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Finding Jobs

Work and Welfare Reform

David E. Card and Rebecca M. Blank, Editors

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Chapter 1

The Employment, Earnings, and Income of Less Skilled Workers over the Business Cycle

Hilary W. Hoynes

One of the most substantial risks facing workers is the potential for job loss, either permanent or temporary. The possibility of a loss in earnings and employment is likely to be of greater concern to less skilled workers because of difficulties in replacing lost income with savings and the earnings of secondary earners. Many government transfer programs have been established to reduce the variability of family income over the business cycle. Because of recent changes in welfare programs, however, there is some uncertainty as to the role that the safety net can and will play in subsequent recessions.

Recent evidence suggests that state and federal policy changes are leading to increases in employment among recipients of benefits from Aid to Families with Dependent Children (AFDC) (see chapter 9 in this volume). With increases in attachment to the labor market comes the potential for increases in family income and earnings. However, with increasing labor market attachment also comes the risk of recession and loss of family income. The potential for cyclical fluctuation in earnings is very different from the relatively constant transfer that a family could expect from AFDC.

This chapter examines the impact of changes in local economic conditions on the employment, earnings, and income of individuals in different skill groups. The skill groups are defined by sex, race, and education level. The emphasis here is on the relative impact of cycles across these demographic groups. Our findings consistently show that the labor market outcomes of less skilled workers exhibit more variability over business cycles than those of higher-skilled groups. Nonwhites and those with lower education levels are more impacted by changes in local economic conditions. Furthermore, high-skilled women exhibit significantly less sensitivity to business cycles than low-skilled women, especially low-skilled nonwhite women. These patterns hold for both recessions and recoveries. These groups are more likely to have reductions in employment and earnings during a downturn and are also more likely to have gains in recoveries. An examination of individuals in isolation, however, gives an incomplete picture of the effect of cycles on well-being. The results of our study also show that government transfers decrease the differences between groups, resulting in more skill-group-neutral effects of business cycles on family income than individual earnings.

Many previous studies have examined the effects of business cycles and local labor markets on individuals and families. That prior work generally shows that less skilled workers are more impacted by cycles. My research contributes to the literature in three important ways. First, this chapter is focused on a comparison of the responses across demographic groups, defined by sex, education, and race. Second, the chapter examines a broad range of individual and family outcomes, including employment, hours, earnings, and income. Most previous studies focus on one or two individual measures. The combination of detailed outcome measures and comparisons across demographic groups allows me to present a very complete picture of the way families are impacted by cycles—a picture that has not been generated by the existing literature. Third, the study examines whether these effects vary across business cycles. This is all done in a simple empirical framework that makes use of variation in the timing and severity of recessions across metropolitan statistical areas (MSAs). This variation is much richer than that used in time-series studies.

The focus in the chapter on relative responses across demographic groups and different individual and family outcomes can be used to inform the policy process. The results shed light on particular problems that may exist for less skilled workers, for women versus men, or for whites versus nonwhites. These differences may result from differences in labor market attachment, industry, or geographic location. Furthermore, the examination of different outcome measures may shed light on the success or failure of particular government transfer programs designed to insure against fluctuations in income. For example, policies such as unemployment insurance and job training are geared toward individuals, and their effects will show up in individual outcomes. Other policies, such as Aid to Families with Dependent Children and the Earned Income Tax Credit, are geared toward families, and their effects will show up in family income.

PREVIOUS LITERATURE

This study has connections to many different areas of research, including the literature on wage, earnings, and income inequality; trends in employment and earnings for women; determinants of labor market outcomes and differences between groups; and worker displacement. It is neither feasible nor desirable to present here a comprehensive review of the literature. Instead, this review focuses explicitly on those studies that examine the effect of local labor market conditions on employment and income outcomes. In particular, I focus on three features of these studies: the variables used to control for the characteristics of the area labor market, the outcome measures, and the degree to which differences across groups is explored.

The applications that are most relevant to this analysis include those that examine the effect of business cycles and local labor markets on employment outcomes (Bartik 1991, 1993a, 1993b, and 1996; Blanchard and Katz 1992; and Holzer 1991), real wages (Bils 1985; Blank 1990; Keane, Moffitt, and Runkle 1988; and Solon, Barsky, and Parker 1994), racial differences in labor market outcomes (Bound and Holzer 1993 and 1995), labor market outcomes of disadvantaged youth (Acs and Wissoker 1991; Bound and Freeman 1992; Cain and Finnie 1990; Freeman 1982, 1991a, and 1991b), and family income, poverty, and income inequality (Bartik 1994; Blank 1989; Blank 1993; Blank and Blinder 1986; Blank and Card 1993; and Cutler and Katz 1991). These studies almost universally find an important role for local labor market conditions.

The studies of disadvantaged youth relate labor market outcomes to local (typically, MSA) unemployment rates. That literature has consistently found that higher local unemployment rates lead to reductions in employment and earnings (Acs and Wissoker 1991; Bound and Freeman 1992; Cain and Finnie 1990; Freeman 1982, 1991a, 1991b), with larger effects for blacks, younger workers, and less educated workers (Acs and Wissoker 1991; Freeman 1991a).

The studies of family income and poverty have typically used either national (Blank 1989, 1993; Blank and Blinder 1986; Cutler and Katz 1991) or regional (Blank and Card 1993) variation in unemployment rates or gross national product (GNP). The studies have found a consistent negative relation between unemployment rates and inequality and poverty. Of particular interest is Rebecca Blank (1989), who disaggregates household income into many components and examines the relative cyclicality of the components. She finds earnings and capital income to be procyclical and some transfer income to be countercyclical. Overall, she finds greater variation over the cycle for those who are young, male, and nonwhite.

The literature that is most relevant for this study is the literature that uses variation across MSAs in labor market conditions to examine labor market outcomes across different demographic groups (Bartik 1991, 1993a, 1993b, 1994, and 1996; Bound and Holzer 1993 and 1995). The studies by Timothy Bartik use growth in employment, changes in the manufacturing share of employment, and changes in the average wage premium implied by the area's industry mix. John Bound and Harry Holzer (1993 and 1995) use skill-group-specific measures of employment growth, using as weights the skill group's participation in each industry at the beginning of the period. The results differ somewhat across the studies, but they generally show that changes in labor demand lead to larger changes for blacks, younger persons, and those with lower education levels. The patterns seem to hold for men and women.

Distinct from the above literature on labor market outcomes are studies that use panel data to examine the cyclicality of real wages. The literature uses primarily aggregate measures of business cycles (national unemployment rates of GNP growth) and asks to what degree aggregate wage fluctuations over the cycle are the result of changes in the composition of the workforce. The results vary somewhat across the studies but generally find that the composition effect alone leads to countercyclical wage patterns. Accounting for this composition effect, wages are found to be procyclical, with greater fluctuations for those who are male, young, and working in private sector.

Overall, these studies raise several possible explanations for the differences across groups in sensitivity to business cycles. An often-cited explanation is variation across demographic groups in mobility rates: the larger the long-run supply elasticity for the demographic group, the lower the expected effect of a demand shift on wages and employment. Those with lower rates of population mobility will have larger effects. A second explanation is that different demographic groups tend to be employed in different sectors and occupations that may be associated with greater or lesser risks of layoff.

DATA

The study uses the Outgoing Rotation Group (ORG) (covering the period from 1979 to 1992) and the March Annual Demographic File (ADF) data (covering the period from 1975 to 1997) from the Current Population Survey (CPS). The advantage of the ORG data, which pools monthly survey observations, is that its samples are about three times the size of the ADF sample—which is particularly important when presenting results by skill group within MSAs—but the labor market outcomes included in the survey are limited. I use indicators for employment in the previous week, full-time employment in the previous week, and earnings in the previous week, where "full-time employment" denotes a workweek of at least thirty-five hours. The data covers the period from 1979 to 1993, with about 325,000 observations each year.[1]

Ultimately, broader measures of individual and family well-being are important. The ADF provides comprehensive data on employment, earnings, and income over the past year. The analysis of the ADF data uses hourly earnings, annual hours, annual earnings, family earnings, family transfer income, and total family income. When evidence from the two data sources is combined, the results tell a comprehensive story about the impact of business cycles on workers and families. The data also cover a relatively long time period, allowing for examination of the recessions over three decades.

The ADF (or March CPS) includes labor market and income information for the previous year, at the individual and family level. Many different measures of individual and family outcome are considered, including whether household members were working, whether the work was full time all year, number of weeks worked, average hourly earnings, annual hours, annual earnings, family earnings (head and spouse), family transfer income, and total family income. All measures are annual and correspond to the calendar year previous to the survey. "Full time" is defined as at least thirty-five hours a week in the previous year,

and "full year" is defined as fifty or more weeks in the previous year. The ADF data is available beginning with the 1964 survey year. Because of major changes in the survey beginning in 1976, this study uses the surveys from 1976 to 1998, covering the years from 1975 to 1997.[2] The sample size is approximately 150,000 persons a year.

The earnings data are "top-coded" in both surveys.[3] In the ORG data, weekly earnings are top-coded at $999 through 1988 and $1,923 from 1989 on. In the ADF data, annual earnings are top-coded at $50,000 through 1981, $75,000 from 1982 to 1984, $100,000 from 1985 to 1988, and about $200,000 from 1989 on. Following Lawrence Katz and Kevin Murphy (1992) and more recently Francine Blau (1998), the earnings of top-coded individuals are adjusted to be 1.45 times the top-coded value. Beginning in 1996, instead of giving each top-coded observation the value of the top-code, the CPS assigns the mean among the sample of top-codes (by demographic group). The earnings figures can be as high as $600,000 in this period. I make no adjustment for top-coding in these years. There is no apparent top-coding of family earnings or family income. Real earnings and income are constructed using the CPI-U-X1 deflator.

For most of the analysis, the microeconomic data is collapsed into cells defined by MSA, year, and skill group. Skill groups are defined by education, race (white, nonwhite), and sex. The nonwhite group includes both blacks and white Hispanics. The ORG data identifies forty-four MSAs, whereas the ADF data (beginning a few years earlier) identifies thirty-five MSAs. In order to better approximate labor market areas, the MSAs are combined in their consolidated MSA (CMSA) units where applicable. Examples of CMSAs include New York, Los Angeles, and Chicago. The final sample includes thirty-five MSAs or CMSAs in the ORG data and twenty-seven MSAs or CMSAs in the ADF. For the remainder of the chapter, these geographic units will be referred to as MSAs.

In 1990, the MSA sample accounts for about 60 percent of the total metropolitan population (or 50 percent of the total population). The sample accounts for virtually all of the metropolitan population in 1975. The lack of complete coverage in the later part of the period comes from the need to create metropolitan areas that are consistent geographic units over the entire time period. Thus, metropolitan areas that are added in the middle of the period, for example, are not included in the sample.[4] The median MSA in the ORG data contains about two hundred observations a year, compared with about seventy-five observations a year in the ADF. Once the cells are further refined to skill groups, some cells get quite small. When possible, data are combined into two-year periods to reduce the problem of small skill group, MSA, and year cells. All analyses in this chapter are weighted.[5]

The same sample selection criteria are applied to both the ORG and ADF data. The sample includes persons between twenty-two and sixty-two years of age. The self-employed, those working without pay, and those with positive earned income but zero hours of work are excluded. Following Katz and Murphy (1992), we exclude individuals with real weekly earnings of less than $67 in 1982 dollars (that is, one half of the value of the minimum wage assuming a forty-hour workweek). The final sample has about 220,000 observations a year in the ORG sample and 70,000 observations a year in the ADF sample.

TRENDS IN LABOR MARKET OUTCOMES AMONG SKILL GROUPS

This period is characterized by important secular trends in employment and earnings as well as containing three recessionary periods. The experiences vary dramatically across demographic groups.

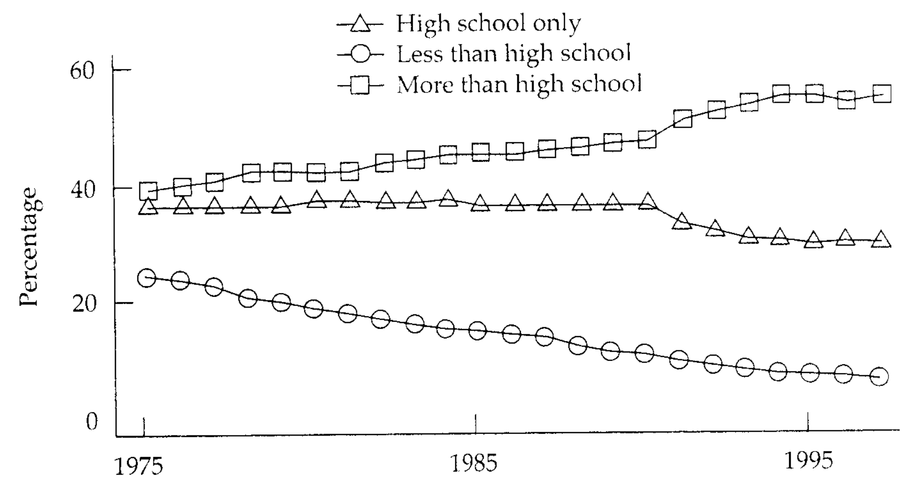
Definitions

Skill groups are defined by education, race, and sex. "Low-skilled workers" are typically defined using education level, and the term most often denotes persons with less than a high school education. This analysis uses data covering a period of three decades and is concerned with making comparisons across groups, over time, and across cycles. It is important for the analysis that the skill groups are defined to be relatively comparable over time. However, education levels have been rising over time for all demographic groups. In the presence of rising education levels, even if the distribution of earnings and income are unchanged over time, one would expect that the relative position of persons with low levels of education (for example, high school dropouts) would decline over time. That is, over time, this group would become more and more disadvantaged.

To illustrate this point further, figures 1.1 to 1.4 present trends in the percentage of persons with various education levels in the ADF sample, by race and sex. These figures show that the percentage of persons with less than a high school education has fallen dramatically in this period. For example, between 1975 and 1997, the percentage of white men with less than a high school education declined from 25 to less than 10 percent (figure 1.1). The percentage of nonwhite men with less than a high school education declined from 50 to 30 percent (figure 1.2). During the same period of time, among white men, the percentage with only a high school diploma has not changed significantly, and the percentage of those with greater than a high school diploma has increased. Among nonwhites, both groups—those with only a high school diploma and those with education beyond high school—are increasing. The trends are even more dramatic for women (figures 1.3 and 1.4).[6]

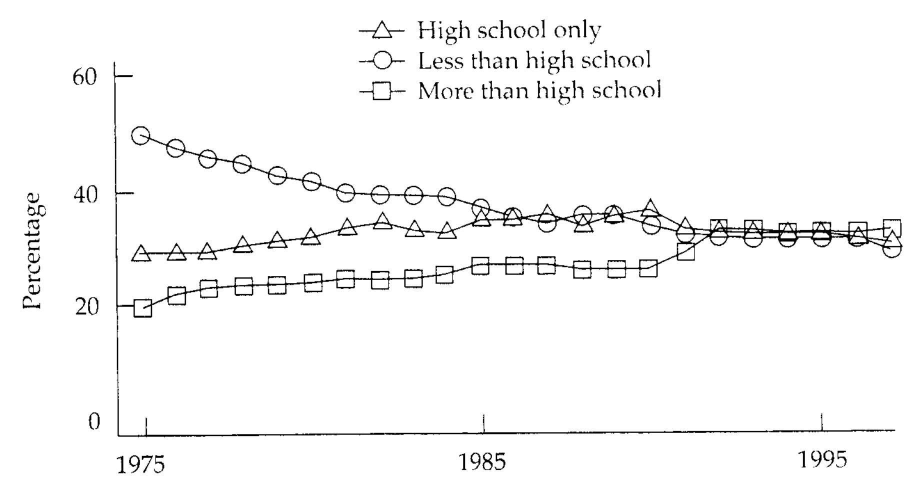
In the presence of these increases in education levels over this period, the main analyses in this chapter compare those with a high school education or less

FIGURE 1.1 / Distribution of Population by Education, White Men, 1975 to 1997



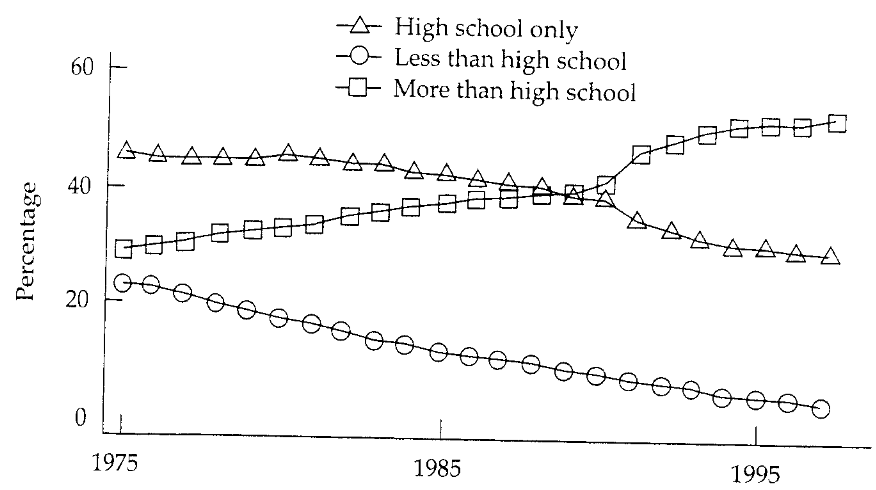
Source: Annual Demographic Files.

FIGURE 1.2 / Distribution of Population by Education, Nonwhite Men, 1975 to 1997



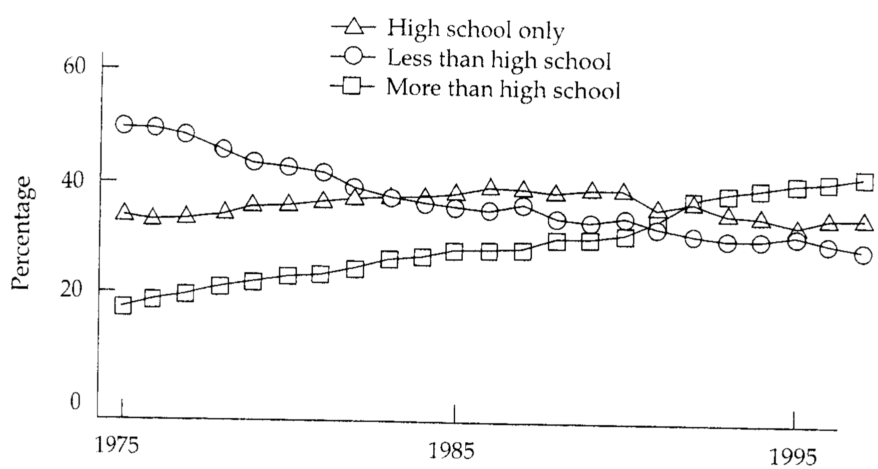
Source: Annual Demographic Files.

FIGURE 1.3 / Distribution of Population by Education, White Women, 1975 to 1997



Source: Annual Demographic Files.

FIGURE 1.4 / Distribution of Population by Education, Nonwhite Women, 1975 to 1997



Source: Annual Demographic Files.

with those with more than a high school education. Those with a high school education or less are defined to be less skilled workers. This group will be less disadvantaged than high school dropouts, however, and where possible I examine outcomes across all four education groups (less than twelve years, twelve years, thirteen to fifteen years, more than sixteen years).[7]

Trends in Employment, Earnings, and Income, Using Annual Demographic Files

Figures 1.5 to 1.8 present trends in the ratios of employment to population (EPOP) for men between 1975 and 1997 by race and education. There are two definitions for the employment to population ratios. "EPOP: Any Work" represents the employment-to-population ratio for those who worked at all the previous year. "EPOP: FTYR" represents the employment-to-population ratio for those who worked full time (at least thirty-five hours a week) and for the full year (at least fifty weeks) during the previous year.

Several observations can be noted from these simple figures. As expected, EPOP ratios are higher for those with higher levels of education. Among less educated men, nonwhites tend to have higher EPOP ratios than whites. A striking trend in the figure is the declining employment-to-population ratios among men with less than a high school education. By the mid-1990s, fully 30 percent of men are not working at all over the year. This is undoubtedly in part a result of the changing composition of the lowest education group over this time period.

The graphs also provide insight into the impact of cycles on different groups. The figures suggest that employment rates of those with lower education levels and nonwhites exhibit more cyclical variation. There seems to be more cyclical fluctuation in the full-time employment rates (figures 1.7 and 1.8) than in the "any work" employment rates (figures 1.5 and 1.6). For nonwhites with less than a high school education, the EPOP: Any Work graph (figure 1.6) also varies significantly over the cycle. This is striking given that the measure is any work in the entire calendar year. The high rate of nonwork in the trough of the recession in the early 1980s is consistent with the persistently high unemployment rates for this group. Note that the variability in the measures for nonwhites reflects small sample sizes, especially for higher education groups.

Figures 1.9 to 1.12 present trends in annual hours worked and earnings for the same groups of men. It is important to note that these earnings and hours figures are averages for all individuals in the group under study, which includes both workers and nonworkers. Therefore, the change in earnings is comprehensive and reflects changes in hours, weeks, and hourly wages as well as changes in the composition of the work force.

In general, the pattern for annual hours worked is similar to the trends for the EPOP ratios. These figures show that, to a greater extent than in other measures, both annual hours and real annual earnings show cyclical variation for college-educated white men. Whereas the average hours and earnings of less educated individuals also show cyclical variation, the relative variability of hours and earnings from low-level to high-level education groups is less dramatic than the variability in the employment figures. In graphs not presented here, the variation in annual hours worked comes more from variation in weeks worked each year than from hours worked each week. That may be attributable to measurement error in hours worked each week, or it may reflect the nature of employment reductions that firms elect to implement.[8]

Figures 1.13 to 1.20 present similar figures for women. These figures show that employment and earnings for women are increasing secularly over this period for all groups, but at a substantially slower rate for nonwhite women and those with low education levels. These trends are so strong that it is difficult to make any inferences about the variation over the business cycle.

Although not shown here, family earnings and family income also show cyclical variation. Family income and, to a lesser extent, family earnings show less variability across demographic groups compared with the fluctuations in individual earnings. Our empirical model explores the reasons for this difference.

EMPIRICAL MODEL

The goal of this analysis is to estimate how individuals in different demographic groups are affected by changes in macroeconomic conditions. One approach to estimating this effect is to take the time-series trends presented above and regress the outcomes on a measure of the business cycle, such as the unemployment rate. This approach is not taken here for two reasons. First, aggregate measures of business cycles do not necessarily capture the relevant cycle if there is area variation in the timing or severity of the cycle. Second, the unemployment rate (or some other aggregate measure of employment) can be mechanically related to the dependent variable (for example, the EPOP ratio for less skilled persons); this reflection or endogeneity problem makes the interpretation of such estimates difficult. One approach used in the literature is to use an instrumental variables method to account for endogeneity in the unemployment rate (Bound and Holzer 1993 and 1995). As an alternative, this analysis treats the shock to a local area as unobserved and compares the response to the shock among different groups. This avoids the reflection problem and has the added advantage of differencing out an MSA effect. All of the comparisons across groups are made within MSAs, which takes advantage of the wide regional variation in the timing and severity of recessions. For this and all remaining analyses in this chapter, I start by collapsing the data into cells defined by MSA (m), time (t), and skill group (j). Let y_{jmt} be the mean of a given labor market outcome for group j in area m in year t. Suppose one could observe some exogenous measure of the business cycle in the MSA in time t, represented by y_{mt}. Putting the variables y in

(Text continues on p. 41.)

FIGURE 1.5 / Annual White Male Employment Outcomes, EPOP: Any Work, by Education, 1975 to 1997

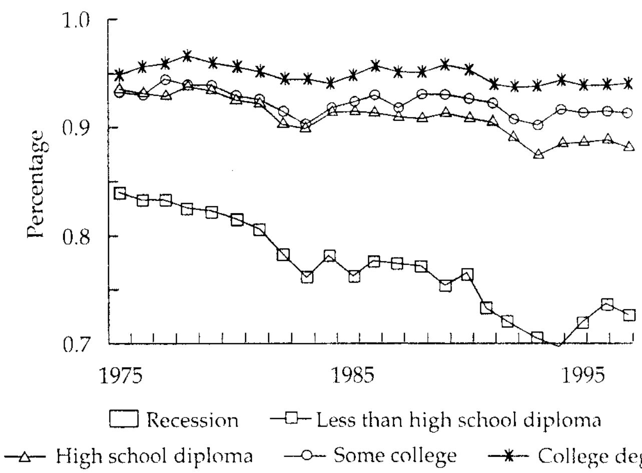
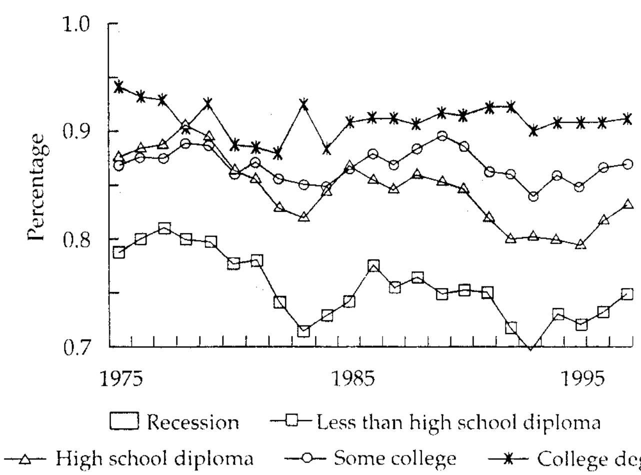


FIGURE 1.6 / Annual Nonwhite Male Employment Outcomes, EPOP: Any Work, by Education, 1975 to 1997



Source for figures 1.5 and 1.6: Annual Demographic Files.

Note: EPOP: Any Work is the employment-to-population ratio for those who worked at all during the previous year. EPOP: FTYR is the employment-to-population ratio for those who worked full time (at least thirty-five hours a week) and a full year (at least fifty weeks) during the previous year.

FIGURE 1.7 / Annual White Male Employment Outcomes, EPOP: FTYR, by Education, 1975 to 1997

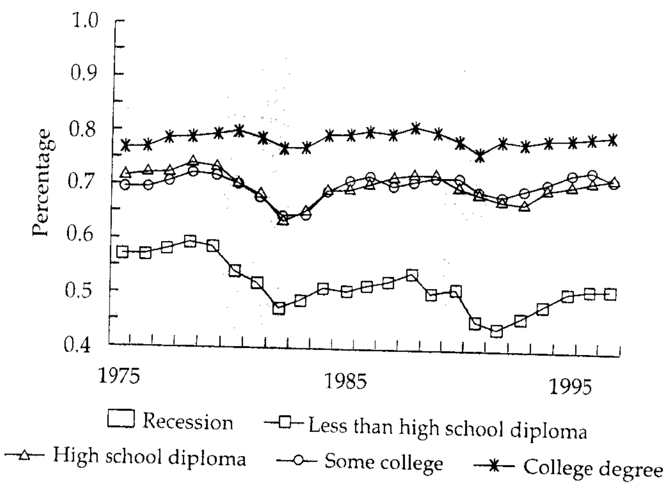
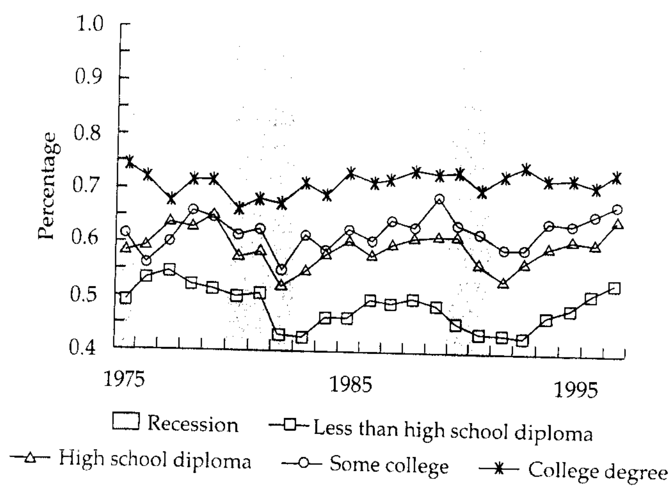


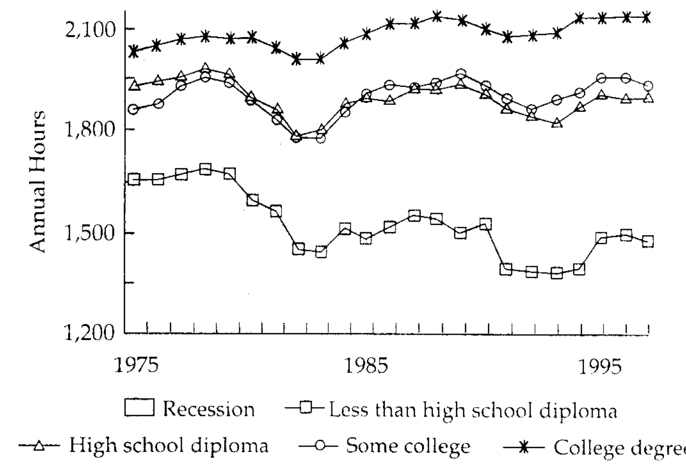
FIGURE 1.8 / Annual Nonwhite Male Employment Outcomes, EPOP: FTYR, by Education, 1975 to 1997



ource for figures 1.7 and 1.8: Annual Demographic Files.

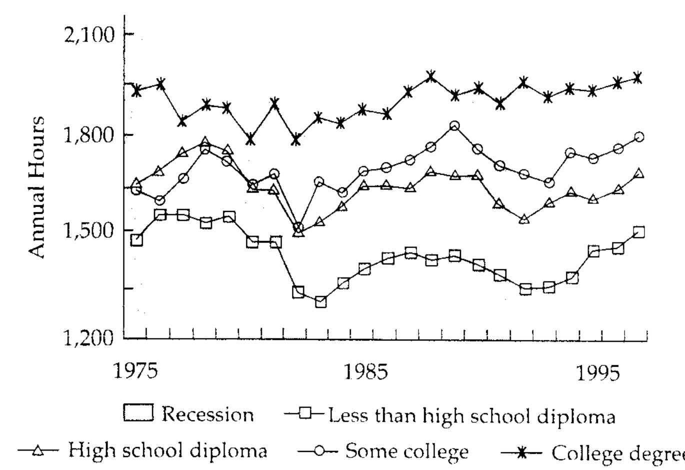
Note: EPOP: Any Work is the employment-to-population ratio for those who worked at all during he previous year. EPOP: FTYR is the employment-to-population ratio for those who worked full ime (at least thirty-five hours a week) and a full year (at least fifty weeks) during the previous year.

FIGURE 1.9 / Annual White Male Employment Hours, by Education, 1975 to 1997



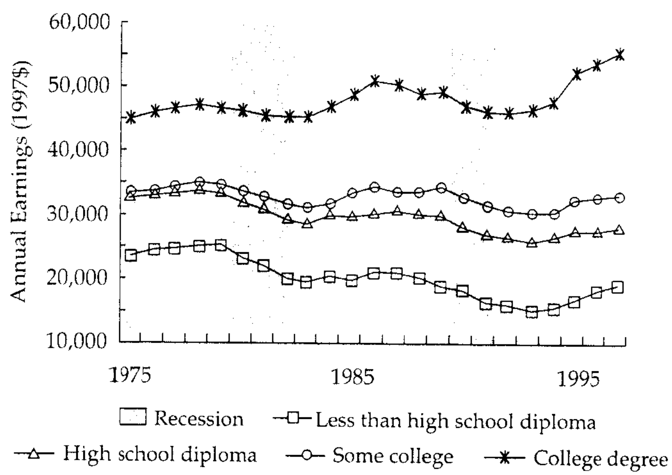
Source: Annual Demographic Files.

FIGURE 1.10 / Annual Nonwhite Male Employment Hours, by Education, 1975 to 1997



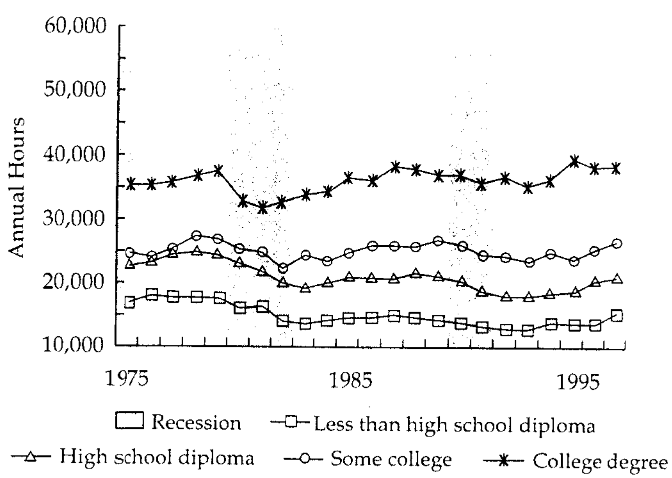
Source: Annual Demographic Files.

FIGURE 1.11 / Annual White Male Earnings (1997 Dollars), by Education, 1975 to 1997



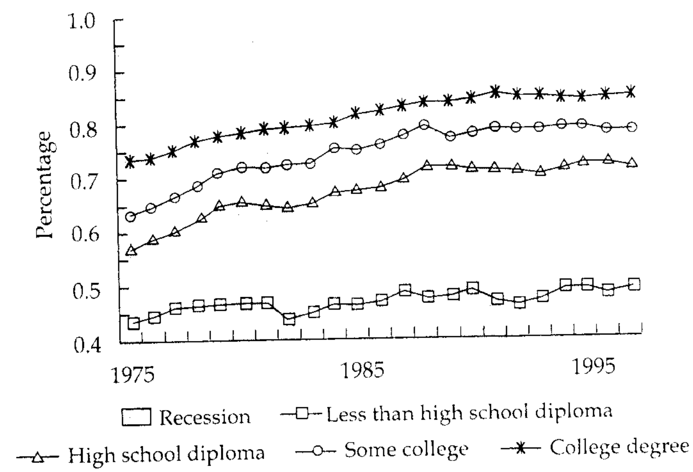
Source: Annual Demographic Files.

FIGURE 1.12 / Annual Nonwhite Male Earnings (1997 Dollars), by Education, 1975 to 1997



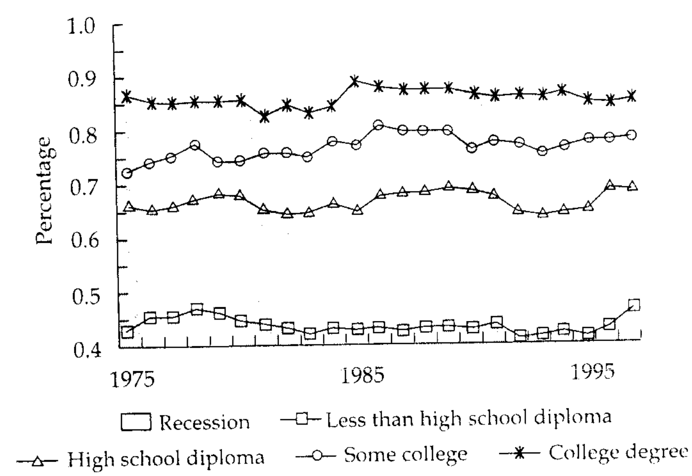
Source: Annual Demographic Files.

FIGURE 1.13 / Annual White Female Employment Outcomes, EPOP: Any Work, by Education, 1975 to 1997



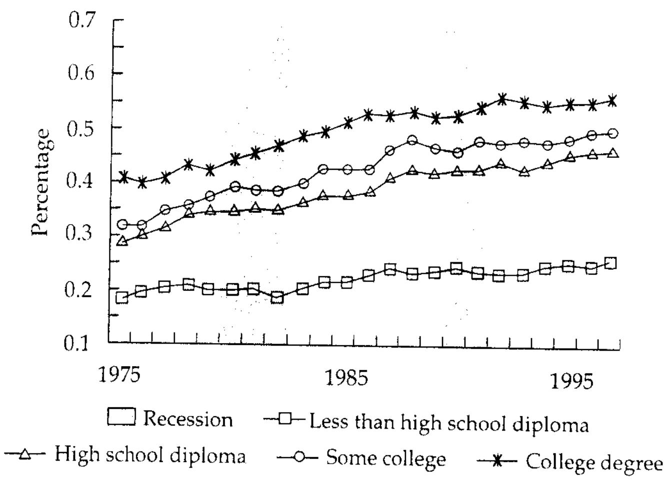
Source: Annual Demographic Files.

FIGURE 1.14 / Annual Nonwhite Female Employment Outcomes, EPOP: Any Work, by Education, 1975 to 1997



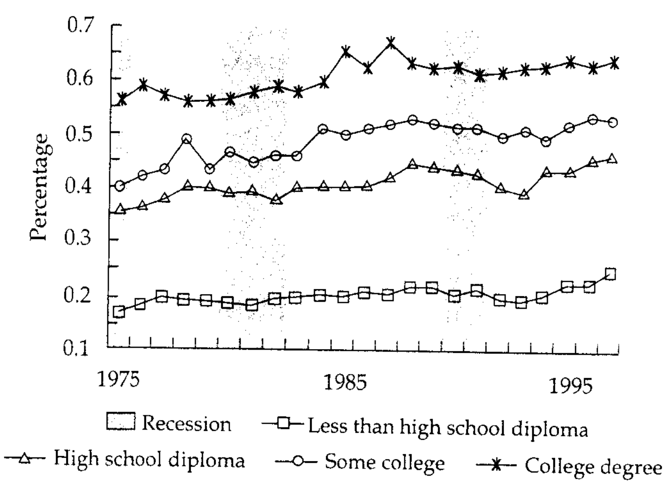
Source: Annual Demographic Files.

FIGURE 1.15 / Annual White Female Employment Outcomes, EPOP: FTYR, by Education, 1975 to 1997



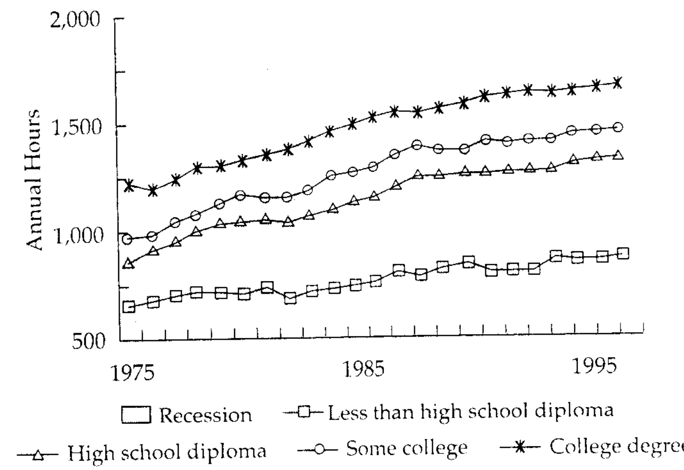
Source: Annual Demographic Files.

FIGURE 1.16 / Annual Nonwhite Female Employment Outcomes, EPOP: FTYR, by Education, 1975 to 1997



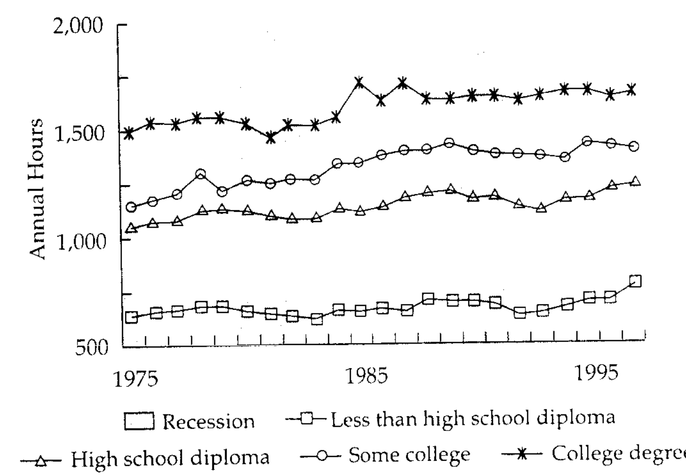
Source: Annual Demographic Files.

FIGURE 1.17 / Annual White Female Employment Hours, by Education, 1975 to 1997



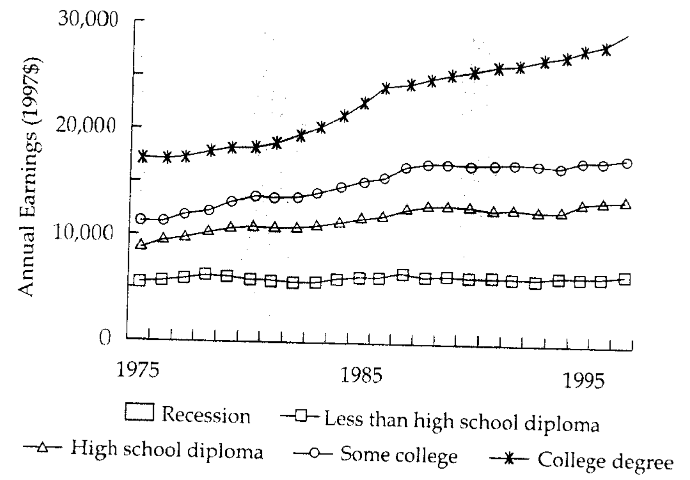
Source: Annual Demographic Files.

FIGURE 1.18 / Annual Nonwhite Female Employment Hours, by Education, 1975 to 1997



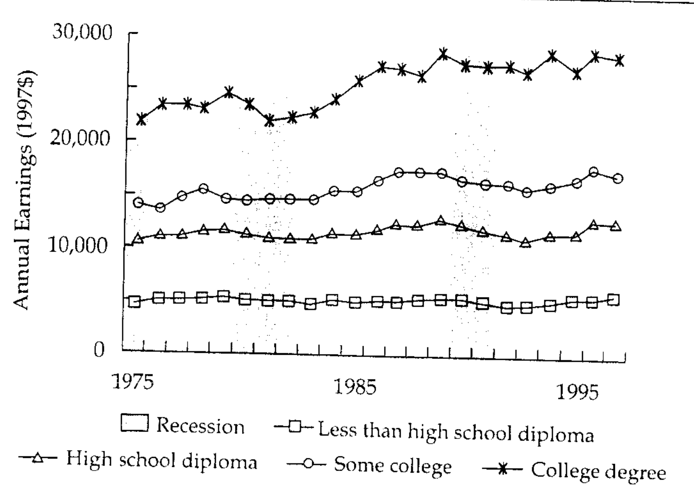
Source: Annual Demographic Files.

FIGURE 1.19 / Annual White Female Earnings (1997 Dollars), by Education, 1975 to 1997



Source: Annual Demographic Files.

FIGURE 1.20 / Annual Nonwhite Female Earnings (1997 Dollars), by Education, 1975 to 1997



Source: Annual Demographic Files.

logs, one could characterize the log of the mean labor market outcome for group j in MSA m in period t by the following equation:

$$\log(y_{jmt}) = \alpha_{0j} + \alpha_j t + \delta_t + \mu_m + \gamma_j \log(y_{mt}) + \upsilon_{jmt}$$

Here, the labor market outcome is specified to be a function of a fixed skill group effect (α_{0j}), a skill-group specific trend (α_j), a fixed time effect (δ_t), a fixed MSA effect (μ_m), a measure of the MSA cycle y_{mt}, and a random component γ. Note that the coefficient on y_{mt} varies with skill group; thus the effect of MSA fluctuations can differ across the groups. The key parameters are the υ_{jmt}.

Suppose the equation is differenced over some time period t for each MSA and skill group. Using the symbol Δ to represent the change in a variable, the equation becomes

$$\Delta\log(y_{jmt}) = \alpha_j + \lambda_t + \gamma_j \Delta\log(y_{mt}) + \epsilon_{jmt}$$

In the transformed equation, $\Delta\log(y_{jmt})$ is the change to the labor market outcome for group j in MSA m, between $t-1$ and t. The term $\Delta\log(y_{mt})$ represents the shock to a particular MSA in time t. Note that in this equation, the fixed MSA effect and the fixed group effect drop out.[9]

The problem with estimating this equation is finding an exogenous measure of the shock $\Delta\log(y_{mt})$. The approach used here is to treat the shock as unobserved and estimate each $\Delta\log(y_{mt})$ as a parameter. I therefore estimate the following equation:

$$\Delta\log(y_{jmt}) = \alpha_j + \gamma_j \beta_{mt} + \epsilon_{jmt} \qquad (1.1)$$

This is a very simple equation. The β_{mt} parameters capture the shock to MSA m in period t and are just coefficients on dummy variables for each MSA-time period. There are a total of $M \times T$ parameters for the shocks, where M is the total number of MSAs and T is the total number of time periods. Overall, there are $J \times M \times T$ observations where J is the total number of skill groups. The parameters for the shock can be estimated because of the multiple skill groups for each MSA and year. The model is identified by the assumption that the responsiveness across skill groups, γ_j, is constant across MSAs.[10]

The relative responsiveness across groups is captured by the parameters γ_j. The model can be extended to look for structural changes in the intercepts (skill group trends) and slopes (skill group responsiveness to cycles) over time. The approach is a simple way to allow for comparisons between multiple skill groups over multiple time periods.

The analysis uses many alterative individual and family outcomes to fully characterize the impact of cycles on different groups. Accordingly, equation 1.1 is estimated for each of the outcomes of interest. First, this estimation is done one equation at a time. In this estimation, the parameters capturing the skill group response to the shock (γ) have to be normalized to fix the scale of the estimated shock parameters (β). We choose a "reference" skill group and normalize the γ for that group to one. The parameters for the other skill groups are interpreted as the response relative to the response for the reference group. In addition, the intercept for the reference group is set to zero, so the intercepts for the other skill groups are interpreted as the average trend for group j relative to the trend for reference group.

This estimation does not take account of the fact that the MSA and time "shocks" (β_{mt}) enter each of the labor market outcome equations. Therefore, I also estimate the models by pooling the equations and constraining the value of β_{mt} to be equal across the equations. This "pooled" model has three advantages. First, only one normalization on the γ's is necessary across all the equations. We can therefore examine not only how the sensitivity to cycles varies across groups but also how it varies across different outcome variables. Second, there may be efficiency gains to accounting for the common parameters across the equations. Third, conceptually it is attractive to think of a single "shock" to an area, which is then filtered down to different outcomes (for example, hours, earnings, income) and different groups.[11]

Although the model in equation 1.1 is presented in logs, in practice I examine the models using both changes in logs and changes in levels. The change in the logs is attractive because of the interpretation as percentage changes in the variable. In practice, we do not know if the correct form for the model is in levels or logs. Because the mean levels of the outcomes vary substantially across the groups, the estimates of the γ's can be significantly biased toward finding greater responsiveness to cycles for less skilled groups if the model is misspecified.[12]

These regressions are estimated using both the ORG and ADF data. Skill groups are defined by education, race, and sex. There are a total of eight skill groups (2 sex $\times$ 2 race $\times$ 2 education). With the exception of average hourly earnings (which is averaged over workers only), all variables are constructed as means over the entire population (workers and nonworkers) in these cells, using the CPS sample weights. To increase cell sizes (which is important for investigating impacts on nonwhites), the data are grouped into two-year periods.

The variables used in the analysis include employment rates, hours worked, earnings, average hourly wage, head of household's earnings, spouse's earnings, transfer income, and other family income. In each case the cell means are constructed using the sample of individuals (as opposed to families) and their characteristics (for example, sex, education, race). Therefore, the entire analysis is based on individuals, even though some of the measures are "family"-based measures. I do this so that I can directly compare the results for individual and family outcomes. The alternative is to create cells using observations on families, using the head of household's characteristics to define the cell. This makes it difficult to connect the individual and family measures.[13]

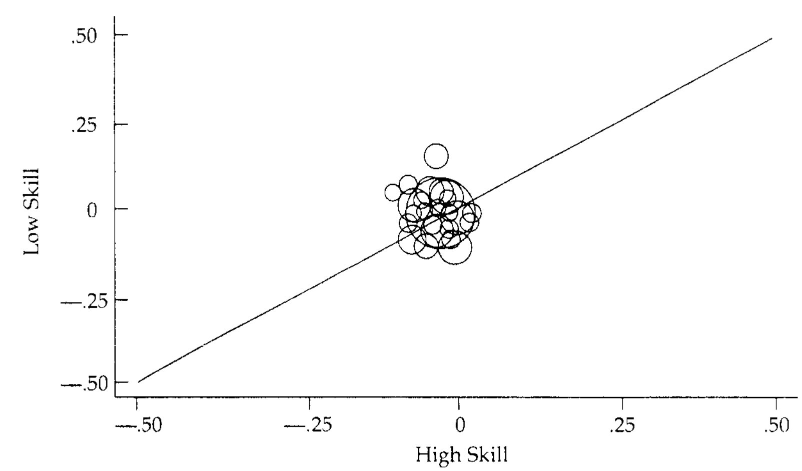
The two education groups are those with a high school education or less and those with more than a high school education. The choice of two education

groups (compared with the four groups used in the aggregate analysis) is made for two reasons. First, and most important, with increases in education levels, the group with less than a high school education is becoming more disadvantaged over time. This shows up quite dramatically in the simple trend graphs of figures 1.1 to 1.20. By choosing somewhat broader education categories, I hope to minimize the problems with making comparisons over time with a group whose composition is changing. The down side of this approach is that the "low" education group is not that low, and this will probably attenuate the differences between low- and high-skilled groups. Second, the use of four education groups leads to very thin cells, especially with nonwhites.

GRAPHICAL ANALYSIS OF DIFFERENCES ACROSS LOW- AND HIGH-SKILLED GROUPS

Figures 1.21 through 1.32 plot the change in a labor market outcome for a particular less skilled group [$\Delta\log(y_{jmt})$] against the change in the same labor market outcome for a high-skilled "reference group" [$\Delta\ln(y_{rmt})$]. This approach can generate simple comparisons between the sensitivity of employment, earnings, and income of less skilled and more skilled groups. The presentation here is limited to the ADF file.

FIGURE 1.21 / Change in Log Annual EPOP: Any Work, White Males, by Skill Level, 1977 to 1983

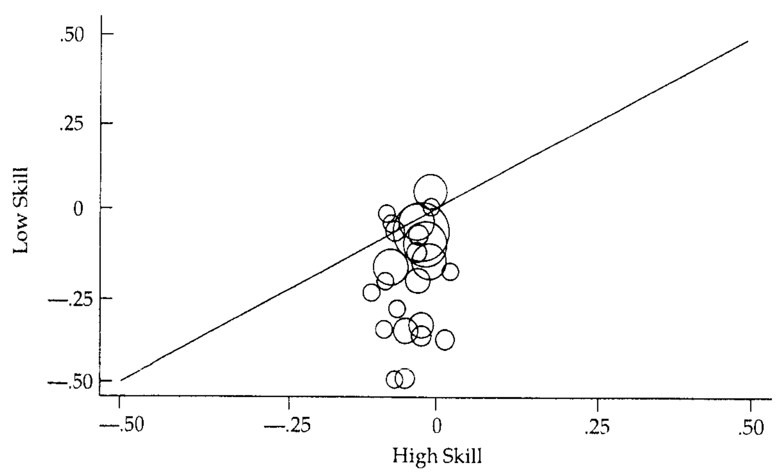


Source: Annual Demographic Files.

In particular, I look at changes between the trough and peak of a given cycle. These figures use the 1982 recession as the cycle, measured as the change from 1979 (the previous peak) to 1982 (the trough). The 1982 recession is chosen because it was the most severe recession in the period covered in the CPS data. The reference group for all figures is white men with high education levels (those with greater than a high school education), chosen because they appear to be the group with the least sensitivity to cycles. This approach is best applied to groups that are not experiencing significant trends over time. It can be difficult to extract the cycle from the trend in this simple analysis. Consequently, I present graphs only for men. The regression results, presented in the next section, provide estimates for all eight skill groups.[14]

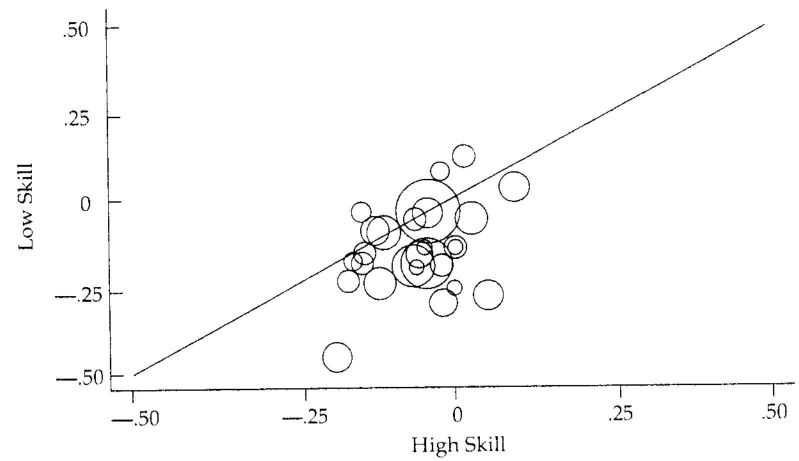
All the graphs have the same form. First, consider figure 1.21. Each point on the graph is for an MSA. On the y-axis is the change in the log of the EPOP: Any Work (for the previous year) for white men with a high school education or less (the low-skilled group). On the x-axis is the change in the log of the same EPOP measure for the reference or high-skilled group, defined as white men with more than a high school education. The figures differ only in the choice of low-skilled group and labor market outcome. Figure 1.22 compares the change in EPOP: Any Work for nonwhite men with a high school education or less to the reference group. Figures 1.23 and 1.24 present the same analysis for the EPOP: FTYR. The points on the graph are weighted to reflect the size of the MSA. The larger the circle, the larger the MSA.

FIGURE 1.22 / Change in Log Annual EPOP: Any Work, Nonwhite Males, by Skill Level, 1978 to 1983



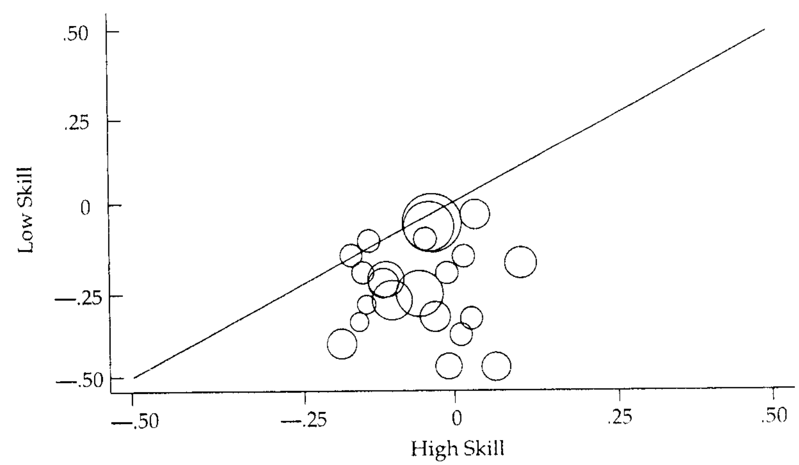
Source: Annual Demographic Files.

FIGURE 1.23 / Change in Log Annual EPOP: FTYR Work, White Males, by Skill Level, 1978 to 1983



Source: Annual Demographic Files.

FIGURE 1.24 / Change in Log Annual EPOP: FTYR Work, Nonwhite Males, by Skill Level, 1978 to 1983



Source: Annual Demographic Files.

TABLE 1.1 / Change in Male Employment as Share of Population in Selected MSAs, from 1979 to 1982 and from 1989 to 1992

Large Reduction		Small Reduction	
Change in the Log of Male EPOP: Any Work Between 1979 and 1982			
Detroit	−0.14	Denver	−0.05
Pittsburgh	−0.13	Washington DC	−0.03
Columbus, OH	−0.12	San Francisco	−0.03
Milwaukee	−0.11	New York	−0.02
Cleveland	−0.10	Boston	−0.01
Change in the Log of Male EPOP: Any Work Between 1989 and 1992			
New Orleans	−0.15	Miami	0.00
San Diego	−0.09	Kansas City	0.00
Boston	−0.08	Detroit	0.01
New York	−0.07	Cleveland	0.02
San Francisco	−0.07	Houston	0.02

Note: Author's tabulations of CPS Outgoing Rotation Group Data. *EPOP* is defined as the weighted number of men working last year over the weighted male population in the MSA. The sample includes all men who are between the ages of twenty-two and sixty-two. We exclude those working without pay, the self-employed, and those with weekly earnings of less than $67 in 1982 dollars. For more detail on sample selection, see text.

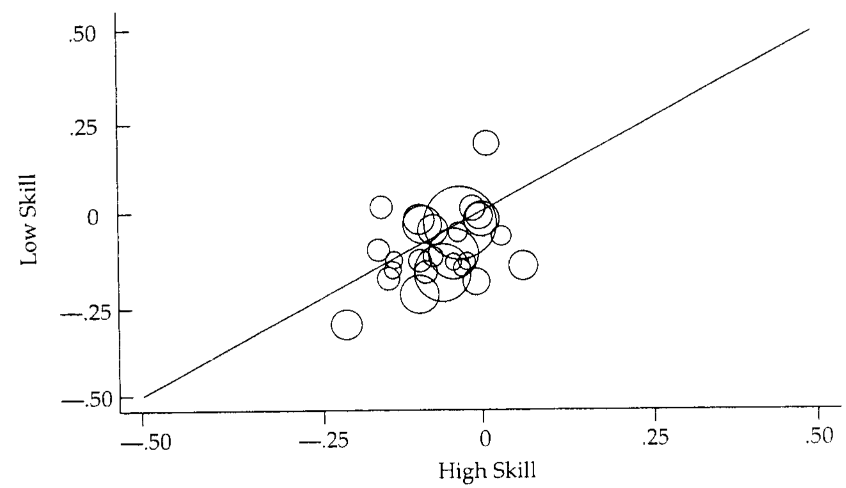
Each graph includes a 45-degree line to make the comparison between groups easier. If the points generally lie below this line, then the percentage change in the outcome for the less skilled group is greater (more negative) than the change in the outcome for the more skilled group. If the points are clustered on the line, then the responses are similar. A point above the 45-degree line means a larger response among the high-skilled group than among the low-skilled group.

One advantage of this approach is that it makes use of rich variation across labor markets in the United States. As an illustration of this, table 1.1 compares the outcomes across MSAs in the 1982 and 1992 recessions. In particular, I measure the change in the log of the ratio of male employment to population for any work (EPOP: Any Work) in the previous week, based on the ORG data for each MSA from 1979 to 1982 and from 1989 to 1992. For each of the two time periods, the table presents the MSAs with largest and smallest percentage changes over the period. The 1982 recession hit the industrial Midwest hardest. For example, Detroit, Pittsburgh, and Cleveland had reductions on the order of 10 to 15 percent, whereas San Francisco, New York, and Boston experienced reductions of only 1 to 3 percent. In the 1992 recession, on the other hand, reductions on the order of 7 to 10 percent were experienced in San Diego, Boston, and New York, and the effect in the industrial Midwest was relatively mild.

Returning to figures 1.21 to 1.24, several observations can be made. As can be seen from figure 1.21, white men with low education levels have fluctuations in annual employment rates that are fairly similar to those of white men with high education levels—that is, most of the observations are clustered on the 45-degree line. The same is not true for nonwhite men. Figure 1.22 suggests that nonwhite men were significantly more impacted by the negative shock in this period than the reference group. Note that almost all of the observations lie below the 45-degree line. In many cases the response for less skilled nonwhite men is many times larger than the change for the reference group. Using EPOP: FTYR, both white (figure 1.23) and nonwhite (figure 1.24) low-skilled men appear to be more negatively impacted by the 1982 recession than white high skilled men. Within the low-skilled group, nonwhites appear to be significantly more affected than whites. The difference between the races is particularly evident in the EPOP: Any Work data.

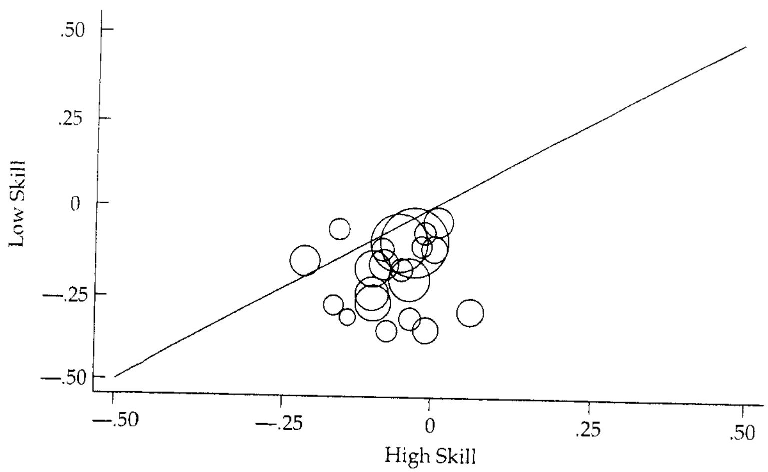
Figures 1.25 to 1.28 repeat the analysis and compare the change in the log of mean annual hours worked (figures 1.25 and 1.26) and mean annual earnings (figures 1.27 and 1.28) for low-skilled men relative to those of high-skilled men. Recall that annual earnings is averaged over both workers and nonworkers and thus reflects changes in employment, hours worked each week, and wages. As these figures illustrate, white and (especially) nonwhite low-skilled men show

FIGURE 1.25 / Change in Log of Mean Annual Employment Hours, White Males, 1978 to 1983



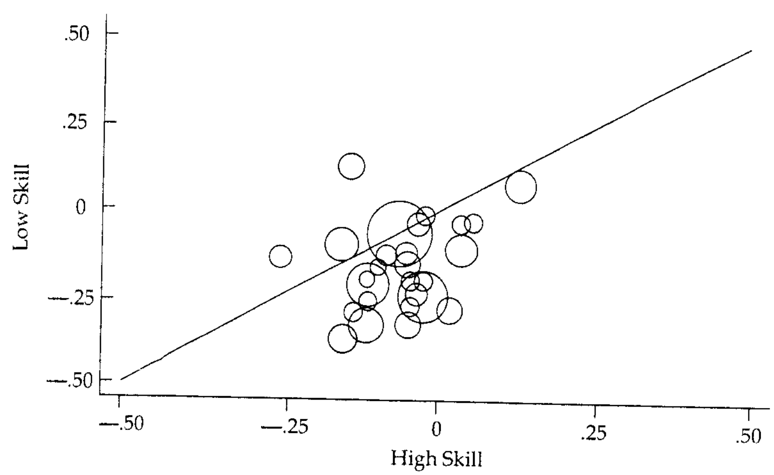
Source: Annual Demographic Files.

FIGURE 1.26 / Change in Log of Mean Annual Employment Hours, Nonwhite Males, 1978 to 1983



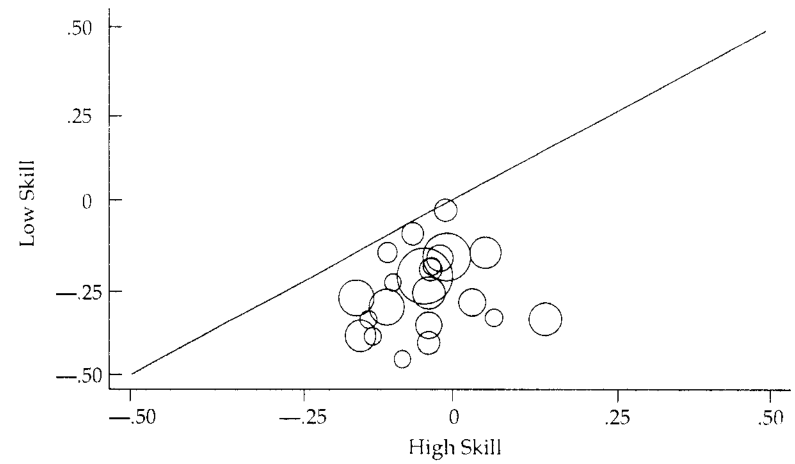
Source: Annual Demographic Files.

FIGURE 1.27 / Change in Log of Mean Annual Earnings (1997 Dollars), White Males, 1978 to 1983



Source: Annual Demographic Files.

FIGURE 1.28 / Change in Log of Mean Annual Earnings (1997 Dollars), Nonwhite Males, 1978 to 1983



Source: Annual Demographic Files.

larger reductions in hours and earnings than white highly educated men. These patterns are similar to those found with the EPOP: FTYR.

In figures not shown here, family income and family earnings also show greater responsiveness among low-skilled men. The differences between groups appear to be smaller than those found for annual earnings. This is likely to reflect the ongoing increases in employment and earnings among married women, the presence of secondary workers entering the labor market to replace the recession-induced lost earnings of the primary earner, or the countercyclical effect of government transfers for low-skilled groups.

REGRESSION RESULTS

The preliminary analysis above shows that low-skilled men were more impacted by the 1982 recession than high-skilled men. Within skill groups, nonwhites seem to be affected more adversely than whites. These results, though illustrative, are somewhat qualitative and may be sensitive to the presence of trends for skill groups. In addition, the results speak to one particular time period and do not take full advantage of the differences in the timing of cycles across areas. This section extends the analysis by providing estimates of the empirical model in equation 1.1 using the full time periods covered in the data. This approach uses year-to-year changes to take full advantage of the variation in the timing of the economic changes across areas.

The observations for the regressions are the cells defined by skill group, MSA, and time. There are six time periods and thirty-five MSAs in the ORG data and ten time periods and twenty-seven MSAs in the ADF data.[15] With eight skill groups, this yields a total of 1,680 observations in the ORG and 2,160 observations in the ADF. The reference group for all regressions is white men with high levels (more than twelve years) of education. All models are estimated using weighted nonlinear least squares, with weights constructed as the population count of the cell. The precision of the estimate of the dependent variable varies inversely with the size of the cell, and the weights will weight down the small cells. No cells are dropped from the analysis.

Results for Weekly Measures Using ORG Data

We begin by presenting estimates using the ORG data and estimate each labor market outcome equation separately, without accounting for common MSA shocks across the equations. The results for these "single equation" estimates are shown in table 1.2. Each column in the table corresponds to estimates for a different equation, and they differ only in the definition of the dependent variable. The table reports the parameter estimates for the γ's (relative impact of the shock across skill groups). All other parameters are suppressed from the table. Because the MSA-time shock, β_{mt}, is unobserved and estimated as a parameter, some normalization must be made to fix the scale. In these initial regressions, in which each equation is estimated separately, we normalize the parameter for the impact of the cycle on the reference group (highly educated white men) to 1($\gamma_1 = 1$). The parameters for the other skill groups are interpreted as the response relative to the response for high-skilled white men.

The ORG data collects information on work status for the previous week. Table 1.2 shows three measures. EPOP: Any Work is the employment-to-population ratio for those who worked at all in the previous week. EPOP: FT is the employment-to-population ratio for those who worked full time (at least thirty-five hours) in the previous week. Lastly, mean real weekly earnings are used. Columns 1 and 2 present estimates where the EPOP is specified as changes in logs. Columns 3 and 4 estimate these models using changes in levels of EPOP. Column 5 presents estimates for changes in log weekly earnings. The statistical significance of the parameters are determined by testing whether the coefficient is significantly different than 1 (that is, when there are no differences across groups).

As can be seen in columns 1 and 2 of table 1.2, there are sizable and statistically significant differences in the responses to cycles across skill groups. The fluctuation in the EPOP: Any Work value is 1.4 times greater for low-skilled white men and almost four times greater for low-skilled nonwhite men than the response for high-skilled white men. The results for EPOP: FT are generally

TABLE 1.2 / Regression Results Using CPS Outgoing Rotation Group

Skill Group	(1) EPOP: Any Work (Log)	(2) EPOP: FT (Log)	(3) EPOP: Any Work (Level)	(4) EPOP: FT (Level)	(5) Mean Weekly Earnings (Log)
High education, white men	1	1	1	1	1
High education, nonwhite men	1.28	1.73	1.30	1.34	1.46
	(0.47)	(0.51)	(0.28)	(0.25)	(0.24)
High education, white women	0.56*	0.90	0.57**	0.52**	0.85
	(0.19)	(0.23)	(0.11)	(0.10)	(0.11)
High education, nonwhite women	1.21	1.61	1.09	1.10	1.01
	(0.44)	(0.47)	(0.26)	(0.23)	(0.21)
Low education, white men	1.36	1.45	1.29	1.35*	1.22
	(0.28)	(0.31)	(0.17)	(0.16)	(0.14)
Low education, nonwhite men	3.88**	3.51**	2.95**	2.77**	1.99**
	(0.69)	(0.66)	(0.35)	(0.30)	(0.22)
Low education, white women	1.53	2.38**	0.82	0.63**	0.94
	(0.29)	(0.44)	(0.13)	(0.11)	(0.12)
Low education, nonwhite women	5.42**	4.49**	1.44*	1.12	1.49**
	(0.91)	(0.81)	(0.22)	(0.18)	(0.18)
n	1,680	1,680	1,680	1,680	1,680
r^2	0.39	0.38	0.40	0.39	0.47

Note: High education is defined as more than twelve years of schooling, low education as twelve years or less. Each column is a separate regression, in which the dependent variable is the change in the log or level of the labor market outcome evaluated at the mean for the cell defined by MSA, year, and skill group. The parameter estimates reported in the table are the coefficients on the MSA time shock for each skill group. The regression also includes intercepts for each skill group, capturing average growth rates in the labor market outcome for each skill group. The regression is estimated using nonlinear weighted least squares, using the cell's population as the weight. The sample is from the CPS ORG data and covers 1979 through 1992. The data are grouped into two-year periods to increase cell sizes. All labor market outcome variables correspond to the week preceding the interview. For details on sample selection and variable construction, see the text. Standard errors are in parentheses. A ** [*] indicates the parameter is significantly different from 1 at the 1 percent [5 percent] level.

similar to the EPOP: Any Work results. The results for women show that the employment and earnings of high-skilled white women exhibit significantly less cyclical fluctuation than those of any other group, including high-skilled white men. That may be a result of the differences in the industries and occupations that men and women are working in. Alternatively, it may also reflect the fact that women may act as "added workers" who enter the labor force in recessions to make up for lost earnings of the principal earner. Low-skilled nonwhite women are the most severely impacted by cycles: the results in columns 1 and 2 indicate that, for a given shock, their employment rates fluctuate five times as much as high-skill white men.

These large parameters for less educated women are attenuated somewhat when the models are estimated in levels instead of logs. These estimates are shown in columns 3 and 4. As discussed earlier, if the level model is correct, then the low mean employment rate among these groups (EPOP: FTYR rates for less educated women are 0.42 for whites and 0.37 for nonwhites) will lead to larger parameters for those groups. Some of these impacts are significant. The most extreme example is the coefficient for low-skilled nonwhite women, which, in the EPOP: Any Work equation, is reduced to 1.44 from 5.42. For the remainder of the chapter, I rely on the more conservative level equations for EPOP regressions.[16]

The results in column 5 show that the differences across skill groups are smaller when real weekly earnings are used. In a given period, the percentage change in real weekly earnings of white low-skilled men is 1.2 times as large, and the change for nonwhite low-skilled men is about twice as large, as that experienced by white high-skilled men. This may reflect greater rigidities in wages for low-skilled workers. For example, if equilibrium wage rates are driven down in recessions, to the extent that the minimum wage creates a wage floor for low-skilled workers, the reduction in earnings for low-wage workers will be smaller, relative to that for high-skilled workers, than their reduction in employment. Alternatively, this may reflect the change in the composition of workers over the business cycle and how this compares across skill groups. This point has been discussed in the empirical literature on cyclical behavior of real wages (for example, see the recent paper by Gary Solon, Robert Barsky, and Jonathan Parker [1994]).

The estimates from pooling the three equations for the ORG data are presented in table 1.3. The top portion of the table presents the γ parameters, along with their standard errors, for each skill group. Note that only one normalization is needed to identify the model. Here we normalize the coefficient for high-skilled white men to one in the EPOP: Any Work equation. All the coefficients are now relative to the effect on EPOP: Any Work for high-skilled white men. Looking across the columns one can see how the fluctuation of the various measures compare with one another. Overall mean weekly earnings vary the most across the cycle, followed by the EPOP: FT and then the EPOP: Any Work. For example, among less educated nonwhite women, the impact of a shock on mean earnings is about three times as large as the impact on employment rates. In order to better compare the results to the "single equation" estimates in table 1.2, the bottom portion of table 1.3 presents the estimates normalized, as they are in table 1.2. That is, in each column the parameters are divided by the estimated γ for high-skilled white men. The statistical significance refers to testing whether these renormalized parameters (in the bottom portion of the table) are significantly different from one.

Comparing the estimates in the bottom portion of table 1.3 with the estimates in table 1.2, very similar patterns emerge. Nonwhites and less educated workers experience fluctuations larger than those of other groups. Even within education groups, nonwhites fare worse than whites, possibly reflecting their more disadvantaged status. White women in both high- and low-education groups experi-

TABLE 1.3 / Pooled Regression Results, Using CPS Outgoing Rotation Group Data

Coefficient	(1) EPOP: Any Work (Level)	(2) EPOP: FT (Level)	(3) Mean Weekly Earnings (Log)
MSA shock, by skill group			
High education, white men	1	1.31 (0.20)	2.96 (0.42)
High education, nonwhite men	1.63 (0.34)	1.88 (0.38)	4.36 (0.80)
High education, white women	0.60 (0.14)	0.72 (0.15)	2.47 (0.39)
High education, nonwhite women	1.26 (0.30)	1.11 (0.32)	3.18 (0.68)
Low education, white men	1.37 (0.21)	1.64 (0.24)	3.79 (0.52)
Low education, nonwhite men	2.92 (0.39)	3.22 (0.43)	6.34 (0.85)
Low education, white women	0.80 (0.15)	0.82 (0.16)	2.82 (0.41)
Low education, nonwhite women	1.52 (0.25)	1.53 (0.26)	4.56 (0.66)
MSA shock relative to high-skilled white men			
High education, white men	1	1	1
High education, nonwhite men	1.63	1.44	1.47*
High education, white women	0.60**	0.55**	0.83
High education, nonwhite women	1.26	0.84	1.07
Low education, white men	1.37	1.25	1.28*
Low education, nonwhite men	2.92**	2.46**	2.14**
Low education, white women	0.80	0.63**	0.95
Low education, nonwhite women	1.52*	1.20	1.54**
n	1,680	1,680	1,680
r^2	0.33	0.33	0.46

Note: High education is defined as more than twelve years of schooling, low education as twelve years or less. Each column presents estimates of an equation in which the dependent variable is the change in the log or level of the labor market outcome evaluated at the mean for the cell defined by MSA, year, and skill group. The equations are estimated jointly with the MSA shocks common to each equation. The parameter estimates reported in the table are the coefficients on the MSA time shock for each skill group. The regression also includes intercepts for each skill group capturing average growth rates in the labor market outcome for each skill group. The regression is estimated using nonlinear weighted least squares, using the cell's population as the weight. The sample is from the CPS ORG data and covers 1979 to 1992. The data are grouped into two-year periods to increase cell sizes. All labor market outcome variables correspond to the week preceding the interview. For details on sample selection and variable construction, see the text. Standard errors are in parentheses. A ** [*] indicates the parameter is significantly different from 1 at the 1 percent [5 percent] level.

ence less cyclical variation than all other groups. Nonwhite less educated women exhibit more fluctuation, though less than their male counterparts.

All remaining regression models are estimated using the pooled model. This does not significantly change the qualitative results.

Results for Annual Measures Using ADF Data

The ADF data allows for two important extensions to the analysis of the ORG data. First, I can examine more comprehensive measures of employment corresponding to activities over the past year, thereby getting at changes in the duration and intensity of employment. Second, I can examine family measures in addition to individual measures. The family is the key economic unit and, for policy purposes, an analysis limited to individuals would be incomplete. An analysis of families may differ from one of individuals in that families contain varying numbers of potential workers with differences in propensities for intrafamily substitution of labor market activity.

The results for the ADF are presented in two tables. Table 1.4 presents the results for individual labor market outcomes (EPOP: FTYR, annual hours, annual earnings, and hourly wages), and table 1.5 presents the results for the family outcomes (one's own earnings, head of household's earnings, spouse's earnings, other family income, and family earnings and income). All results are based on estimates of the pooled model, and the tables are identical in format to table 1.3. The top portion of the table presents the γ parameters, along with their standard errors for each skill group. The single normalization in the pooled model is that the coefficient for high-skilled white men is normalized to one in the EPOP: FTYR equation. The bottom portion of the table presents estimates with parameters normalized to one for the reference group in each equation, thus allowing for easy comparisons across skill groups.

Looking at the top portion of table 1.4, we can see that the magnitude of changes in annual earnings exceeds that for annual hours or employment rates. This is not surprising, as annual earnings capture changes in employment and hours worked. Average hourly wages (averaged over workers) are, along with the other measures, procyclical. This is consistent with the more recent real-wage studies. The bottom portion of table 1.4 provides estimates of the relative responsiveness across groups. The responsiveness to a shock is higher for those with lower education levels and nonwhites and lower for highly educated white women. The results are particularly striking when white and nonwhite low-skilled groups are compared. For both men and women, nonwhites are significantly more impacted by business cycles than whites. For example, the equation for mean annual hours worked shows that white low-skilled men are 1.3 times more affected than high-skilled white men, whereas nonwhite low-skilled men are more than 3.0 times more affected.[17]

The results for earnings show smaller differences across groups than the employment measures. This is also found in the ORG data. Again, this may reflect

TABLE 1.4 / Pooled Regression Results, Using Individual Measures from Annual Demographic File Data

Coefficient	(1) EPOP: FTYR (Level)	(2) Annual Hours (Log)	(3) Annual Earnings (Log)	(4) Hourly Wage (Log)
MSA shock, by skill group				
High education, white men	1	1.21 (0.28)	3.24 (0.56)	2.83 (0.54)
High education, nonwhite men	2.26 (0.50)	2.76 (0.67)	5.03 (1.03)	2.70 (0.94)
High education, white women	0.02 (0.26)	0.11 (0.21)	1.10 (0.33)	1.02 (0.37)
High education, nonwhite women	0.96 (0.36)	1.38 (0.51)	2.52 (0.74)	0.77 (0.76)
Low education, white men	1.38 (0.26)	1.60 (0.33)	3.38 (0.59)	2.06 (0.49)
Low education, non white men	2.82 (0.49)	3.97 (0.70)	6.15 (1.05)	2.10 (0.69)
Low education, white women	0.58 (0.17)	1.48 (0.30)	2.86 (0.51)	1.88 (0.44)
Low education, nonwhite women	2.04 (0.39)	4.69 (0.78)	7.66 (1.23)	4.01 (0.82)
MSA shock relative to high-skilled white men				
High education, white men	1	1	1	1
High education, nonwhite men	2.26**	2.28*	1.55*	0.95
High education, white women	0.02**	0.09**	0.34**	0.36**
High education, nonwhite women	0.96	1.14	0.78	0.27**
Low education, white men	1.38	1.32	1.04	0.72
Low education, nonwhite men	2.82**	3.28**	1.90**	0.74
Low education, white women	0.58**	1.22	0.88	0.66
Low education, nonwhite women	2.04**	3.88**	2.36**	1.42
n	2,160	2,160	2,160	2,160
r^2	0.16	0.17	0.29	0.09

Note: High education is defined as more than twelve years of schooling, low education as twelve years or less. Each column presents estimates of an equation in which the dependent variable is the change in the log or level of the labor market outcome evaluated at the mean for the cell defined by MSA, year, and skill group. The equations are estimated jointly with the MSA shocks common to each equation. The parameter estimates reported in the table are the coefficients on the MSA time shock for each skill group. The regression also includes intercepts for each skill group capturing average growth rates in the labor market outcome for each skill group. The regression is estimated using nonlinear weighted least squares, using the cell's population as the weight. The sample is from the CPS ADF and covers 1975 to 1996. The data are grouped into two-year periods to increase cell sizes. All labor market outcome variables correspond to the year prior to the interview. For details on sample selection and variable construction, see the text. Standard errors are in parentheses. A ** [*] indicates the parameter is significantly different from 1 at the 1 percent [5 percent] level.

differences across groups in the types of workers who experience unemployment (or reductions in hours) or differences in wage rigidities between high- and low-skilled workers. This can be examined more directly by looking at the estimates for the equation for average hourly wages (table 1.4, column 4). The adjusted parameters in the bottom half of the table are mostly less than one, which implies that the cyclical fluctuations in the wages of high-skilled white men are larger than those found for nonwhites, women, and less skilled workers. This dampens the differences across groups in annual earnings.

The estimates for the pooled models of family outcomes are presented in table 1.5. Family income is disaggregated into head of household's earnings, spouse's earnings, and other family income as well as total family earnings and income.[18] Other family income includes transfers, capital income, and earnings of other family members. Individual annual earnings are also included, to provide some reference to the earlier tables on individual outcomes.[19] We can see from the top portion of table 1.5 that the earnings of household heads is less variable than individual earnings. Comparing head's earnings (column 1) with family earnings (column 5), we can also see that in the most disadvantaged groups (nonwhite or less educated) there is little evidence of labor substitution among family members as family earnings fluctuate more than the head of the household's earnings. Among more skilled families (highly educated whites), family earnings fluctuate less than the head of the household's earnings. That can be seen more directly in the small coefficient on spouse's earnings for highly educated white groups. Transfers tend to reduce the size of the shock, which can be seen by comparing the estimates for family earnings and family income.

By examining the bottom portion of table 1.5, with parameters normalized to one for the reference group in each equation, one can compare how the different family measures impact groups differentially. In general, these figures match the general pattern of findings thus far. Those with lower education levels and nonwhites show greater responsiveness to cycles than the high-skilled and white groups. The most striking results exist for spouse's earnings, with much greater fluctuations for poorly educated nonwhite, and to a lesser extent white, individuals. This is in part a function of lower marriage rates in these groups but may also reflect differences in the propensity for women to be "added workers."

Including nonlabor income has a significant impact on the differences in cyclical responses across skill groups. In general, the gaps between groups narrow when total family income is considered (table 1.5, column 6). This pattern was also found by Blank (1989) and Blank and Card (1993). The reduction in volatility is especially evident for nonwhite less skilled individuals. For example, family earnings of less educated nonwhite women fluctuate three times as much as those of the reference group, but their family income fluctuates only 2.5 times as much as the income of the reference group. This is a 15 percent reduction. In analyses not shown here, the reduction in the impact of cycles on low-skilled families comes from receipt of countercyclical government transfers such as welfare and unemployment assistance.[20]

Discussion

The results from the analysis of the ORG and ADF data show consistently that, relative to high-skilled white men, nonwhites and those with low education levels

TABLE 1.5 / Pooled Regression Results Using Family Measures from CPS Annual Demographic File (ADF)

Coefficient	(1) Own Earnings (Log)	(2) Head of Household's Earnings (Log)	(3) Spouse's Earnings (Log)	(4) Other Family Income (Log)	(5) Total Family Earnings (Log)	(6) Total Family Income (Log)
MSA shock, by skill group						
High education, white men	1	0.94 (0.14)	0.54 (0.19)	1.00 (0.23)	0.81 (0.12)	0.81 (0.11)
High education, nonwhite men	1.35 (0.28)	1.26 (0.28)	1.77 (0.49)	0.59 (0.53)	1.32 (0.24)	1.17 (0.22)
High education, white women	0.34 (0.10)	0.86 (0.13)	0.23 (0.18)	1.23 (0.24)	0.72 (0.11)	0.75 (0.10)
High education, nonwhite women	0.84 (0.24)	0.97 (0.24)	1.85 (0.45)	1.44 (0.49)	1.33 (0.23)	1.25 (0.21)
Low education, white men	0.94 (0.15)	0.92 (0.14)	0.92 (0.22)	0.57 (0.24)	0.92 (0.13)	0.82 (0.12)
Low education, nonwhite men	1.50 (0.23)	1.35 (0.22)	2.51 (0.41)	1.36 (0.40)	1.74 (0.23)	1.48 (0.20)
Low education, white women	0.83 (0.13)	0.87 (0.13)	1.22 (0.22)	0.87 (0.23)	0.98 (0.13)	0.91 (0.12)
Low education, nonwhite women	2.18 (0.27)	1.88 (0.25)	3.91 (0.49)	1.50 (0.38)	2.49 (0.28)	1.99 (0.22)

(Table continues on p. 58.)

TABLE 1.5 / *Continued*

Coefficient	(1) Own Earnings (Log)	(2) Head of House-hold's Earnings (Log)	(3) Spouse's Earnings (Log)	(4) Other Family Income (Log)	(5) Total Family Earnings (Log)	(6) Total Family Income (Log)
MSA shock relative to high-skilled white men						
High education, white men	1	1	1	1	1	1
High education, nonwhite men	1.35	1.34	3.28*	0.59	1.63*	1.44
High education, white women	0.34**	0.91	0.43	1.23	0.88	0.93
High education, nonwhite women	0.84	1.03	3.42**	1.44	1.64*	1.54
Low education, white men	0.94	0.98	1.70	0.57	1.14	1.01
Low education, nonwhite men	1.50**	1.44*	4.64**	1.36	2.15**	1.83**
Low education, white women	0.83	0.93	2.26**	0.87	1.21	1.12
Low education, nonwhite women	2.18**	2.00**	7.24**	1.50	3.07**	2.46**
n	2,160	2,160	2,160	2,160	2,160	2,160
r^2	0.22	0.31	0.31	0.19	0.13	0.03

Note: High education is defined as more than twelve years of schooling, low education as twelve years or less. Each column presents estimates of an equation in which the dependent variable is the change in the log of the labor market outcome evaluated at the mean for the cell defined by MSA, year, and skill group. The equations are estimated jointly with the MSA shocks common to each equation. The parameter estimates reported in the table are the coefficients on the MSA time shock for each skill group. The regression also includes intercepts for each skill group capturing average growth rates in the labor market outcome for each skill group. The regression is estimated using nonlinear weighted least squares, using the cell's population as the weight. The sample is from the CPS ADF and covers 1975 to 1996. The data are grouped into two-year periods to increase cell sizes. All labor market outcome variables correspond to the year prior to the interview. For details on sample selection and variable construction, see the text. Standard errors are in parentheses. A ** [*] indicates the parameter is significantly different from 1 at the 1 percent [5 percent] level.

have greater fluctuation in cycles. Highly educated white women are the only group that consistently shows lower responsiveness in comparison with the reference group. The reasons for this are not immediately apparent. Some groups may be less tied to the labor market and may rely on government transfers or the labor earnings of other family members. Another hypothesis is that the jobs held by individuals in these groups vary in ways that would lead to expected differences in employment fluctuations. It is fairly well established that workers in construction and manufacturing, laborers, younger workers, and those in nonunion employment experience more employment fluctuations, whereas jobs in the public and so-called FIRE (finance, insurance, and real estate) sectors, managerial jobs, and union jobs experience less employment fluctuations.

These possibilities are explored in table 1.6, which presents means of some of these variables for each of the skill groups used in the analysis. The patterns in the table match in many ways the patterns found in the regressions. For example, highly educated white women, the least responsive group, are least likely to be in construction and manufacturing and are much more likely to be in retail trade, FIRE, and public sector jobs. They are also more likely to be in managerial and professional jobs and less likely to be operators or laborers. Less educated nonwhite men, a group with relatively high cyclical responsiveness, are the most represented in construction, manufacturing, and laborer positions and have the lowest union participation rates. This simple analysis gives mixed evidence for less skilled nonwhite women, who were found in the regression analysis to be the most responsive group. On the one hand, they have the highest rates of nonattachment to the labor market and the highest welfare reliance, which would suggest smaller cyclical fluctuations. On the other hand, those who are employed are more likely to be in manufacturing and in laborer positions, which would lead to higher rates of cyclical fluctuation.

Extensions

All the regression results hold the skill group responsiveness to be fixed over the entire time period. The two major business cycles covered in the data, the 1982 and 1992 recessions, differed a great deal in terms of which industries and occupations were most impacted. Henry Farber (1997), using data from the Displaced Worker Surveys, shows that in the early 1990s displacement rates among higher-educated workers increased relative to those with lower education levels.

Figures 1.29 to 1.32 present changes between 1989 and 1992 in the log of mean annual hours and earnings for low-skilled men compared with mean annual hours and earnings for the reference group, high-skilled white men. Comparing these figures with figures 1.25 to 1.28, the comparable figures for the period from 1979 to 1982, several important differences emerge. First, in the 1992 recession,

(Text continues on p. 65.)

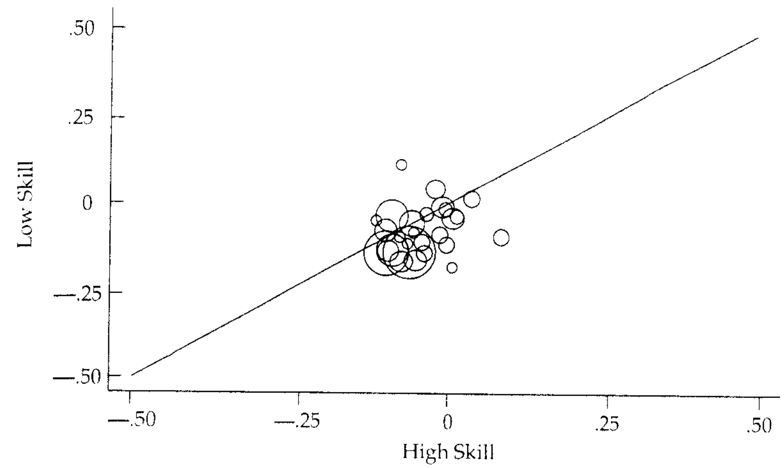
TABLE 1.6 / Means of Selected Characteristics by Skill Group, 1998 CPS Annual Demographic File

	High Education				Low Education			
	Men		Women		Men		Women	
Characteristics	White	Nonwhite	White	Nonwhite	White	Nonwhite	White	Nonwhite
Age	43.7	38.7	43.3	37.9	43.3	37.3	47.9	40.7
Family income								
Head of household's earnings (%)	66	63	60	60	59	59	54	54
Spouse's earnings (%)	17	17	19	17	17	14	16	11
Welfare income (%)	0	0	0	2	0	2	2	7
Other transfers (%)	7	9	9	11	13	11	16	15
EPOP: Any Work	0.93	0.89	0.82	0.82	0.86	0.80	0.67	0.58
EPOP: FTYR	0.77	0.82	0.53	0.58	0.68	0.61	0.42	0.37
Union membership (%)[a]	42	30	40	35	38	27	40	30
Industrial Composition[a]								
Construction (%)	6.1	5.2	1.2	0.6	15.2	12.9	1.3	0.8
Manufacturing (%)	19.0	16.4	7.7	7.3	23.2	22.2	13.2	18.2
Retail trade (%)	12.6	13.6	13.7	14.1	19.6	20.6	28.9	22.5
Finance, insurance, and real estate (%)	6.7	5.3	8.8	9.5	2.3	2.4	7.8	4.9
Public administration (%)	7.3	9.7	5.1	7.3	2.9	2.0	3.4	3.2
Occupational composition[a]								
Managerial and professional (%)	43.8	30.6	46.7	35.8	7.8	3.9	11.5	6.5
Technical, sales, and administrative (%)	23.5	24.2	38.7	44.5	15.6	11.9	48.0	34.2
Service occupations (%)	22.2	28.0	12.0	15.1	45.4	48.5	29.1	40.1
Operators and laborers (%)	10.4	17.2	2.7	4.6	31.3	35.6	11.5	19.3
N	15,207	2,937	17,398	4,020	15,855	7,378	19,048	8,452

Source: Annual Demographic Files 1998.

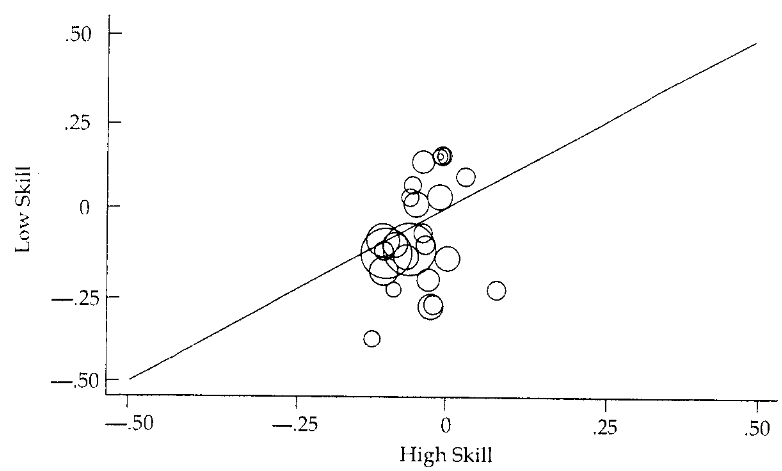
[a]Means apply to the sample of persons working as of the survey week. High education is defined as more than twelve years of schooling, low education as twelve years or less.

FIGURE 1.29 / Change in Log of Mean Annual Employment Hours, White Males, by Skill Level, 1988 to 1993



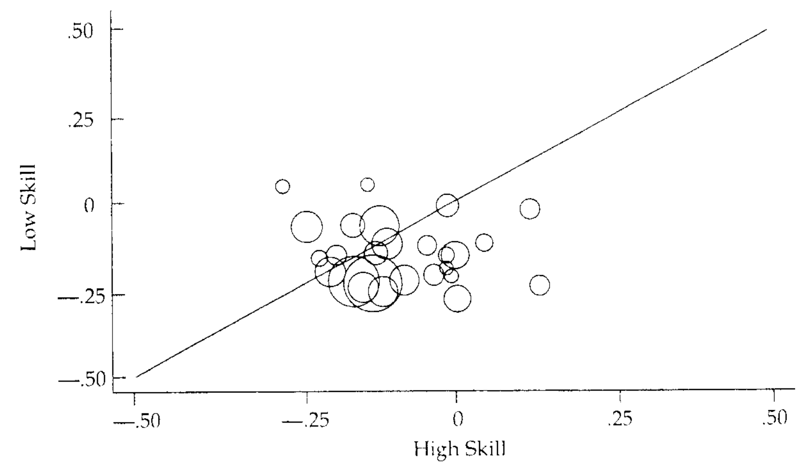
Source: Annual Demographic Files.

FIGURE 1.30 / Change in Log of Mean Annual Employment Hours, Nonwhite Males, by Skill Level, 1988 to 1993



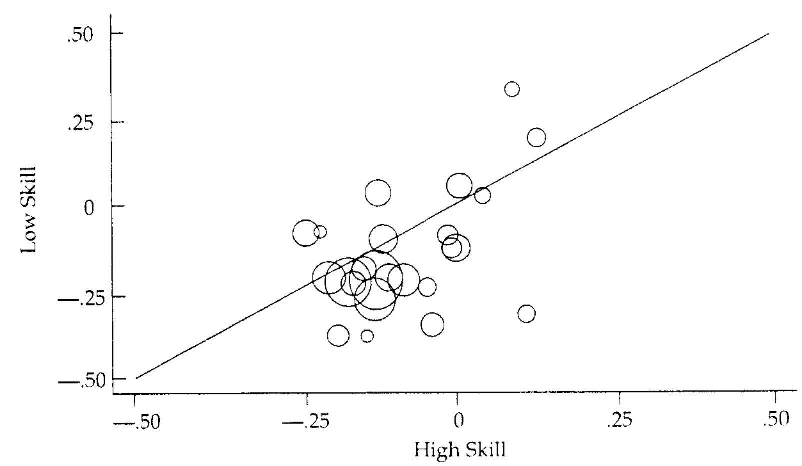
Source: Annual Demographic Files.

FIGURE 1.31 / Change in Log of Mean Annual Earnings, White Males, by Skill Level, 1988 to 1993



Source: Annual Demographic Files.

FIGURE 1.32 / Change in Log of Mean Annual Earnings, Nonwhite Males, by Skill Level, 1988 to 1993



Source: Annual Demographic Files.

TABLE 1.7 / Pooled Regression Results Using Family Measures from CPS Annual Demographic File (ADF) Allowing for Changes in Parameters over Time

Coefficient	(1) Own Annual Earnings (Log)	(2) Total Family Earnings (Log)	(3) Total Family Income (Log)
MSA shock, by skill group: all years			
High education, white men	1	0.80 (0.18)	0.76 (0.16)
High education, nonwhite men	2.02 (0.51)**	1.90 (0.45)**	1.70 (0.40)**
High education, white women	0.85 (0.20)	0.77 (0.18)	0.76 (0.17)
High education, nonwhite women	1.61 (0.44)	1.69 (0.40)*	1.67 (0.38)**
Low education, white men	1.25 (0.25)	1.10 (0.21)	0.93 (0.18)
Low education, nonwhite men	2.14 (0.42)**	2.38 (0.42)**	1.97 (0.36)**
Low education, white women	1.06 (0.21)	1.12 (0.21)	0.94 (0.18)
Low education, nonwhite women	2.39 (0.43)**	2.60 (0.44)**	2.09 (0.36)**
MSA shock by skill group: post-1988			
High education, white men	0	−0.03 (0.21)	−0.04 (0.19)
		0.00	*0.00*
High education, nonwhite men	−0.96 (0.56)	−1.15 (0.48)**	−1.09 (0.43)**
		−1.12	*−1.05*
High education, white women	−0.69 (0.22)**	−0.09 (0.20)	−0.12 (0.19)
		−0.06	*−0.08*
High education, nonwhite women	−1.28 (0.48)**	−0.83 (0.44)	−0.92 (0.40)*
		−0.80	*−0.88*
Low education, white men	−0.30 (0.29)	−0.28 (0.25)	−0.23 (0.21)
		−0.24	*−0.19*
Low education, nonwhite men	−0.81 (0.46)	−1.25 (0.45)**	−1.12 (0.38)**
		−1.22	*−1.08*
Low education, white women	−0.49 (0.24)	−0.24 (0.24)	−0.13 (0.21)
		−0.21	*−0.09*
Low education, nonwhite women	−0.58 (0.49)	−0.48 (0.50)	−0.46 (0.41)
		−0.44	*−0.42*
n	2,160	2,160	2,160
r^2	0.30	0.37	0.34

Note: High education is defined as more than twelve years of schooling, low education as twelve years or less. Each column presents estimates of an equation in which the dependent variable is the change in the log of the labor market outcome evaluated at the mean for the cell defined by MSA, year, and skill group. The equations are estimated jointly with the MSA shocks common to each equation. This specification allows the effects of MSA shocks to differ over the period. The top panel presents estimates corresponding to the full period and the bottom presents estimates for the post-1988 period. The numbers in italics in the bottom panel represent the changes in the skill group coefficient in the post-1988 period relative to the change for white men with high education. Standard errors are in parentheses. In the top panel, ** [*] indicates the parameter is significantly different from 1 at the 1 percent [5 percent] level. In the bottom panel, ** [*] indicates that the parameter is significantly different from 0 at the 1 percent [5 percent] level.

the effect of the downturn on the low-skilled group was much closer to the effect on the high-skilled group. The MSA observations are clustered much closer to the 45-degree line (the line of equal effects). Second, this feature is found for both whites and nonwhites, although more so for whites.

This is explored further in table 1.7. The table reports results for individual earnings, family earnings, and family income and uses the same pooled model as used above. The only difference is the addition of a set of skill-group-specific cycle parameters that apply to the post-1988 period, based on the equation

$$\Delta\log(y_{jmt}) = \alpha_j + (\gamma_j + \gamma_{1j} \times Post88_t)\beta_{mt} + \epsilon_{jmt}$$

The coefficient γ_{1j} represents the change in responsiveness between the early and later periods. The year 1988 is chosen as the break year because it is the end of the recovery from the 1982 recession. The top portion of the table presents the cyclical responsiveness parameters for the overall period (γ_j), and the bottom portion presents the parameters for the difference between the pre- and post-1988 periods (γ_{1j}). There are two normalizations needed to estimate in the pooled model. The coefficient for high-skilled white men in the overall period is normalized to one. In addition, the parameter capturing differences between the pre- and post-1988 periods is set to zero for this group. In the bottom portion of the table, I also renormalize all of the coefficients by subtracting the value for the reference group. These renormalized coefficients are in italics. The tests of statistical significance are whether the top panel figures are different from one and the bottom panel figures are different from zero.

These results fairly consistently show that the relative responsiveness of cycles by the low-skilled groups relative to high-skilled white men has declined over this time period. That is, all coefficients in the bottom of the table are negative. This is consistent with Farber (1997).[21] The largest reductions occur for the most disadvantaged groups. For example, referring to the results for annual earnings, the relative responsiveness of low-skilled nonwhite men fell by −0.81. The relative responsiveness of family income fell by −1.08 for nonwhite men with low-level education skills, from an overall level of 2.09. The table indicates that many of these reductions are statistically significantly different from zero. The reductions for low-skilled nonwhite women were not as large. Overall, these results show that the 1992 recession was much more skill-group neutral than the 1982 recession.[22]

Several sensitivity tests were performed for these models. In all cases, specific parameters changed somewhat, but the qualitative results were the same. Changing the definition of race from white non-Hispanic and black Hispanic to white and black led to larger racial differences. Hispanic men appear to be more like whites in that they have relatively high employment rates and relatively less cyclical variation. They also have relatively low education levels, so they are a sizable fraction of the low-education nonwhite group. Expanding the skill groups by considering four education groups led to larger differences between education levels. However, the precision of the estimates declined somewhat, and many of the differences were not statistically significant.[23]

CONCLUSION

The results of this study consistently show that those with lower education levels—nonwhites and low-skilled nonwhite women—are more impacted by business cycles than high-skilled white men. The analysis of family income shows that there is evidence that government transfers are effective at narrowing the differences in impacts across demographic groups.

The results suggest that a 1 percentage point increase in the employment rate of highly educated white men is accompanied by a 2.92 percentage point increase in the employment rate for less educated nonwhite men and a 1.5 percentage point increase in the employment rate for less educated nonwhite women. Total annual family earnings of less educated nonwhite men are expected to fluctuate twice as much as the fluctuation for highly educated white men (and for comparable groups of women an increase by a factor of three is expected). Total family income is somewhat more neutral across groups, with relative responses of nonwhite less educated men and women of 1.8 and 2.5, respectively.

The results also suggest that the 1992 recession and subsequent recovery had differential impacts compared with the 1982 recession and recovery. In particular, in the later period, the sensitivity to cyclical variation of less skilled groups was still greater than that of high-skilled groups, but the differences narrowed. This may be accounted for in part by the fact that the less skilled groups had somewhat low employment rates going into the 1992 recession. It also may reflect differences in the industries that were affected in the 1992 versus the 1982 recessions. Identifying the sources of this change is important and future work should address this issue.

Welfare reform is generating an inflow of less skilled workers in the labor market. This study highlights the importance of thinking ahead toward the next recession, and its impact on less skilled workers. The effects could be very adverse if these relatively new labor market entrants have exhausted their AFDC time limits and have incomplete coverage in the unemployment insurance program. This suggests policies aimed at making sure that unemployment insurance reaches these new entrants and extending time limits in the case of adverse state labor market conditions.

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NOTES

1. The data are available through 1995. However, 1994 and 1995 data were dropped because the variables identifying MSAs appear to be incorrect.
2. Before the 1976 survey year, weeks worked in the previous year was a categorical variable, and usual hours worked each week in the previous year was not available. Hours worked in the previous week is available but is an inaccurate measure of hours worked in the previous year.
3. Top coded means that you do not see the true value if it is larger that the top code (for example, if income = $1,000,000 it may be recorded as 100,000).
4. Considerable effort was made to ensure that the MSAs were comparable units over time. With each decennial census, the Bureau of Labor Statistics redefines MSAs. This usually amounts to adding a new MSA or splitting up an existing MSA in growing areas but could in principle lead to the elimination of MSAs in declining areas. In this analysis, split-off MSAs were combined, making the series comparable over time. However, some MSAs can also be redefined by adding areas to an existing MSA. I cannot address these changes. Fortunately, changes in MSA definitions occur only once in a decade, following the decennial census. The results are not sensitive to dropping the "seam years."
5. The CPS data are not designed to be used as an MSA sample. This can lead to significant sampling errors in the MSA and skill group cells. This problem is addressed by using weights in the analysis and by making every effort to have large cell sizes (by choosing the largest MSAs, combining two-year periods, and using relatively few skill groups).
6. Beginning in the 1992 survey, the CPS records the degree earned rather than the years of schooling completed. As is evident in the figure, this decreases the percentage of people with a high school diploma and increases the percentage of those with greater than a high school diploma.
7. An alternative approach is to define skill groups by their relative position in the earnings or wage distribution (that is, defining the disadvantaged as those in the lowest twentieth percentile). Because this analysis is not limited to workers, skill groups would have to be assigned using predicted wages. This approach may be examined in future work.
8. Figures 1.11 and 1.12 show that average earnings for college-educated white men increased substantially starting in 1995. This is a result of the change in the top-coding in the CPS. The results are not sensitive to dropping these years.
9. Furthermore, the fixed time effect and random-error term have been transformed to be the first difference of the original terms.

10. In practice I have eight skill groups, which turns out to be more than enough to estimate the parameters precisely. Note that the time effects λ_t are subsumed in the MSA- and time-specific time effects. The MSA shock parameters may not be consistent because with each additional period T, M additional parameters must be estimated (M is the number of MSAs).

11. Note that even though the shocks are equivalent across equations, the parameters cannot be "added up" across equations. That is because the dependent variable is the change log of the mean within a cell. Specifically, even if $y = y_1 \times y_2$, the log of the mean of y does not equal the log of the mean of y_1 times the log of the mean of y_2.

12. To see this point, assume that the true model is linear in the changes in levels. Then (dropping the MSA subscript for simplicity) equation 1.1 becomes $\Delta y_{jt} = a_j + g_j \Delta y_t + e_{jt}$. Let y_j denote the mean level of y_{jt} and y denote the mean level of y_t. Then the equation can be transformed to be $\Delta y_{jt}/y_j = (a_j/y_j) + [g_j \times (y/y_j)(\Delta y_t/y)] + e_{jt}/y_j$. Using an approximation for the log, this implies that $\Delta \log(y_{jt}) = \alpha_j + \gamma_j \Delta \log(y_t) + e_{jt}$, where $\gamma_j = g_j \times (y/y_j)$. So if group j has a low mean of the variable y, then the estimated γ_j will be greater than one even if (the true) g_j equals one. I thank Joe Altonji for pointing this out and Dave Card for helping to formalize it.

13. In an earlier version of this chapter, following Lynn Karoly (1992) and others I created adjusted family measures by dividing family earnings and inome by the family's poverty threshold. This adjusts for family size using the implicit equivalency scales, which account for age structure and economies of scale. Neither of these adjustments changed fundamentally the results from what is reported here.

14. One could in principle de-trend the data for women before plotting the data. Another possibility is to control for the trend by using high-skilled women as the reference group for women. Both of these approaches were implemented, but, in part to keep this section brief, the discussion of women is postponed until the regression results can be examined.

    As mentioned previously, the CPS data is combined into two-year periods to increase the number of observations in each cell. Still, some of the nonwhite skill groups have very few observations in some of the smaller MSAs. For the graphs, a cell is only included if there are at least 20 observations a cell. On average, this drops about five MSAs on the nonwhite graphs.

15. For the analyses of both data sets, the data are combined into two-year periods. The ORG data cover the periods from 1979 and 1980 through 1991 and 1992. The year 1993 was dropped because there was no second year to pool it with. The ADF data cover the period from 1975 and 1980 through 1991 and 1992, with 1997 dropped for the same reason. After differencing the data, there are six time periods in the ORG (from 1981 to 1992) and ten time periods in the ADF (from 1977 to 1996). By combining two years, the resulting first differences span on average a two year change.

16. The results for changes in levels of earnings generated similar results to changes in logs. For the remainder of this chapter, changes in logs are used for everything except the EPOP ratios.

17. I also estimated models with EPOP: Any Work. Those estimates show large but no statistically significant differences across groups.

18. For the purposes of this analysis, the head of the household is defined as either the head of the CPS family or subfamily, if the person is part of a family, or, if an unrelated person or secondary individual, the individual himself or herself. In married couples, the man is assigned to be the head. If there is no spouse in the family, a value of zero is used for spouse's earnings.

19. Note that the parameter estimates for individual earnings in table 1.5 do not match exactly the parameters in table 1.4. That is because a different set of equations were estimated, which generates somewhat different estimated MSA shocks. The coefficients are quite comparable.

20. I explored estimating models with more disaggregated measures of nonlabor income, such as public assistance. In practice, few families receive these transfers, and most of the parameters were not statistically significant.

21. Timothy Bartik (1996) finds no evidence of changes over time. Bartik's sample, however, ends in 1987, which is likely to have been before the changes started taking place.

22. I, of course, cannot conclude that this is evidence that future recessions will be more skill-group neutral. There are only two recessions in the data, and these results could be driven by something specific to the 1992 recession that is unlikely to be replicated.

23. Other specification tests included limiting the MSA sample to the fifteen to twenty largest MSAs, dropping "seam" years, when the MSA boundaries change, and dropping the 1995 and 1996 ADF years, when the top-code on earnings increased significantly. The results were not sensitive to changing the MSA sample or dropping the seam years. Dropping the most recent ADF years did lead to modest increases in the relative responsiveness of the earnings and income of low-skilled groups. Looking back at figures 1.11 and 1.12, the earnings of highly educated white men increased significantly with the increase in top-codes in 1995. Given that this occurred in the middle of a recovery, dropping those years leads to larger differences in the cyclical variation of skill groups.

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