Table 10

Effects on Black Earnings of "Evening Out" MSA Growth,
Compared With the Actual Percentage Change in Black/White Earnings Ratios

	Simulated Percentage Effect on Black Earnings of "Evening Out" MSA Growth, 1973-89	Actual Percentage Change in Ratio of Black to White Earnings, 1973-89
All Blacks 16 and over	4.8%	-2.6%
High School Dropouts	5.7%	-15.6%
High School Completers	4.7%	-1.7%
Youth 16-24	6.8%	-11.9%
Prime Age 25-54	4.6%	-5.8%
Older GE 55	3.4%	-13.3%
Males	4.4%	-10.2%
Females	4.7%	-10.7%

Notes: Percentage effects of evening out growth calculated using differences in white versus black 1973 population-weighted growth for 33 MSAs from 1973 to 1989. The white-weighted percentage change in MSA employment from 1973-89 exceeds the black-weighted change by 5.7%, slightly greater than the weighted growth differentials reported for 314 MSAs in Table 9. Calculations also use estimated growth effects for black sub-groups from Figures 7, 11, 12, and 13. Percentage change in ratio of black to white earnings calculated based on table 5.

VI. Effects of Changes in MSA Industrial Mix on Black and White Economic Success

Strategy for Estimating the Effects of MSA Industrial Mix

As a reminder, the dependent variables in this study are the year to year change in the average MSA economic outcome for various demographic groups. Most of the text discussion and tables focus on one particularly important economic outcome variable, the year-to-year change in average MSA real personal earnings per capita for a demographic group. The models in this section continue to include as independent variables time dummies and metropolitan employment growth. Also, the models in this section do not include a metropolitan decentralization variable; models including a metropolitan decentralization variable are considered in section VII. The models in this section do add in as independent variables different variables that depend on changes in the MSA's industrial mix.

Simultaneously including as independent variables all the industrial mix variables would lead to multicollinearity problems and imprecise estimates. My alternative strategy is to add in the industrial mix variables as independent variables one at a time. Industrial mix variables that are significant are kept in subsequent models that include additional industrial mix variables; industrial mix variables that are statistically insignificant are dropped. All models also include time dummies and MSA employment growth.

I begin this alternative modelling strategy by including as an independent variable the change in the share of MSA jobs in manufacturing. Declining manufacturing is one of the more popular explanations for black poverty problems. To anticipate the results below, this variable has the expected effects at a statistically significant level only for some groups. I

then try an alternative industrial mix variable that I believe is theoretically superior to the manufacturing share variable: the change in the average MSA wage premium due to changing industrial mix. This wage premium variable attempts to capture how MSA wages will change due to increases or decreases in industries that pay well relative to the credentials of their workers. I would argue that this wage premium variable better measures the main reason why the MSA's manufacturing share is argued to be important: MSA manufacturing share reflects how many MSA jobs are "good jobs." Again anticipating results, this wage premium variable appears to statistically dominate the manufacturing share variable.

I then add in separately, as independent variables, other industrial mix variables, to a model that already includes as independent variables the time dummies, MSA employment growth, and the wage premium variable. I first add in as an independent variable the change in the share of MSA labor demand for a particular demographic group due to changes in MSA industrial mix. I then drop this demographic share variable, and add in as an independent variable the change in the years of education demanded by an MSA's employers due to changes in the MSA's industrial mix. As the results will show, these demographic share and education demand variables are generally not statistically significant.

At each stage of this estimation search strategy, I considered alternative lag lengths in the economic development variables: the metropolitan employment growth variable and the various industrial mix variables. I considered models with five different lag lengths, from zero lags up to four lags. A zero lag model, for example, would include current year to year MSA employment growth and the current year-to-year change in whatever industrial mix variables were included in a particular specification. A two lag model would include

current MSA employment growth and current change in the MSA industrial mix variables, once-lagged employment growth and once-lagged industrial mix variables, and twice-lagged employment growth and twice-lagged industrial mix variables. Only a maximum of four lags were considered, because the industrial mix variables are only measured starting with the 1975-76 time period. In general, zero lag models—models with only current values of employment growth and industrial mix variables—were preferred to longer lag lengths by Schwartz's Bayesian Criterion for most of the specifications considered. Exceptions will be noted in the tables.

Effects of Alternative Measures of Industrial Mix on Real Personal Earnings

Table 11 presents the estimated effects of changes in the MSA manufacturing share on the real earnings of various groups of blacks and whites. As a reminder, this model also includes as independent variables the time dummies and MSA employment growth.

Decreases in the MSA manufacturing share do not have significant negative effects on blacks overall or whites overall. Decreases in the MSA manufacturing share do have significant negative effects on three important groups: white high school dropouts, black high school completers, and black prime-age persons.¹⁸ The estimates suggest that declining manufacturing generally has more negative effects on a black group than on a comparable white group.

¹⁸ "Significance" here means that the probability is less than .15 for a two-tail test, or a *t*-statistic greater than around 1.44 in absolute value.

Table 11

Effects of MSA Growth and Change in MSA
Manufacturing Share on Adjusted Real Personal Earnings
of Various Black and White Groups

	% Effect on Earnings of 1% Increase in <u>MSA Employment</u>		% Effect on Earnings of 1 Point Increase <u>in Manufacturing Share</u>	
Blacks	.715***	(.212)	1.085	(.926)
Whites	.535***	(.083)	-.381	(.358)
Black Dropouts	1.237***	(.557)	-2.054	(2.389)
White Dropouts	.582***	(.180)	1.674***	(.805)
Black Completers	.623***	(.285)	1.803*	(1.241)
White Completers	.427***	(.088)	-.502	(.376)
Black 16-24	.902*	(.587)	2.637	(2.604)
White 16-24	.796***	(.201)	-.046	(.890)
Black 25-54	.624***	(.262)	2.038**	(1.146)
White 25-54	.520***	(.101)	-.255	(.437)
Black GE 55	.983*	(.680)	-3.137	(2.892)
White GE 55	.554***	(.230)	-.116	(.981)
Black Male	.635***	(.278)	1.264	(1.219)
White Male	.531***	(.097)	-.174	(.417)
Black Female	.790***	(.304)	.376	(1.316)
White Female	.461***	(.130)	-.937**	(.567)

Notes: Standard errors are in parentheses. *, **, and *** indicate statistical significance at the 15%, 10%, and 5% level, 2-tail test. Estimated effects again come from specifications with controls for national time period effects. Estimation period runs from 1973-74 to 1988-89. Number of observations by group is same as reported in Figure 7, and Figures 11-13. All reported estimates are for zero-lag specification. Zero-lags is optimal specification according to SBC, among all specifications from 0 to 10 years, for all groups except: White Males (WM); Whites 25-54 (W25). For these groups, the optimal lag length is one year. LR effects of growth and manufacturing on earnings for these two groups, in a one-lag specification, is as follows: WM: growth .497 (.127); manuf. -.452 (.519); W25: growth .413 (.134); manuf. -.695 (.551).

Table 12 presents the effects on real earnings of changes in an alternative measure of MSA industrial mix, the average wage premium. The table 12 results are for a specification that includes as independent variables the time dummies, MSA employment growth, and the wage premium variable, but not the manufacturing share variable. The wage premium variable has more statistically significant effects in table 12 than the manufacturing share variable had in table 11. Declines in the average wage premium in an MSA lead to significant declines in the real personal earnings of blacks overall, whites overall, white dropouts, black high school completers, white youths, black prime-age persons, black males, black females, and white females.¹⁹ When both the wage premium and the manufacturing variable are included in the estimation (table 13), the manufacturing variable is never significantly positive for any group. In addition, the estimated effects of the wage premium variable are usually not much affected by the inclusion of the manufacturing share variable. Thus, the wage premium variable seems to dominate the manufacturing variable as a measure of industrial mix.

Table 14 reports estimated effects on real earnings from a model that adds as an independent variable the change in the share of MSA labor demand for the relevant demographic group due to changes in the MSA's industrial mix. For each demographic group, one demographic variable is added to the model. This demographic variable measures demand change for the demographic group whose change in real earnings is being used as the dependent variable. Each estimating equation also includes as independent variables the time dummies, MSA employment growth, and the MSA wage premium

¹⁹ Again, "significance" here is a probability of less than .15 for a 2-tail test.

Table 12

Effects of MSA Growth and Changes in
the MSA Average Industry Wage Premium on the
Adjusted Real Personal Earnings of Various
Black and White Groups

	<u>% Effect on Earnings of 1 % Increase in MSA Employment</u>		<u>% Effect on Earnings of 1 % Increase in MSA's Wage Premium</u>	
Blacks	.547***	(.252)	6.202***	(2.785)
Whites	.377***	(.098)	2.221***	(1.105)
Black Dropouts	.720	(.651)	2.182	(7.084)
White Dropouts	.289	(.215)	8.550***	(2.503)
Black Completers	.470	(.336)	6.973**	(3.699)
White Completers	.329***	(.104)	.764	(1.157)
Black 16-24	1.011	(.713)	5.677	(8.063)
White 16-24	.552***	(.239)	5.786***	(2.762)
Black 25-54	.571**	(.310)	6.244**	(3.437)
White 25-54	.392***	(.120)	1.819	(1.355)
Black GE-55	-.320	(.804)	12.160	(8.645)
White GE-55	.365	(.267)	3.902	(2.985)
Black Male	.414	(.331)	6.272**	(3.653)
White Male	.461***	(.115)	1.583	(1.285)
Black Female	.570*	(.365)	6.973**	(4.013)
White Female	.164	(.154)	2.959**	(1.765)

Notes: Standard errors are in parentheses. *, **, *** indicate statistical significance at 15%, 10%, and 5% levels, 2-tail test. All models also include time dummies. Estimation period runs from 1975-76 to 1988-89. Number of observations by group is as follows: 1365 for all white groups; B, 1167; BD, 960; BC, 1109; B16, 946; B25, 1126; B55, 920; BM, 1099; BF, 1125. Zero lag length is optimal lag length according to SBC, for all lag lengths from 0 to 4 years, for all groups except white drop-outs, white completers, white adults, and white males. For these groups, optimal lag length is one year. LR effects of MSA growth for these four groups in one lag specification are: WD, .236 (.270); WC, .243 (.131); W25, .143 (.156); WM, .224 (.146). LR effects of wage premium of these groups in one lag specification are: WD, 10.162 (2.874); WC, 1.669 (1.455); W25, 3.568 (1.745); WM, 4.000 (1.625).

Table 13

Effects of MSA Growth, Changes in the MSA Manufacturing Share,
and Changes in the MSA Wage Premium on the Adjusted Real
Personal Earnings of Various Black and White Groups

	% Effect on Earnings of 1% Increase in <u>MSA Employment</u>		% Effect on Earnings of 1 Point Increase in <u>Manufacturing Share</u>		% Effect on Earnings of 1% Increase in MSA's <u>Wage Premium</u>	
Blacks	.541***	(.253)	.292	(1.213)	5.771***	(3.455)
Whites	.401***	(.098)	-1.004***	(.442)	3.756***	(1.292)
Black Dropouts	.772	(.654)	-2.736	(3.146)	6.802	(8.846)
White Dropouts	.281	(.216)	.401	(.990)	7.952***	(2.906)
Black Completers	.457	(.338)	.612	(1.598)	5.971	(4.532)
White Completers	.355***	(.104)	-.974***	(.465)	2.247**	(1.354)
Black 16-24	.951	(.715)	3.949	(3.444)	-1.169	(10.035)
White 16-24	.569***	(.240)	-.733	(1.097)	6.926***	(3.247)
Black 25-54	.545**	(.311)	1.443	(1.498)	3.845	(4.246)
White 25-54	.414***	(.121)	-1.023***	(.541)	3.382***	(1.583)
Black GE-55	-.153	(.807)	-7.628***	(3.773)	25.001***	(10.719)
White GE-55	.380	(.270)	-.513	(1.215)	4.670	(3.496)
Black Male	.403	(.332)	.656	(1.591)	5.177	(4.522)
White Male	.476***	(.115)	-.609	(.518)	2.509**	(1.508)
Black Female	.586*	(.366)	-.840	(1.747)	8.385**	(4.974)
White Female	.210	(.154)	-1.910***	(.698)	5.879***	(2.054)

Notes: Standard errors are in parentheses. *, **, and *** indicate significance at the 15%, 10%, and 5% levels for a 2-tail test. All models also include time dummies. All estimates are for a zero-lag specification. The estimation period is 1975-76 to 1988-89. The number of observations by group is identical to those given in the notes to Table 12.

Table 14

Effects of Shifts in the MSA Industry Mix
Toward a Group on Adjusted Real Personal
Earnings of That Group

	<u>Blacks</u>	<u>Whites</u>
Overall	-1.485 (1.380)	11.482*** (3.862)
Dropouts	-2.488 (2.321)	0.162 (0.753)
Completers	-0.458 (1.458)	2.732 (1.906)
Ages 16-24	0.809 (3.304)	2.497** (1.419)
Ages 25-54	-0.166 (1.518)	6.769*** (2.649)
Ages GE 55	2.290 (2.143)	-0.656 (1.895)
Males	1.740 (1.289)	2.523*** (0.605)
Females	-1.184 (1.215)	-2.149*** (0.755)

Notes: Reported effects are percentage effects on earnings of a percentage change in predicted share of a group—based on MSA industry mix—in total employment demand (e.g., shift from 10% share of employment for blacks to 11 percent is 10% increase). Standard errors are in parentheses. *, **, and *** indicate statistical significance at 15%, 10%, and 5% levels using a two-tail test. All estimates also control MSA growth, MSA wage premium, and time dummies. Estimation period runs from 1975-76 to 1988-89. Number of observations by group is identical to those given in Table 12. All estimates are for zero-lag specifications. Zero-lag specification is optimal specification according to SBC, among lag lengths from 0 to 4 years, for all groups.

variable. For the various black groups, there is no sign that shifts in the MSA industrial mix towards industries that demand large proportions of that particular black group has significant positive effects. The demographic share variables do have significantly positive effects for some white groups. But the pattern of the coefficients suggests that these white demographic variables are probably proxies for some unobserved variables that favorably affect industrial mix. For example, the white demographic share and black demographic share variables are almost perfectly negatively correlated. If one properly adjusts these variables for differences in how they are defined, a shift towards a "white" demographic structure has approximately the same magnitude positive effect on earnings for both blacks and whites.²⁰

Table 15 drops the demographic share variable, and adds in the education variable. This education variable measures the change in education demand in the MSA due to changes in the MSA's industrial mix. The models in table 15 continue to include as independent variables the time dummies, MSA employment growth, and the MSA wage premium variable. The education variable does not perform well. Increased education demand does not appear to hurt the low-education dropout groups. Increased education demand is estimated to adversely affect younger persons. But the regression adjustment procedure at least in theory calculates the predicted real earnings of younger persons having the same

²⁰ The black and white demographic share variables are the logged shares of these groups. Suppose that a shift in the unlogged white share (WS) has the same effect on the black and white earnings variables (BE and WE), or $dBE/dWS = dWE/dWS = \text{some constant } k$. Now by the definition of the unlogged black share variable (BS), dBS approximately equals $-dWS$. So $dBE/dBS = -k$. But the variables actually used in the regression are the logged shares. Under these assumptions, $dBE/d\ln(BS) = -k \cdot BS = -k(.107)$ at the mean of BS, and $dWE/d\ln(WS) = k \cdot WS = k(.860)$ at the mean of WS. Hence the ratio of the logged white demographic share variable's coefficient to the black coefficient should be $.860/(-.107) = -8.04$. The observed ratio in Table 14 is $11.482/(-1.485) = -7.73$.

Table 15

Effects on Real Earnings
of Shifts in An MSA's Industrial Mix
Towards Higher Education Industries

	<u>Blacks</u>	<u>Whites</u>
Overall	-0.347 (0.569)	-0.144 (0.225)
Dropouts	0.772 (1.468)	-0.192 (0.500)
Completers	-0.026 (0.745)	-0.036 (0.236)
Ages 16-24	-3.453*** (1.631)	-1.072*** (0.573)
Ages 25-54	-0.367 (0.701)	-0.163 (0.275)
Ages GE 55	1.341 (1.766)	0.084 (0.606)
Males	-0.525 (0.743)	-0.153 (0.262)
Females	-0.155 (0.817)	-0.239 (0.359)

Notes: Reported effects show proportional effects on real earnings of 1 year increase in educational requirements, based on industry mix. For example, coefficient of -0.347 for all blacks means that 1-year increase in educational requirements—an enormous change—would reduce black earnings by 34.7%. Standard errors are in parentheses. *, **, and *** indicate statistical significance at 15%, 10%, and 5% levels for a two-tail test. All specifications also control MSA growth, the change in wage premium variable, and the time dummies. Estimation period runs from 1975-76 to 1988-89. Number of observations by group is given in Table 12. All reported estimates are for zero-lag specifications. Zero-lag is optimal specification according to SBC, among all lag lengths from 0 to 4 years, for all groups except white males. For white males, optimal lag length is one year. Long-run effect of education on white male earning in one lag specification is .207 (.326).

education as prime-age and older persons. It is unclear why increased education demand should have more negative effects on younger persons than prime-age and older persons after this adjustment.

Overall, these results are most consistent with the view that the most important MSA industrial mix variable for black and white economic success is the average MSA wage premium. Changes in MSA education demand, whether measured by changes in the share of demand for high school dropouts or changes in average education levels of the typical MSA industry, do not have the predicted adverse effects on low education groups.

The lack of effects of these education demand measures at the MSA level need not imply that changing education demand has zero effects at the national level. The measures of education demand mix used here are quite imperfect. Several researchers have argued that educational requirements are increasing primarily because of changes within industries, not because of changes in industry mix (Katz and Murphy, 1992; Bound and Johnson, 1992). In addition, increases in education demand at the MSA level may be more easily accommodated by in-migration of educated workers, the most mobile population group. For both these reasons, the effects of national education demand increases could be greater than the effects of this report's MSA education demand variables.

The earnings effects of the MSA wage premium could plausibly reflect the wage premium's effects on both local wages and local labor supply. As shown in table 12, the effect of reductions in the industry wage premium is more than 1-to-1: a 1 percent reduction in the industry wage premium reduces white personal earnings by 2.2 percent and black personal earnings by 6.2 percent. A 1 percent reduction in the MSA wage premium would

have exactly a 1 to 1 effect on earnings if each industry in the MSA paid the same as the national average and persons' labor supplies were unaffected by a shift away from high wage industries. But it is plausible that a shift away from high-wage industries in an MSA will tend to reduce the average industry's wages in that MSA relative to its national counterpart. Also, a shift away from high wage industries may tend to reduce labor force participation. For both these reasons—reductions in relative MSA industry wages and reduced labor supply—a percent reduction in the MSA wage premium might be expected to reduce average MSA earnings by more than 1 percent. These hypotheses will be explored further below. But of course these large industry wage premium effects may also occur because the wage premium variable may be a proxy for other influences of MSA industry mix. As has been shown by Dickens and Katz (1987), many industry characteristics—unionization for example—are highly correlated with the industry wage premium. It is hard to distinguish between hypotheses involving these highly correlated industry characteristics.

Further Exploration of the Effects of the MSA Industry Wage Premium on Personal Earnings

I now further explore how the average MSA industry wage premium affects black and white earnings, and the consequences and implications of these effects of average MSA wage premiums. To begin, figure 14 provides a decomposition of the effects of the industry wage premium on overall black and white personal earnings into its effects on various determinants of earnings. Wage premium effects for blacks are due more to wages going up than to work activity going up. Wage premium effects for whites are due somewhat more to work activity going up than to wages going up. One plausible interpretation of these black-white

Figure 14
A Decomposition of How Changes
in the MSA Wage Premium Affect Real Earnings

Notes: Standard errors are in parentheses. *, **, and *** indicate statistical significance at 15%, 10%, and 5% levels for a 2-tail test. Note that the various percentage effects only approximately add up. These results are based on specifications that control MSA growth and time dummies. Also, all results are for zero-lag specifications. The MSA growth decomposition from these specifications are quite similar to what was previously presented for specifications without the wage premium variable.

differences is that blacks have more difficulty than whites in getting access to high-wage premium industries but that racial wage differentials are narrower within such industries.

Figure 15 reports the poverty consequences of changes in the average MSA wage premium. The MSA wage premium does not have statistically significant effects on poverty for blacks or whites, and for whites the estimated effect has an unexpected sign. One plausible interpretation of these results is that persons on the margin of poverty do not have access to high wage premium jobs, so the anti-poverty effect of shifts towards or away from high wage industries is limited.

What are the policy implications of these estimated MSA industry wage premium effects? It might appear that increasing the MSA wage premium is a more attractive option than increasing MSA employment for state and local policymakers. As shown in table 13, for many groups a 1 percent increase in the industry wage premium has a much greater effect on real earnings than a 1 percent increase in MSA employment. For example, for blacks overall, a 1 percent increase in the wage premium increases real earnings by over 6 percent, whereas a 1 percent increase in MSA employment increases real earnings by only 0.5 percent. But it is risky to just compare the coefficients on different variables. It is probably far more costly for policymakers to increase an MSA's industry wage premium by 1 percent than to increase an MSA's wage premium by 1 percent. Increasing an MSA's industry wage premium by 1 percent requires extremely large shifts in MSA industry mix. For example, a 1 percent increase in an MSA's industry wage premium could be accomplished by shifting 10 percent of the MSA's employment to industries that pay 10 percent more, which seems hard to do. In contrast, a 1 percent increase in MSA

**Figure 15: Effectiveness of 1% Increase in MSA Wage Premium
in Reducing Black and White Poverty Rates**

Reduction in Poverty Rate (in Rate Points)

Notes: Standard errors are in parentheses. Estimated effects show reduction in poverty rate. For example, 1.685 effect for blacks means that a 1% increase in wage premium would reduce a black poverty rate that was initially 20% to 18.315%. Estimates use 1234 MSA-year observations for blacks, and 1432 MSA-year observations for whites. All estimated models also include time dummies and MSA employment growth. Estimated models use a zero-lag specification.

employment may be achievable by feasible changes in state and local economic development policies, according to the research literature reviewed in chapter 2 of Bartik (1991).²¹

Of course, it may not be possible to independently increase the MSA growth variable and the MSA wage premium variable. These two variables could be causally related in either direction. An increased MSA wage premium may increase the income of MSA residents, resulting in increased consumer demand. This increased consumer demand may lead to increased MSA employment in non-base industries such as retail industries. On the other hand, MSA growth may tighten MSA labor markets, which may increase wages in the average MSA industry compared to its national counterpart industry. These higher MSA wages may discourage growth in the MSA by industries that are sensitive to wage costs. These wage-sensitive industries tend to be industries in which pay is low relative to the credentials required—low wage premium industries. The MSA's industry mix will shift towards high wage premium industries.

Causality tests with this data base suggest that the causality runs both ways between the MSA wage premium and MSA growth (table 16). These causality tests show particularly

²¹ There is another argument that it is more difficult to change the wage premium variable by 1 percent than to change the employment growth variable by 1 percent. The natural variation in the sample (the standard deviation in the sample) of the wage premium variable is far less than the natural variation of the employment growth variable (table 8). As a result, the beta coefficient—this report's coefficient times the ratio of the standard deviation of the independent variable to the standard deviation of the dependent variable—of the wage premium variable is usually about the same magnitude as the beta coefficient of the employment growth variable in most of the estimated models. It is plausible that the costs of changing some variable through policy are inversely related to the variable's standard deviation in the sample. If so, the smaller standard deviation in the sample of the wage premium variable than of the employment growth variable may indicate that it is more costly to change the wage premium variable than change the employment growth variable.

Table 16

Tests of Causation Between MSA Growth
and Changes in the MSA Wage Premium

<u>Direction of Causation Examined</u>	<u>Probability of F-test Statistic for Lagged "Causative" Variables</u>
Growth causing changes in Wage Premium	.0001
Changes in Wage Premium causing growth	.0419

Notes: These regressions regress (1) growth and (2) changes in the wage premium on five lagged values of both variables. The relevant causality test is an F-test for whether the "other variable's" lagged values matter, once we control for lagged values of the dependent variable.

significant causal effects of MSA growth in increasing the MSA wage premium.

Thus, policymakers should realize that there may not be a clear tradeoff between having more local growth and having higher "quality" local industries. Local growth and higher quality local industries tend to go together. A successful growth strategy will make it harder to pursue low-wage industries. Growth can be more easily sustained in the long run by encouraging the growth of high-wage industries. A successful strategy of encouraging high-wage industries will tend to encourage growth. A "growth" strategy and a "high-wage" strategy should be viewed as complementary and not competing strategies.

The empirical results may also have implications for national policy towards high-wage and low-wage-premium industries, although the case here is more unclear. The results suggest, but do not prove, that national declines in high-wage-premium industries in the 1970s and 1980s may have hurt blacks more than whites. The results also suggest, but do not prove, that a 1 percent national decline in average industry wage premium may, with "spillover-multiplier" effects on other industries and labor supply, affect earnings by more than 1 percent. The uncertainty arises because the estimates in this report, which show the effects of MSA differentials in wage premium changes, cannot without further assumptions be used to predict the effects of national changes in the average industry wage premium. Among other factors, a national change in average wage premiums due to shifting industry mix might have consequences for national wage and price inflation that cannot be captured in the models presented here.²²

²² This limitation is not a severe problem for the analysis in section V of the national effects of evening out MSA growth, because that "thought experiment" held overall national growth constant. As a first approximation, holding constant overall national employment

VII. Effects of MSA Decentralization on Black and White Economic Success

I now consider the effects of MSA decentralization on the real personal earnings of various black and white groups. As described above, the MSA decentralization measure used here is the percentage employment growth of the entire MSA minus the percentage employment growth of the "central county" in the MSA.²³ Positive values of this variable imply decentralization. The hypothesis is that greater decentralization harms the job access of at least some black groups, reducing their earnings. In addition to MSA decentralization, all specifications in this section include as independent variables the time dummies, MSA employment growth, and the MSA wage premium variable.²⁴

The specification used here might be questioned because it examines how decentralization affects all MSA residents, whereas decentralization should most severely hurt the economic fortunes of central city residents. But because blacks and less educated persons have a greater probability of living in central cities, adverse effects on central city residents

growth should hold constant macroeconomic variables even if the distribution of MSA demand or population changes.

²³ That is, the decentralization variable is 100 times the following expression: the year-to-year change in the natural logarithm of the MSA's total employment minus the year-to-year change in the natural logarithm of employment in the county containing the central city of the MSA. As mentioned in Table 3, this decentralization variable is equal to 100 times the year-to-year change in the natural logarithm of the ratio of MSA employment to central county employment.

²⁴ In addition, the specifications included a dummy variable for whether the MSA was a single-county MSA. From the definition of the decentralization variable, this variable will always be zero for single-county MSAs. These zero values of this variable could be seen as due to measurement error. Including a dummy for single-county MSAs tests for this possibility. This dummy variable never had statistically significant effects, and its inclusion did not appear to affect the coefficients on the other variables.

should be detectable by examining effects on these groups. Furthermore, considering all MSA residents avoids the tricky problem that the within-MSA choice of residence is clearly endogenous. If decentralization hurts central city residents and helps suburban residents, it is hard to tell whether this reflects real changes in economic outcomes or simply selective migration from city to suburbs. But if decentralization hurts all blacks or all dropouts in the MSA, one can not argue that this outcome results from particular high income blacks and dropouts moving to the suburbs.

Table 17 reports estimated effects on real earnings in a model that includes as independent variables the decentralization variable, metropolitan employment growth, the wage premium variable, and the time dummies.²⁵ The table 17 estimates are for a zero-lag specification, that is a specification in which only current values of the independent variables are included. There is no sign that decentralization has any significant negative effects on the personal earnings of any group.

But for a few groups, a one-lag specification shows some signs that decentralization may have a short-run effect. Table 18 reports short-run and long-run results from the one-lag specification for various black and white subgroups. The estimates suggest significantly negative short-run effects of decentralization on the personal earnings of blacks, black and white high school dropouts, prime-age blacks and whites, and black males.²⁶ This short-run effect, however, appears to disappear quite quickly.

²⁵ In addition, the specifications include a dummy variable for single-county MSAs, as explained in the previous footnote.

²⁶ Again, statistical significance statements are based on a 2-tail test probability level of .15.

Table 17

Effects of MSA Growth, Changes in MSA Wage Premium,
and MSA Decentralization on Changes
in Real Earnings

	<u>Growth</u>		<u>Wage Premium</u>		<u>Decentralization</u>	
Blacks	.579***	(.256)	5.981***	(2.808)	-.041	(.359)
Whites	.449***	(.101)	1.881**	(1.118)	-.103	(.173)
Black Dropouts	.727	(.658)	1.581	(7.060)	.181	(.910)
White Dropouts	.411**	(.222)	8.380***	(2.528)	-.038	(.385)
Black Completers	.525*	(.341)	7.076**	(3.721)	-.288	(.480)
White Completers	.390***	(.107)	.476	(1.177)	-.165	(.182)
Black 16-24	1.095*	(.728)	5.345	(8.141)	-.428	(1.004)
White 16-24	.574***	(.247)	5.547***	(2.804)	.067	(.420)
Black 25-54	.593**	(.315)	6.117**	(3.460)	-.009	(.452)
White 25-54	.494***	(.124)	1.519	(1.370)	-.173	(.215)
Black GE-55	-.141	(.825)	11.714	(8.701)	-.723	(1.077)
White GE-55	.398*	(.276)	3.445	(3.035)	-.156	(.462)
Black Male	.450	(.333)	5.757*	(3.648)	-.119	(.472)
White Male	.509***	(.119)	1.407	(1.308)	-.084	(.205)
Black Female	.600*	(.372)	7.100**	(4.049)	.050	(.518)
White Female	.280**	(.159)	2.327	(1.787)	-.106	(.269)

Notes: Standard errors are in parentheses. *, **, and *** indicate statistical significance at 15%, 10%, and 5% levels for a two-tail test. The decentralization variable is the percentage difference between overall MSA employment growth minus central city county employment growth. All specifications control time dummies and a single-county MSA dummy. The estimation period runs from 1975-76 to 1988-89. The sample size for all groups is 17 observations less than the sample size for each group on the list in the notes to Table 12. These 17 fewer observations occur because 2 MSAs in the BEA data base have missing central county employment data. All estimates reported in this table are for zero-lag specifications. Zero-lag is the optimal lag length according to the SBC, for all lag lengths from zero to four years, for all groups except white males and whites 25-54. For these two groups, one lag is the optimal lag length according to the SBC. Long-run growth effects and wage premium effects for these two groups, in a one-lag specification are: WM, growth, .265** (.149); wage premium, 3.703*** (1.665); W25, growth, .258* (.158); wage premium, 2.974** (1.771). One-lag results for decentralization variable are listed in Table 18.

Table 18

Short-Run and Long-Run Effects on Real Earnings
of Decentralization in 1-Lag Specification

	<u>Short-Run Effect</u>		<u>Long-Run Effect</u>	
Blacks	-1.549**	(.833)	-.159	(.412)
Whites	-.611**	(.357)	-.099	(.250)
Black Dropouts	-3.736**	(2.015)	-.048	(1.073)
White Dropouts	-1.430**	(0.817)	.105	(.450)
Black Completers	-.822	(1.097)	-.519	(.546)
White Completers	-.793***	(.359)	-.161	(.205)
Black 16-24	-1.162	(2.392)	-.073	(1.169)
White 16-24	.824	(.904)	.159	(.483)
Black 25-54	-1.542*	(1.039)	-.240	(.518)
White 25-54	-1.037***	(.427)	-.120	(.245)
Black GE-55	-3.040	(2.466)	-.790	(1.212)
White GE-55	-.309	(.916)	-.350	(.531)
Black Male	-1.940**	(1.093)	-.237	(.550)
White Male	-.575	(.402)	-.118	(.232)
Black Female	-1.394	(1.156)	.052	(.595)
White Female	-.597	(.569)	.003	(.311)

Notes: Short-run effect is immediate effect on real earnings of a change in decentralization variable, and long-run effect is cumulative effect after 1 year of decentralization, in a specification with 1 lag in all economic development variables (growth, wage premium change, and decentralization). Specifications also control time dummies. Standard errors are in parentheses. *, **, and *** indicate statistical significance at 15%, 10%, and 5% levels for a 2-tail test. Number of MSA time period observations on which estimates are based are as follows: all white groups, 1186; B, 988; BD, 789; BC, 935; B16, 777; B25, 947; B55, 757; BM, 924; BF, 946.

A natural interpretation of this result is that the MSA labor market can adjust relatively quickly, but not instantaneously, to within-MSA shifts in employment. One would expect adjustments of labor supply within an MSA to be easier than adjustments of labor supply across MSAs. But these within-MSA adjustments might still take some time, particularly for less mobile groups such as blacks and high school dropouts, who are concentrated in central cities.

A second interpretation is that the lack of long-term effects of decentralization is due to the crude nature of the decentralization measure used here. Measures used in other studies that are specific to the person's neighborhood, such as average journey-to-work times in that neighborhood for jobs for which the person is qualified, are far better measures of how job access affects the person.

VIII. Conclusion

This report's findings support a key theme of the demand-side view of black urban poverty problems: local labor demand conditions significantly affect black economic success. This demand-side view has been most prominently advocated by William Julius Wilson and John Kasarda, although others such as Bluestone and Harrison (1982) have also suggested the importance of demand-side conditions in explaining black economic problems. Although cultural and psychological factors may affect black economic problems, as Lawrence Mead and others contend, culture and psychology do not prevent poverty from being reduced when the local economy improves.

But this report's findings suggest that the features of local demand that matter are somewhat different than the features Wilson and Kasarda emphasize. Wilson and Kasarda stress that black poverty problems are being worsened by manufacturing decline in central cities. This report's findings suggest that the overall metropolitan economy is at least as important as the movement of jobs from central cities to suburbs. The findings also suggest why manufacturing decline may cause problems: manufacturing industries tend to be high "wage premium" industries, paying well relative to the credentials required. Employment declines in high wage premium industries, whether in manufacturing or services, seem to play an important role in harming black earnings. Although some deindustrialization researchers, such as Bluestone and Harrison (1982), have stressed the importance of an industry's wage levels, Bluestone and Harrison's point has sometimes become lost in subsequent discussion.

The report's findings suggest general directions for public policy but do not prove the case for any specific policy program. Economic development policies that increase metropolitan growth and attract high wage premium industries can provide important labor market benefits for both white and black residents. But exactly which economic development policies (tax abatements, technology development programs, general tax cuts, improvements in local education, assistance to manufacturers for modernization and exporting, business incubators, entrepreneurial training programs) work best to accomplish these goals is unclear. National policies that seek to provide blacks with more high wage jobs can make a substantial difference in reducing black poverty and increasing black economic success. But which such black labor demand policies (local economic development policies, helping blacks

migrate to healthier metropolitan economies, enterprise zones, public service jobs, wage subsidies for private employment for disadvantaged workers) will be most effective in helping blacks per dollar spent is unclear. The general policy direction of trying to increase demand for black labor in local economies is sound. But much more policy experimentation and research needs to be done to determine how best to improve the local economic climate facing blacks.

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TECHNICAL APPENDIX

This technical appendix fills in details about the methodology and data of the report *Economic Development and Black Economic Success*. The appendix is divided into three main sections with several sub-sections. Section 1 discusses the estimation methodology. Section 2 discusses the regression-adjusted estimated economic outcome variables (dependent variables). Section 3 provides more detail on the economic development variables that are constructed using two-digit industry data.

1. *Details on the Estimation Methodology*

Dependent Variable Definitions

Most dependent variables analyzed in this report are the percentage change in MSA average economic outcomes for different groups from year $t - 1$ to year t . But calculating percentage change is problematic if an economic outcome variable is nonpositive in either year t or year $t - 1$. For example, if percentage change is calculated as 100 times the change in the natural logarithm, the natural logarithm is undefined at non-positive values of the economic outcome variables. If percentage change is calculated using year $t - 1$ values as a base, the percentage change number will be infinite if the economic outcome variable has a zero value in year $t - 1$, and will have an unexpected sign if the economic outcome variable has a negative value in year $t - 1$. Even if economic outcome variables for year t or year

$t - 1$ are positive, percentage change numbers can be large if the positive numbers for year $t - 1$ or year t are small. These large percentage change numbers could unduly influence regression estimates.

For many MSA-year cases, this project's economic outcome variables are zero, negative, or a small positive number. These problematic cases arise because particular demographic groups often have a small sample size in a particular MSA and year. For example, it might be that all black high school dropouts interviewed in Kalamazoo in 1988 happened to have zero earnings. Negative numbers can arise for earnings or wages because this study includes self-employment earnings, which can be negative. In addition, the regression adjustment procedure can produce negative predictions for economic outcomes in an MSA for some group. Negative predictions would occur if a group has surprisingly low values of the economic outcomes relative to the group's educational and experience credentials. It is theoretically feasible to constrain the regression adjustment procedure to prevent negative outcomes (for example, some type of tobit procedure). But such elaborate statistical constraints would be prohibitively expensive in time given all the groups and economic outcomes considered in this project.

To avoid these problems, percentage change in each economic outcome variable was simply defined as the absolute change in that variable in that MSA from year $t - 1$ to year t , divided by the sample mean over all MSAs and years in that variable, times 100, or

$$(T.1) \quad \% \Delta y_{mgt} = [\bar{y}_{mgt} - \bar{y}_{mgt-1}] / \bar{y}_g \cdot 100,$$

where $\bar{y}_{mgt}$ is the mean value of some economic outcome for group g in MSA m in year t , and $\bar{y}_g$ is the mean value of that same economic outcome over all MSAs and years. This

definition is equivalent to estimating a model with absolute change in the economic outcome variable as a dependent variable, and then multiplying all estimated coefficients by 100 over the mean of the economic outcome variable to get percentage effects.

One objection to this procedure is that these percentage change values will go up or down over time depending on the generally prevailing level of the economic outcome variable in the nation. Perhaps this could bias estimates if the economic development variables show some time trend. But all the estimating equations include a complete set of dummy variables for time periods. These time period dummies should absorb any systematic changes in percentage change values over time. In addition, the dependent variables are all defined in real terms. There is often no clear time trend in the real level of the economic outcome variables.

Heteroskedasticity

The report's main task is to estimate equations with the year-to-year percentage change in MSA average economic outcome variables as dependent variables and the percentage change in MSA "economic development" variables as independent variables. One problem in estimating these equations is that their dependent variables are probably heteroskedastic. The regression-adjusted MSA average economic outcome variables are derived from the Current Population Survey. The CPS sample size varies a great deal from one MSA to another. Because the sample size is small for some MSAs and large for others, the error in measuring these regression-adjusted group means will be quite large in small sample size MSAs and much smaller in large MSAs. This variation in measurement error

should create considerable heteroskedasticity in the year-to-year changes in the economic outcome variable. Without some correction, this heteroskedasticity will make the coefficient estimates less efficient, and will bias the estimated standard errors.

Any correction for this heteroskedasticity problem must consider the time and complexity costs of imposing this correction on the many models estimated in this project. A correction that is reasonably simple to simultaneously impose on many models has great appeal.

A reasonably simple heteroskedasticity correction can be developed if we make some simplifying assumptions that are literally false but likely to be approximately true. Suppose that the dependent variable, instead of being the percentage change in the regression-adjusted mean for MSA m from time $t - 1$ to time t , was instead the percentage change in the ordinary mean. Assume further that the overall mean for the group ($\bar{y}_g$ above) is accurately enough estimated to be treated as non-stochastic. Assume further that the only source of error in the estimating equation is the measurement error in measuring the group means for the MSA for years $t - 1$ and t . Finally, assume that this measurement error is uncorrelated between years $t - 1$ and t .

Under all these assumptions, the variance in the disturbance term in a typical estimating equation can be written as the following equation:

$$(T.2) \quad V(e_{mgt}) = (1/\bar{y}_g)^2 \sigma^2 [(1/N_{gmt}) + (1/N_{gmt-1})] 100^2,$$

where e_{mgt} is the disturbance term from the estimating equation in section III of the report's main text, σ^2 is the variance of observations on the outcome variable for an individual person, and N_{gmt} is the sample size for group g in MSA m in year t . Heteroskedasticity can

then be corrected by weighting all variables involved with a given group's outcome by 1 over the square root of the term in brackets in equation (T.2). This term in brackets varies from observation to observation only due to the sample size in years $t - 1$ and t for that group and MSA. This same weighting will be used for a particular group, MSA, and year, regardless of the dependent variables and independent variables in a particular specification. Because reweighting is not required if the specification changes, more specifications can be tested in less time.

This heteroskedasticity correction is literally false in several ways. But this correction is still likely to provide a good approximate correction. The measurement error for regression-adjustment means will not follow exactly the formula given in equation (T.2). But this measurement error should strongly depend on the cell size in that MSA for those two years, as (T.2) suggests. There is some correlation over time in the CPS measurement error, as some households are included in the sample in two consecutive years. But this correlation is likely to be roughly proportional to the term in brackets, so the same measurement error variance will likely apply.¹ Finally, because of other sources of error in the estimating equation, the disturbance term variance actually should equal a constant term plus some slope coefficient times the bracket term in equation (T.2). But this bracket/measurement error

¹ For example, when the sample size for the MSA and group is the same in both years, and exactly half of the CPS sample is retained from year to year (the extreme case), then the covariance between the measurement error will be given by

$$(1/2)\rho\sigma^2[1/N_{gm}]$$

where ρ is the year to year correlation in the economic outcome variable for the typical person in the sample both years.

variance is likely to be quite large compared to other sources of error. Also, as Kennedy (1992, p. 131) has pointed out, attempts to estimate the disturbance term variance as a linear function of the bracket term are likely to yield extremely imprecise estimates of the intercept and slope coefficient. Estimation procedures will often be more efficient if they ignore the other sources of disturbance variance.

Thus, there are some good arguments that this simple heteroskedasticity correction will not be a bad approximation. Just as important, any of these possible "improvements" in estimating the heteroskedasticity would tremendously complicate the estimation procedure for all these many models, groups and variables. These more complicated procedures would not necessarily improve the efficiency of the estimates.

Table T1 reports White heteroskedasticity tests and standard error corrections for the black and white personal earnings models (White, 1980). These tests and corrections use variables that have already been weighted and transformed, using the simple approximation procedure implied by equation (T.1). This weighting is intended to eliminate heteroskedasticity. In addition, after weighting, all variables were transformed to correct for serial correlation.² Thus, these tests are examining whether there is any sign of significant heteroskedasticity, which might affect the accuracy of our estimated standard errors, after

² This estimated serial correlation is always negative. This negative serial correlation probably reflects measurement error again. Because $\bar{y}_{mgt-1}$ enters negatively in $\% \Delta y_{mgt}$, but positively in $\% \Delta y_{mgt-1}$, the measurement error in $\bar{y}_{mgt-1}$ will cause $\% \Delta y_{mgt}$ and $\% \Delta y_{mgt-1}$ to be negatively correlated.

Table T1

White's Test for Remaining Heteroskedasticity
After Simple Heteroskedasticity Correction

	White's Chi-Squared Statistic	df	Probability	Standard errors for Estimated LR Effect of Growth	
				White-corrected Consistent Standard error	Original Uncorrected standard errors
Adjusted Real Personal Earnings Equation for Blacks	83.65	79	.3388	.187	.185
Adjusted Real Personal Earnings Equation for Whites	80.56	74	.2815	.083	.074

Notes: Estimating equations are for zero-lag specification, with simple correction for heteroskedasticity and serial correlation.

doing our simple heteroskedasticity-serial correlation corrections.³ The White test clearly shows no sign of any remaining heteroskedasticity. Furthermore, heteroskedasticity consistent standard errors do not differ much from the original standard errors.

Weighting Procedure for Comparing Estimates for One Group With the Estimates for Other Groups

A similar weighting procedure is used for regressions comparing results for one group with results for some other group (e.g., black high school dropouts versus white high school dropouts, and white high school dropouts versus white high school completers). These comparison regressions examine whether an economic development variable such as MSA employment growth has the same percentage effect on real earnings for two different demographic groups. The comparison regressions use as a dependent variable the percentage change in some economic outcome variable for one group (call it group r) minus the change in some economic outcome for another group (group c). Suppose we continue to use the same assumptions that were used to derive equation (T.2). In addition, assume that the measurement errors for the two groups are uncorrelated. Under these assumptions, the error variance for these "comparison regressions" will be given by the following equation:

³ The White test detects types of heteroskedasticity that are correlated with various products and cross-products of the independent variables in the model. It is these types of heteroskedasticity that affect the consistency of the package-produced standard errors (Kennedy, 1992, pp. 130, 131). Other types of heteroskedasticity may exist, and could allow for more efficient estimators, but these other types of heteroskedasticity will not cause the standard errors to be incorrect.

$$(T.3) \quad V(e_{mrt} - e_{mct}) = (1/\bar{y}_r^2) \sigma_r^2 [(1/N_{rmt}) + (1/N_{rmt-1})] 100^2 \\ + (1/\bar{y}_c^2) \sigma_c^2 [(1/N_{cmt}) + (1/N_{cmt-1})] 100^2$$

Assume that the ratio of the standard deviation to the mean for each group is approximately the same. It is plausible that this assumption is approximately true compared to the tremendous variance in group sample size across MSAs. Then the error variance for these comparison regressions can be rewritten as the following equation:

$$(T.4) \quad V(e_{mrt} - e_{mct}) = k [(1/N_{rmt}) + (1/N_{rmt-1}) + (1/N_{cmt}) + (1/N_{cmt-1})]$$

where k is some constant. To correct for heteroskedasticity, one over the square root of the term in brackets is used to weight all variables for comparison regressions. The weighted variables are then used in estimation with a first-order serial correlation correction.

Possible Biases in Standard Error Estimates Due to Pooling Cross-Section and Time-Series Data

The regression models of how economic development variables affect MSA economic outcomes pool data across MSAs and years. Such pooling of cross-section and time-series data can bias the usual estimates of standard errors. The usual standard error calculations assume that the disturbance is uncorrelated across different observations. But some correlation across observations is often likely if cross-section and time-series data are pooled. For the regression models of this report, the disturbance terms for the same year may be correlated across different MSAs, and the disturbance terms for the same MSA may be correlated across different years. If there is correlation across different observations in disturbance terms, a new observation may not add as much new information as is assumed by

the simplest regression techniques. Hence, the true standard errors of the coefficient estimates may be higher than the estimated standard errors that are provided using simple regression techniques. These problems with pooling data have been extensively discussed in the econometrics and labor economics literature by Moulton (1986, 1988, 1990), Moulton and Randolph (1989), Freeman (1989, 1991), and Dickens and Katz (1987).

Any correlation in the disturbance across MSAs for a given year should be absorbed by the year dummies included in all the regression equations. Any correlation in the disturbance across years for a given MSA will be reduced because this project is analyzing changes in economic outcomes in the MSA rather than the level of economic outcomes in the MSA. Levels of economic outcomes in an MSA may be highly positively correlated because unobserved attributes of the MSA—such as its amenities, city size, etc.—may heavily influence wages and other economic outcomes in the city. But any unobserved attributes of the MSA that are fixed over time disappear in a changes specification. In addition, the regression estimation always corrects for the serial correlation that occurs between two observations for adjacent years in the same MSA. This serial correlation correction could potentially correct for any unobserved shocks that change economic outcomes in an MSA and persist from year to year. As it turns out, however, the estimated serial correlation is always negative. This negative serial correlation is probably due to measurement error in these CPS-derived MSA regression-adjusted means. This measurement error-induced negative serial correlation apparently overwhelms any positive serial correlation that might be caused by persistent shocks to MSA economic outcomes.

Despite this evidence, one could argue that there might be some significant positive correlation in the disturbance term across non-adjacent years for the same MSA. This positive correlation would bias usual standard error estimates. This positive correlation of the disturbance within MSAs can be analyzed as being caused by unobserved "random effects"—shocks to the disturbance term—that are MSA-specific and are part of the overall disturbance term (Moulton, 1986, 1989, 1990). Moulton and Randolph suggest that the presence of such random effects can be tested for using an F-test of whether a vector of MSA "fixed effects"—dummy variables for each MSA—is statistically significant.⁴

I applied Moulton's F-test to two regressions: the regressions with percentage change in overall black and white real earnings as dependent variables, and time dummies and metropolitan employment growth as independent variables, with no lags in growth.⁵ These F-tests clearly reject the hypothesis of unobserved MSA fixed or random effect components. The relevant F-test statistic for blacks is .6047 (df=208, 1007; probability =.0000057). The F-test for whites is .7347 (df=233, 1180; probability=.0017916). These F-tests show that unobserved MSA effects do not significantly affect real earnings growth once we control current MSA employment growth. Hence, there is no evidence that the standard error

⁴ Moulton and Randolph show that the traditional "Lagrange Multiplier" test for the presence of random effects is likely to be biased in most reasonably sized samples, and will too often reject the hypothesis of random effects.

⁵ This zero-lag model with only current growth and time dummies provides the maximum scope for any unobserved MSA effects to be present. Unobserved MSA effects are even less likely to be present if we add additional lags in growth, or add other MSA economic development variables to the specification.

estimates presented in this report are biased by unobserved correlations across observations in different years for the same MSA.⁶

2. *Details on the Regression-Adjusted Economic Outcome Variables*

Adjusting for Estimated Local Prices and Inflation

All estimated dollar amounts for average MSA economic outcomes are converted to real terms using estimates of local prices and local inflation rates. This subsection describes the procedures used for estimating local prices and local inflation rates.

For most of the economic outcome variables, it is only crucial to have good estimates of local inflation rates, not local price levels. The dependent variables used in this report's main estimating equations are the percentage change in MSA economic outcomes from year to year. For variables such as personal earnings, or average earnings per week or per hour, the real percentage change from year to year in the variable approximately equals the nominal percentage change minus the local inflation rate.

But changes in the MSA poverty rate can not be expressed as simple function of the inflation rate. Estimated local price levels will also make a difference in estimating poverty rate changes.

⁶ In addition, the estimated effects of MSA growth in this zero-lag, MSA fixed effects specification are actually larger than are estimated without MSA fixed effects. The effects of a 1% shock to MSA employment on blacks in this fixed effects specification is 1.232 (standard error=.247); the effects on whites is .831 (.101). Hence, controlling for MSA fixed effects seems to tend to increase the estimated effects of employment growth on real earnings. However, it should be noted that controlling for MSA fixed effects may also tend to make the estimates more likely to represent short-run effects rather than long-run effects.

Unfortunately, the data on MSA inflation and prices are sparse. MSA inflation data are consistently available only for the 1970s and 1980s for 24 MSAs.^{7,8} MSA price level data are only available for a few years in the 1970s, for around 38 MSAs. These MSA "price level" data are three sets of U.S. Bureau of Labor Statistics' "living standard budgets", showing how much it would cost in different MSAs to achieve an intermediate, higher, and lower "standard of living."⁹

To estimate prices and inflation for MSAs and years for which data are not available, I use the available MSA price and inflation data to make predictions. First, I estimate the determinants of MSA price level differentials for 38 MSAs in 1976. The dependent variable in this estimation is the BLS lower living standard budget for these 38 MSAs. The lower living standard budget is chosen because the price level information is only needed for

⁷ Data are also available for part of this period for an additional MSA, Miami.

⁸ The U.S. Bureau of Labor Statistics reports these MSA numbers in the form of consumer price indices for different MSAs for different time periods, which might imply that these indices allow a comparison of price levels across MSAs. However, all these indices are arbitrarily set equal to 100 as of the same base year for all MSAs, so a comparison of indices across MSAs would really only show how much relative prices in different MSAs have changed since the base year. Also, the market basket used in different MSAs is different, and there is no attempt to ensure that the market baskets priced in different MSAs would yield the same level of utility or well-being.

⁹ These MSA "living standard" budgets also price different market baskets in different MSAs. However, these market baskets are supposed to be what it costs to achieve the same standard of living, given variations in such factors as climate (more clothes are needed to reach the same living standard in cold MSAs) and customs (certain foods are consumed more in some MSAs than others). These different market baskets could be seen as an ad hoc attempt to calculate the minimum cost needed to achieve a given utility level, and this attempt, if successful, would constitute a true cost of living index. Many economists might prefer a less ambitious but less ad hoc procedure of just pricing the identical market basket in different MSAs. But analysis of the intermediate living standard budget does not reveal any major changes in relative living costs when a fixed market basket is substituted for the MSA-differentiated market baskets. (Sherwood, 1975).

calculating poverty rates. The lower living standard budget will probably better approximate the prices facing persons near the poverty line than will the intermediate or higher living standard budgets. The estimates of the determinants of MSA "lower living standard" prices are then used to predict relative price levels as of 1976 for all other MSAs. Second, I estimate the determinants of MSA inflation differentials during the 1970s and 1980s for 24 MSAs. This estimated relationship is used to predict inflation rates for the other MSAs for each year during the 1970s and 1980s. In both the price and inflation estimation, the goal of the estimation is not to produce a full structural model of MSA prices or inflation. Instead, the goal is an equation that will yield good out-of-sample predictions. Finally, I combine these price level estimates for 1976 and inflation estimates for all years to generate a predicted MSA price level for each year and each MSA.

Once these predictions are done, real poverty rates and real economic outcomes can be calculated for each year and each MSA. This study's main dependent variables—the year-to-year percentage change in MSA real economic outcomes and the change in the MSA poverty rate—can then be calculated. All these calculations use actual data for local prices and inflation when such data are available, and predicted values for prices and inflation when the actual values are unavailable.

Table T2 reports the estimated determinants of 1976 MSA price level differentials. The regional dummies simply reflect the well-known price level differences in different regions of the country. The education variable is the average educational requirements in the MSA implied by its 1976 industry mix, which might affect local wages and prices. This particular specification was chosen over specifications that also included the MSA's size

Table T2

Estimates of the Determinants of the Percentage Difference
of MSA Prices from the U.S. Average

	<u>Coefficient</u>	<u>t-statistic</u>
Intercept	-2.028	-3.92
Educational Requirements Due to Industrial Mix	0.155	3.89
North Central Region	-0.0074	-0.87
Northeast Region	0.0257	2.68
South Region	-0.0526	-5.37
West Region	0.0343	3.11

Notes: Dependent variable is $[\ln(\text{MSA costs for lower living standard budget in 1976}) - \ln(\text{U.S. average costs in 1976 for lower living standard budget})]$. Instead of dropping a dummy, sum of region coefficients was restricted to zero; as shown by Suits (1984) and Kennedy (1986), this implies that coefficients show differential of MSAs in region from U.S. average. Number of observations is 38; adjusted R-squared is .515. Mean standard error of individual prediction over 313 MSAs was .036; max was .048.

(measured by employment) and the MSA's average wage premium. The chosen specification was better than these alternatives according to the Akaike Information Criterion. The Akaike Information Criterion is a standard model selection criterion that attempts to minimize the out-of-sample prediction error, which is accomplished by excluding variables whose estimated coefficients are too uncertain.¹⁰ The resulting specification has a reasonably adequate R-squared for a cross-section equation. The average estimated standard error of the predictions is 3.6%. This standard error implies a 95% probability for the typical MSA that the prediction is within 7.2% of the true relative price level.

For inflation, two prediction equations were constructed for two different time periods, due to differences over time in available data. For the time period from 1971-72 through 1976-77, inflation determinants were estimated using the equation reported in Table T3. Time period dummies reflect how MSA inflation is affected by national factors, and the regional inflation variable reflects how MSA inflation is affected by regional factors. MSA employment growth may affect MSA inflation by increasing local land and housing prices and wages. Using the AIC, I chose this specification over a specification that also included the change in the MSA manufacturing share. This equation has a quite high R-squared and many highly significant right-hand side variables. More important, the equation yields a quite small average standard error of individual predictions of .6%. This standard error implies that for the average MSA-year observation, the inflation prediction has a 95% chance of being within 1.2% of the true MSA inflation rate for that year.

¹⁰ As pointed out in Amemiya (1985), the AIC is virtually identical to his Prediction Criterion, which explicitly is designed to minimize out-of-sample prediction error.

Table T3

Estimates of Determinants of MSA Inflation
1971-72 to 1976-77

	<u>Coefficient</u>	<u>t-statistic</u>
Intercept	0.03807	5.34
1972 Dummy	-0.02180	-5.30
1973 Dummy	-0.00494	-2.58
1974 Dummy	0.01793	3.57
1975 Dummy	0.00968	2.41
1976 Dummy	-0.00771	-2.59
1977 Dummy	Excluded	Excluded
Region's Inflation	0.427	3.93
MSA Employment Growth	0.05140	1.33
Lagged MSA Growth	-0.00132	-0.03
Twice Lagged Growth	0.05847	1.61

Notes: Inflation measured as $[\ln(\text{MSA price index in year } t) - \ln(\text{MSA price index in year } t-1)]$. Region's inflation is rate for the region MSA is in (4 regions report inflation rates, Northeast, North Central, South, and West). MSA Employment Growth is $\ln(\text{MSA employment in year } t) - \ln(\text{MSA Employment in year } t-1)$. Lags are this variable one and two years ago. Number of observations is 144, Adjusted R-squared is .936. Mean standard error of individual predictions is .0064; max is .0093.

For the time period from 1977-78 through 1988-89, I estimated MSA inflation determinants using the equation reported in table T4. This equation includes the same independent variables as in the inflation prediction equation reported in table T3. The additional independent variables in table T4 include current and lagged changes in educational requirements. According to the AIC, this specification was superior to alternative specifications that included changes in the MSA wage premium, changes in the MSA's manufacturing share, and changes in other MSA "demographic share" economic development variables. Why increases in the MSA educational requirements variable are associated with lower MSA inflation is unclear. Perhaps increases in educational requirements over time may contribute to reduced wages in some local retail industries that as a result have an excess supply of workers. Alternatively, perhaps higher education industries are attracted to MSAs with lower inflation rates. Whatever the reason, the resulting specification again has a quite high R-squared, and a low average standard error of prediction.

After these estimates were used to construct initial price level estimates for all MSAs for all years, as described above, two additional adjustments were made. First, all the MSA indices were multiplied by a constant to ensure that the employment-weighted average MSA price index for 1989 is 100; that is, all indices were adjusted so that all nominal dollar amounts will be measured in 1989 "average MSA" dollars. Second, MSA prices in 1982 and previous years were multiplied by a year-specific but MSA-invariant factor, equal to the ratio of the CPI-U-X1 price index for that year in the nation to the ordinary CPI-U index for the nation for that year. The CPI-U official price index prior to 1983 is often argued to have overestimated overall inflation because of problems in its calculation and treatment of

Table T4

Estimates of Determinants of MSA Inflation
1977-78 to 1988-89

	<u>Coefficient</u>	<u>t-statistic</u>
Intercept	0.00581	1.01
1978 Dummy	0.01268	2.81
1979 Dummy	0.01836	2.61
1980 Dummy	0.02238	2.45
1981 Dummy	0.01899	2.96
1982 Dummy	0.01010	2.80
1983 Dummy	0.01401	3.77
1984 Dummy	0.00853	2.27
1985 Dummy	0.00108	0.28
1986 Dummy	-0.00742	-1.64
1987 Dummy	0.00076	0.23
1988 Dummy	0.00306	0.97
1989 Dummy	Excluded	Excluded
Region's Inflation	0.765	7.27
MSA Employment Growth	-0.11465	-1.98
Lagged MSA Growth	0.13333	1.92
Twice Lagged Growth	0.07012	1.29
Change in MSA Educational Requirements	-0.17628	-1.54
Lagged Change in Educational Requirements	-0.06664	-0.59
Twice Lagged Change in Educational Requirements	-0.14026	-1.30

Notes: Change in educational requirements is the economic development variable described in Table 3 of text. Number of observations is 299. Adjusted R-squared is .913. Mean standard error of individual predictions is .0114; max is .0169.

housing prices. The CPI-U-X1 is an unofficial index prepared by BLS that attempts to correct for these problems in the treatment of inflation in the 1970s and 1980s. A more sophisticated version of the CPI-U-X1 became the official CPI-U price index in 1983. Hence, this correction attempts to at least roughly avoid over-estimating the inflation rate, and thus underestimating improvements in poverty, during the 1970s and early 1980s.

Choice of Control Variables for Regression Adjustment Procedure

The purpose of the regression adjustment procedure is to accurately predict—for each demographic group, MSA, and year—the value of each economic outcome for a person with "standard" characteristics. As described in the text, these "standard" characteristics are average characteristics for blacks as of the March 1987 CPS. These predictions are "regression-adjusted" means. Regression-adjusted mean values of economic outcomes are preferable to ordinary MSA mean values of economic outcomes because they are more comparable across MSAs and over time. Adjusted means compare persons with the same characteristics, whereas ordinary means may be unusually high or low because of an unusual mix of persons in the MSA in that year.

A good prediction must use a regression specification that is complete and includes only right-hand side variables whose effects are statistically significant at some minimum level of significance. The regression specification must capture the relevant characteristics of persons that explain economic outcomes. Yet if the specification includes too many variables that are statistically insignificant, the resulting predictions will have high standard errors.

I initially considered estimating a separate regression equation for each year, MSA, economic outcome, and demographic group. But preliminary experiments showed that this approach resulted in adjusted means with unacceptably high standard errors. Many MSAs have small samples in the Current Population Survey. Allowing regression coefficients to vary by MSA resulted in imprecise estimates of the regression coefficients and therefore imprecise predictions of the economic outcomes for persons with "standard" characteristics.

Instead, I estimated a specification, for each year, economic outcome, and demographic group, that used an economic outcome as a dependent variable, and the following types of independent variables: MSA dummies, and selected personal characteristic variables. This specification allows the average level of the economic outcome to vary by MSA. But the effects of the personal characteristic variables are constrained to be the same in all MSAs. Although this constraint is unlikely to be literally true, imposing it reduces the standard error of the predictions. Separate regressions were run for each year, and demographic group, so coefficients were allowed to vary from year to year and over different demographic groups.

The personal characteristics used as independent variables were a dummy variable for gender, a dummy variable for high school completion, years of education completed, years of education squared and cubed, age, and powers of age up to the fifth power. This specification was selected after some experimentation. This experimentation concentrated on picking a model that would be a good specification for black personal earnings. All these variables are statistically significant for blacks overall. Furthermore, plots of the residuals by age or education level do not reveal any important age or education groups for which this

specification tends to overpredict or underpredict earnings for blacks. The number of powers used in age may seem high to some readers, but recent research suggests that labor economists have often used too few powers in age or experience to accurately capture age-earnings profiles (Murphy and Welch, 1990).

Table T5 summarizes the results from a typical regression used to calculate the adjusted means. This particular regression is for blacks overall, for the year 1986. As can be seen in the table, all the variables are statistically significant.

One possible criticism of this regression adjustment procedure is that it restricts the effect of age, education, or gender on earnings to be the same in all MSAs. This criticism is valid for the calculation of regression adjusted means for blacks overall or whites overall. But this restriction is later relaxed because the report also analyzes changes in regression-adjusted means for different subgroups of blacks and whites. Separate regression adjustment procedures were done for each subgroup: two education groups (high school dropouts and high school completers), three age groups (persons 16-24; 25-54; 55 and over), and both genders. For each of these demographic subgroups for which this regression adjustment procedure was done, a separate regression was run. Thus, all of these regressions' coefficients, including the MSA dummies' coefficients, were allowed to vary between demographic subgroups. Because the MSA dummies coefficients vary between subgroups, different MSAs are allowed under this procedure to have different relative earnings for high school dropouts versus completers, or for the three age groups considered, or for females versus males.

Table T5

Effects of Personal Characteristics on Earnings
for Blacks, 1986, with MSA Dummies Included

	<u>Coefficient</u>	<u>t-statistic</u>
Intercept	37837.4506	3.44
EDUCATION	865.6525	2.21
(EDUCATION) ²	-147.9815	-3.15
(EDUCATION) ³	8.7511	5.54
AGE	-7634.7681	-8.64
AGE ²	400.9253	9.92
AGE ³	-8.7771	-10.22
AGE ⁴	0.0846	9.87
AGE ⁵	-0.00030	-9.21
GENDER DUMMY VARIABLE (FEMALE=1)	-3774.2857	-17.66
HIGH SCHOOL COMPLETION DUMMY VARIABLE (COMPLETION=1)	1344.2052	3.33

Notes: Personal earnings is dependent variable. In addition to variables listed in this table, the regression also included as independent variables a complete set of MSA dummy variables. F-test for significance of MSA dummies: 2.03 (df=209; 6969); probability of F-test of this size when no true effect of MSA dummies is .0001. Adjusted R-squared = .383; Sample size = 7,189.

Calculation of Standard Errors for Late 1970s to Late 1980s Percentage Change in Real Earnings for Selected MSAs (Figure 3)

Figure 3 presented estimates of the percentage change in regression adjusted real personal earnings for blacks and whites separately, in selected MSAs, from the late 1970s to the late 1980s. This figure reported standard errors of these estimates. This subsection of the technical appendix will outline how these standard errors were calculated. This calculation is quite straightforward. There is but one complication: because some CPS households remain in the CPS sample from one year to the next, the errors in estimating MSA means for adjacent years are positively correlated.

The variance of these percentage change numbers is given by the following formula:

$$(T.5) \quad V[100(Y_8 - Y_7) / Y_7] \approx 100^2 (1/Y_7^4) [Y_7^2 V(Y_8) + Y_8^2 V(Y_7)]$$

Y_7 is the average regression-adjusted real personal earnings for a particular MSA, either for blacks or whites, for 1976, 1977, 1978, and 1979. This is a simple average, calculated as the sum of the individual years' figures divided by four. Y_8 is a similar average for 1986 through 1989. This variance calculation is an approximation relying on a Taylor-series expansion.

The variance of the late 1970s average, Y_7 , is given by the following formula:

$$\begin{aligned}
 V(Y_7) &= V[(Y_{76} + Y_{77} + Y_{78} + Y_{79}) / 4] \\
 (T.6) \quad &= \frac{1}{16} [V(Y_{76}) + V(Y_{77}) + V(Y_{78}) + V(Y_{79})] \\
 &+ \frac{1}{8} [C(Y_{76}, Y_{77}) + C(Y_{77}, Y_{78}) + C(Y_{78}, Y_{79})]
 \end{aligned}$$

Y_{76} is the regression-adjusted mean personal earnings for blacks or whites in a particular MSA in 1976, Y_{77} for 1977, etc. The formula assumes that the CPS sample is independent in non-adjacent years, but may have some correlation in adjacent years. The CPS sampling structure is such that half the housing units in the sample are replaced from one March to the next, whereas the other half of the housing units interviewed are the same from one March to the next. As a result, calculated statistics for adjacent years should have some correlation, whereas statistics in non-adjacent years should not be correlated. A formula similar to equation (T.6) applies to the variance of Y_8 .

I assume the following correlation among regression-adjusted means for adjacent years:

$$(T.7) \quad C(Y_t, Y_{t+1}) = .30\sqrt{V(Y_t) V(Y_{t+1})}$$

The assumption of a year-to-year correlation of .30 relies on information from the Census Bureau (U.S. Census Bureau, 1991, Table D-6 on p. 401). Strictly speaking, this correlation of .30 only applies to unadjusted simple means for personal income figures. One would think that the regression adjustment procedure should reduce the year-to-year correlation, because the regression adjustment eliminates some of the sampling error that results from happening to draw a sample with unusual personal characteristics. As a result, using equation (T.7) may result in overstating the year to year correlation, and hence overstating

all the variances in equations (T.5) and (T.6). Thus, the reported standard errors in figure 3 may be a bit too high.

To calculate all these variances, I used SAS to calculate the variance of the regression-adjusted means for each MSA, year, and group (blacks or whites) in the late 1970s and late 1980s. This variance depends on the variance-covariance matrix of the coefficient estimates and the vector of standard characteristics used to calculate the regression-adjusted means. These variances were then plugged into equations (T.7) and (T.6), and then substituted into equation (T.5). The square root of these variance estimates in equation (T.5) are reported as standard errors in Figure 3.

3. *Details on the Construction and Use of the Economic Development Variables*

Overcoming Suppressed 2-Digit Industries

Several of the MSA "economic development" variables depend on the MSA's industry mix. Examples include the wage premium variable, the educational requirements variable, and the variables measuring the share of MSA labor demand for the different demographic groups. The calculation of these industry mix variables require data on employment by 2-digit industries in the MSA for each year. But such 2-digit industry employment data are frequently not available due to "data suppressions." For confidentiality reasons, federal statistical agencies often will not release information for a particular 2-digit industry's employment in a particular MSA and year.

I overcame these suppressions by estimating the employment in suppressed industries. The procedure began by estimating suppressed 1-digit industries at the state level. The

procedure then went on to estimate in turn suppressed 2-digit industries at the state level, suppressed 1-digit industries at the MSA level, and suppressed 2-digit industries at the MSA level.

At each stage, an outline of the procedure is as follows. Suppressed industry employment numbers for a particular geographic unit (state or MSA) and year were initially estimated where possible by interpolating or extrapolating from reported numbers for that same industry and geographic unit for other years. If interpolation or extrapolation was impossible because that industry was suppressed in that geographic unit for all years, then the industry's employment number was estimated by using information on the industry's share of employment in that year in the next higher geographic unit (i.e., the U.S. for a state, or the state for an MSA). These initial estimates were then adjusted upwards or downwards so the sum of industry numbers for that state or MSA added up to the next broader industrial category. That is, the initial 2-digit estimates would be adjusted so that all 2-digit industry employment numbers would add up to the appropriate 1-digit totals for that geographic unit; the initial 1-digit numbers would be adjusted so that they added up to the all-industry total for that geographic unit.

The initial estimates from interpolation, extrapolation, or higher level geographic units were developed using industry share numbers. Interpolation assumed a constant linear change in an industry's share of the next higher level industrial categories between the observed years. Thus, if a 2-digit industry's share in a geographic unit of its 1-digit category was .15 in 1985 and .17 in 1987, with 1986 suppressed, the initial estimates assumed a .16 share for the industry in 1986. Extrapolation assumed a constant industry share of the next

highest industrial category from the nearest available year for that industry in that geographic unit. Thus, if the last available year for a 2-digit industry had a share of .21 out of its 1-digit category, I assumed that share would continue into the future. Alternatively, if the first available year for a 2-digit industry had a share of .21, I assumed that its share was .21 in previous years. Finally, if interpolation or extrapolation was not possible (because the industry was suppressed for all years for that geographic unit), I assumed that the industry's share of the next highest level industrial category was the same in the next highest level geographic unit for which data were available. Thus, if a 2-digit industry was suppressed for all years for an MSA, its share of the appropriate 1-digit total in that MSA was assumed to be the same as the 2-digit share of the 1-digit total in the state in which the MSA was primarily located.

I implemented this procedure using two different data bases. One data base was from the Regional Economic Information System of the U.S. Bureau of Economic Analysis. This data base provided 2-digit and 1-digit industry employment numbers for the nation and states, and 1-digit numbers for MSAs, for all years from 1969 to 1989. These numbers are official total full time and part time employment estimates prepared by BEA. The second data base was "ES-202" data from the U.S. Bureau of Labor Statistics. This data base provided 2-digit and 1-digit employment numbers for the nation, states, and MSAs, for all years from 1975 to 1989. These numbers are raw counts of the number of employees covered by unemployment insurance. Both data bases use the same MSA definitions for all years, and the MSA definitions are consistent between the 2 data bases.

The REIS data are probably overall better because they are estimates, whereas the ES-202 data simply provides raw counts of employees covered. The ES-202 data are not adjusted for changes in unemployment insurance coverage or reporting, or any other factors that might affect the accuracy of the numbers. On the other hand, the ES-202 data base is unique in providing annual average information at the 2-digit level of detail for MSAs.

Because of these different strengths and weaknesses of the two data bases, the REIS data were used to provide all estimates of 1-digit employment numbers at the MSA level. The ES-202 data was used to provide estimates of the 2-digit shares of 1-digit totals at the MSA level. These ES-202 derived 2-digit shares were then applied to the REIS-derived 1-digit employment numbers to get 2-digit employment numbers.

The actual procedure went as follows. First, REIS suppressions were overcome at the state level, for 1-digit industries. Second, REIS suppressions were overcome at the MSA level for 1-digit industries. Third, ES-202 suppressions were overcome at the MSA level for 1-digit industries.¹¹ Fourth, ES-202 suppressions were overcome at the MSA level for 2-digit industries. Fifth, the 2-digit shares of 1-digit numbers from steps 3 and 4 were applied to the 1-digit numbers from step 2 to get 2-digit numbers at the MSA level.

Although estimating the suppressed industries was quite time-consuming, it is important to note that most industries were not suppressed. For the average MSA/year combination, about 15 of the 73 2-digit industries were suppressed. For the average MSA, less than 3 of the 73 2-digit industries were suppressed for all years from 1975 to 1989.

¹¹ If interpolation or extrapolation was impossible, and state 1-digit or 2-digit numbers were suppressed for ES-202, national shares were used to obtain the initial estimates.

Hence, the "industry mix" economic development variables mostly use real industry employment numbers rather than estimated numbers. Furthermore, even in cases where estimates were made, these estimates are likely to be fairly good. It is not implausible to assume that interpolating or extrapolating industry share numbers from other years for the MSA, or using industry share numbers from the state, will give reasonably accurate industry share numbers for the MSA.

Decomposition of Causes of Shifts in Black High School Completer and Black High School Dropout Labor Demand

Figures 5 and 6 in the main report show surprising trends in the percentage share of labor demand for black high school dropouts and black high school completers. Figure 5 shows that black high school completer demand has declined over time. Figure 6 shows that black high school dropout demand has increased over time.

The text discussion attributes these trends to various changes in the U.S. industrial mix, and the particular industries in which black high school dropouts and completers are concentrated. This subsection will back up the report's assertions with some data.

As defined in this report, the percentage of labor demand for black high school dropout or completer demand as of some year t , for all MSAs, can be expressed by the following equation:

$$(T.8) \quad B_t = (1/100) \sum_i P_{it} B_i$$

where B_t is the percentage of total MSA labor demand that we would expect to go to this particular black group given the industry mix as of year t , B_i is the percentage of

employment in industry i that goes to that particular black group according to the 1990 Current Population Survey, and P_{it} is the percentage share of that industry i in total employment for all MSAs as of year t . This variable is a prediction of the percentage of demand for that black group if each industry in the U.S. employed the same percentage of that group as it did in the 1990 CPS.

The change from year s to year t in this black labor demand variable can be decomposed by the following formula:

$$\begin{aligned}
 (T.9) \quad B_t - B_s &= (1/100) \sum_i (P_{it} - P_{is}) B_i \\
 &= (1/100) \sum_i (P_{it} - P_{is}) (B_i - B)
 \end{aligned}$$

where B is the percentage share of employment in all industries that goes to the particular black group being considered. The second equality in (T.9) follows because both P_{it} and P_{is} sum to 100 and B is a constant across all industries.

The decomposition in equation (T.9) is useful because it can be used to measure each industry's "contribution" to the total change in labor demand for some black group. An industry will make a positive contribution to increasing demand for a black group in either of two cases: (1) the percentage share of total employment demand in that industry is increasing ($P_{it} - P_{is}$ is positive) and that black group has an above-average share of that industry's employment ($B_i - B$ is positive), or (2) the percentage share of total employment demand in that industry is decreasing and that black group has a below-average share of that industry's employment. Similarly, an industry will tend to be decreasing a black group's labor demand in either of two cases: (1) it is a fast growth industry and that black group has

a below-average share of that industry, or (2) it is a slow growth industry and that black group has an above-average share of that industry.

Tables T6 and T7 show a few of the key industries that contribute to the observed trends in black high school dropout and completer demand from 1979 to 1989. Table T6 shows that black high school dropout demand was significantly boosted by the relatively fast employment growth in the eating and drinking place industry and the private household services industry. Black high school dropouts had above-average shares of the employment in these two fast-growth industries. Other industrial changes tended to decrease black dropout labor demand, but not by enough to fully offset the effects of these two industries' growth.

Table T7 shows that black high school completer demand was significantly reduced by relatively slow growth in government employment (both military and civilian, federal and state and local) and communications industry employment. Black high school completers had above-average shares of the employment in these slow-growth industries. Other industrial changes did tend to increase black completer labor demand, but not by enough to offset these declines in government and government-regulated industries.

Table T6

Decomposition of Components of Change in Black High School
Drop-Outs Percentage Share of Labor Demand, 1979-89

(1)	(2)	(3)	(4)
<u>Industry</u>	<u>Change in Percentage Industry's Share, 1979-89</u>	<u>Difference of Black High School Drop-Out Percentage From All Industry Average</u>	<u>Contribution of Industry to Change in Black Drop-Out Share $\{(4)=[(3)(2)] \cdot .01\}$</u>
Food products	-4.05	4.20	-.0170
Eating & drinking places	.618	2.76	.0170
Private household services	.129	12.38	.0160
All other industries			-.0073
Total change in percentage share of labor demand			.0087 (from 2.2492 to 2.2579 %)

Notes: Column (2) is change in industry's percentage share of total employment, 1979 to 1989, for all MSAs. Column (3) is percentage of industry's employees who are black high school dropouts minus similar percentage for all industries.

Table T7

Decomposition of Components of Change in Black High School
Completers Percentage Share of Labor Demand, 1979-89

(1)	(2)	(3)	(4)
<u>Industry</u>	<u>Change in Percentage Industry's Share, 1979-89</u>	<u>Difference of Black High School Completer Percentage From All Industry Average</u>	<u>Contribution of Industry to Change in Black Completers Share $\{(4)=[(3)(2)] \cdot .01\}$</u>
Federal civilian employment	-.349	8.13	-.0284
Federal military employment	-.178	8.90	-.0158
State and local government employment	-1.111	3.09	-.0343
Communications	-.335	6.90	-.0231
All other industries			.0113
Total change in percentage share of labor demand, 1979-89			-.0903 (from 8.3173 % to 8.2270 %)

Notes: Column (2) is change in industry's percentage share of total employment, 1979 to 1989, for all MSAs. Column (3) is percentage of industry's employees who are black high school completers minus similar percentage for all industries.