The Labor Market Effects of Welfare Reform

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Abstract

A major goal of the 1996 federal welfare reform was to increase the labor market participation of welfare recipients. If the reform is successful, this increase in labor supply may exert downward pressure on wages and reduce the employment rate of other low–skilled workers in the labor market. The magnitude of these labor market effects is uncertain because there have not been large changes in eligibility for federal welfare programs from which to draw inferences.

This study analyses the 1991 elimination of the General Assistance program in Michigan, which may provide useful evidence on the effect of the 1996 federal reform. In all, about 82,000 able–bodied adults lost benefits. Comparisons with other states indicate that employment in Michigan increased by two to four percentage points among high school dropouts, which corresponds to 25 to 50 percent of the original GA caseload. There is little evidence of wage or employment declines.

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1 Introduction

The 1996 reform of the federal welfare system was meant to encourage recipients to leave welfare and enter the workforce. To accomplish this goal, time–limitations have been placed on individuals' receipt of benefits and state governments are required to meet federal targets for moving welfare recipients into the workforce. State governments have also been given increased flexibility in the design and implementation of programs in order to meet these goals. If the reform is successful, the increased labor supply of former recipients may lead to downward pressure on wages or decreased employment of other low–skilled workers in the labor market.[1] The magnitudes of these effects are uncertain because there have not been large changes in eligibility for benefits or in the incentives facing welfare recipients in the past. Analyses of closely related changes in the labor market and welfare programs are necessary to better inform the current debate.

This study analyses an earlier welfare reform, the elimination of the General Assistance program in Michigan in October 1991, that may provide useful evidence on the effect of the 1996 federal reform. Cash benefits for able–bodied adults without children were terminated, leaving about 100,000 people – two percent of the state labor force – to turn to the labor market, their families, or other sources for income.[2] The impact of increased labor force participation by former GA recipients is identified by comparing changes in employment rates and hourly wages in Michigan with changes in two sets of comparison states. The first comparison group is composed of Michigan's nearest neighbors, Indiana, Ohio, and Wisconsin. The second group includes these three states plus Missouri, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Virginia, and West Virginia. These states represent alternative counterfactual changes in outcomes that would have occurred in Michigan had the General Assistance program not been eliminated there.[3]

An important difficulty for analyses of the labor market effects of the 1996 federal welfare reform is predicting what would have happened to low–wage labor markets in the absence of the reform. Though individual states are given vastly increased autonomy in the design of welfare programs, inter–state variation in the rate of exit from welfare will be the result of

[1]See Bartik (2000) for a recent survey of this issue.

[2]Studies that examine other aspects of the elimination of the GA program in Michigan include Danziger and Kossoudji (1995), Bound, Kossoudji and Ricart-Moes (1998), and Danziger, Carlson and Henly (2001).

[3]Economic links between Michigan and the comparison states may lead the labor market effects to be spread throughout all of the states. This complicating factor is not directly studied, though I return to it below.

differences in local economic conditions, state policies, and other aspects of labor markets in each state. It may be very difficult to credibly identify the causal role of welfare reform on labor market outcomes. (Indeed, a series of recent studies collected in Danziger, ed (1999) reach different conclusions on the magnitude of the effect of federal welfare reform and state waivers on the decline in AFDC caseloads.) In contrast, a unique feature of this study is the use of people in other states as a counterfactual estimate for how labor markets in Michigan would have evolved had the General Assistance program not been eliminated.

Approximately 82,000 able–bodied adults lost all benefits when Michigan eliminated its program.[4] A survey by Danziger and Kossoudji (1995) indicates that in the second year after benefits were eliminated about 59% of former GA recipients had cash earnings from either formal or casual employment.[5] Some former recipients may have also worked while on GA, while others may have worked only sporadically after the elimination of the program. If 25% of the 82,000 former recipients entered the labor market, it would represent an increase of 0.5% in the total state labor force and an increase of 4% among high school dropouts. This increase is large enough that it could have noticeable affects on the employment and earnings of other low–educated workers.

The section that follows describes the General Assistance program in Michigan. This is followed in Section 3 by a standard model of labor supply and demand that can be used to forecast the effect of the GA program elimination on the low–skilled labor market in Michigan. An important problem in applying such a model is the lack of a consensus in the literature on the magnitude of labor supply and demand elasticities. This makes credible prediction from a theoretical model difficult and underscores the value in empirically evaluating the market adjustments in Michigan.

The data, described in Section 4, come from the 1989 through 1993 monthly Current Population Survey. The basic econometric specification is a standard quasi–experimental, "treatment– and control–group" model in which the change in employment and hourly wages two years before and two years after the elimination of the GA program are compared to the changes in outcomes in the comparison states over the same time period. Since this

[4]This figure comes from Shapiro *et al* (1991).

[5]In the summer of 1993, Danziger and Kossoudji surveyed 426 former General Assistance recipients from Wayne (Detroit), Genesee (Flint), Saginaw, Eaton, and Osceola counties. They were only able to locate about one third of the sample to be drawn from Wayne county and about half of the sample in the other four counties. If the least healthy, least mobile, and thus least likely to work are more likely to have remained in the same residence, their survey will likely understate the employment rate of former GA recipients.

research design relies on the difference in outcomes between Michigan and the comparison states, it is vitally important to control for other shocks that may also influence labor market outcomes. To this end, Section 5 introduces a series of more complex models that attempt to control in various ways for any changes in labor market conditions in Michigan relative to the comparison states. The first extension adds controls for the unemployment rate among college–educated men, a measure of the state of the business cycle. The next series of models allow for unobserved shocks that differentially affect people in different states and times and who have different characteristics.

The results show that employment among people in Michigan without a high school degree increased by two to four percentage points, corresponding to 25 to 50 percent of the original GA caseload. The point estimates below indicate there was no change in hourly earnings. The wage effects are not precisely estimated, however, so moderate declines in wages and employment among low–skilled workers who were not on GA cannot be definitely ruled out.

2 The General Assistance Program in Michigan

General Assistance refers to state, county, or locally–financed welfare programs designed to provide cash payments to poor individuals who do not qualify for the main federally–financed income support programs, such as Temporary Assistance for Needy Families (TANF), Supplemental Security Income (SSI), or Unemployment Insurance (UI). During the period studied here, TANF had not yet been established and the primary welfare program for poor families was Aid to Families with Dependent Children (AFDC), which provided cash benefits primarily to single–parent families, although limited payments were also provided to two–parent families through the AFDC–Unemployed Parent program. Unemployment Insurance benefits are only available to those who previously held a qualifying job for a minimum length of time, and can only be drawn for up to 26 weeks. Finally, SSI provides benefits to low–income people over the age of sixty–five or who are disabled. Thus, GA programs generally serve non–elderly single adults, childless couples, and families who do not qualify for AFDC or the Unemployed Parent program; people who do not meet the work history requirement for UI benefits or exhaust their UI benefits; and disabled people who await or do not qualify for SSI benefits.

According to a 1992 survey, twenty–one states and the District of Columbia had a General

Assistance program with uniform state–wide rules in the early 1990s.[6] Ten additional states did not operate a GA program in the early 1990s, but required each county or locally to do so. The remaining nineteen states did not have any state–wide program or requirements, though individual counties within these states were free to operate programs.

Prior to its elimination in 1991, Michigan's GA program was run through the state's Department of Social Services. The monthly benefit was calculated in a manner similar to AFDC benefits: eligibility was limited to people with income and assets below certain thresholds that varied by county and household size. Like AFDC benefits, additional labor earnings were taxed by the system, with a dollar–for–dollar reduction in GA benefits for each increase in earnings.

Possibly because General Assistance programs vary substantially across and within states, they have not received nearly as much scholarly attention as the major federal anti–poverty programs. However, the program in Michigan was large, serving nearly half as many families as did the AFDC program in the state. The average monthly Michigan GA caseload in 1990 was 97,860, with an average of 1.3 people per case. The AFDC average monthly caseload in Michigan was 217,949, with an average of three people per case. The size of typical cash payments in the two programs were also similar. The average monthly Michigan GA grant per case in 1990 was $237.55, or about $6.14 per person per day. By comparison, the average AFDC family received $464.05 per month, or $5.16 per person per day.[7] General Assistance participants also receive medical benefits and, in most cases, food stamps.

The three largest comparison states in this study – Ohio, New York and Pennsylvania – had General Assistance programs with similar eligibility requirements and which served about the same number of people (relative to the state population) as did the program in Michigan.[8] The remaining comparison states also had GA programs, though there was some variation in the eligibility requirements and benefit levels. For example, in Massachusetts, Missouri and Virginia benefits were not available to adults without children. West Virginia provided short–term benefits to individuals under emergency circumstances to meet food, utilities, or medical expenses.

Figure 1 plots the average annual GA caseload in Michigan from 1979 until the elimination

[6] See Nichols, Dunlap and Barkan (1992).

[7] Figures are from Department of Social Services, State of Michigan (1990). The AFDC figures refers to both Family Groups and Unemployed Parent participants.

[8] See Nichols et al. (1992).

of the program in 1991 along with the unemployment rate among people without a high school degree from 1979 to 2000. The caseload increased substantially during the recession of the early 1980s, but then declined along with the unemployment rate during the second half of the decade. Caseload increases tended to lag behind increases in the unemployment rate, which is likely a result of people enrolling in GA after their unemployment benefits expired. The close connection between the unemployment rate and the caseload indicates that recipients had a connection to the labor market and, therefore, it is reasonable to expect that the elimination of the program affected their labor supply decisions.

As a response to fiscal pressures in the early 1990s, many state governments began to cut spending on social welfare programs in general and on General Assistance in particular.[9] The elimination of the GA program in Michigan was the most dramatic of all the early welfare reforms in terms of the number of people affected and the amount of benefits lost. On October 1, 1991 able–bodied adults without children lost all benefits. Families with dependent children were allowed to receive benefits under the new State Family Assistance program. Approximately 9,700 families were thought to be eligible for this program, though actual participation was about half that. Adults who had been disabled for at least ninety days and had not qualified for SSI were placed in the new State Disability Assistance program. The average monthly caseload in this program in 1992 was 8,253. For most of these people SDA benefits were provided as interim assistance until SSI benefits were approved. In sum, then, about 82,000 people – or 84 percent of the original caseload – lost all benefits as a result of the October, 1991 reforms.

3 How Large of an Effect Would Be Expected?

A standard approach to modeling the labor market impacts of the Michigan GA reform is to posit supply and demand functions for low–skilled labor, and treat the GA reform as an exogenous increase in the supply of labor. The employment and wage effects depend on the elasticities of labor supply and demand. The expected percent change in wages is given by

$$\%\Delta\text{Wages} = \frac{-1}{\epsilon - \eta} \times \%\Delta\text{Labor force} \tag{1}$$

[9] For a summary of such policy changes at the state level see Shapiro et al. (1991) and Lav et al. (1993).

where $\eta < 0$ is the elasticity of labor demand, ϵ is the elasticity of labor supply, and %ΔLabor force is the increase in the low–skilled labor force attributable to the elimination of GA.[10] Some workers will choose not to work at the new, lower wage rate. This change in employment among workers who were already in the labor market prior to the GA reform is given by

$$\%\Delta\text{Employment} = \frac{-\epsilon}{\epsilon - \eta} \times \%\Delta\text{Labor force} \tag{2}$$

Finally, the net change in employment among new labor market entrants and those who were already in the labor force is

$$\%\Delta\text{Net Employment} = \frac{-\eta}{\epsilon - \eta} \times \%\Delta\text{Labor force} \tag{3}$$

The net change in employment will be smaller than the increase in the labor force as long as ϵ is positive. Since it is impossible to identify former GA recipients from other low–skilled workers in the data, only the net change in total employment is empirically identifiable.

Equations 1 through 3 can be used to forecast the effect of the elimination of the Michigan GA program on the change in wages and employment. To do this, three questions have to be answered. First, what is the relevant labor market? Second, what is the size of the increase in the labor force? And third, what are the magnitudes of the elasticities? Even though close to half of the GA recipients in Michigan completed high school, it is likely that their skills were closer to high school dropouts in the general population. Thus, increased labor market participation by former GA recipients will have its strongest effect on the average outcomes of high school dropouts and a very limited effect (if any) on the larger group of better educated workers in Michigan. If one–quarter of the people who lost benefits, about 20,000 people, entered the labor market, the portion of the Michigan labor force without a high school degree would increase by four percent.

Elasticity estimates from research outside of the area of welfare and welfare reform can be used to estimate the change in employment and wages that would result from this increase in the labor force, as previous analysts have done in forecasting the effects of the 1996 federal welfare reform.[11] The difficulty in drawing credible inferences from this type of analysis is

[10] These formulas are found by specifying a labor market equilibrium of $D(w) = GA + S(w)$, where $D(w)$ is labor demand, $S(w)$ is labor supply, and w is the wage rate. GA is the number of new labor market entrants, here assumed to be independent of the wage rate. Rearranging the total derivative of this condition leads to equations 1 through 3. This simple model of the labor market assumes that the increase in the labor force is small relative to the size of the market, and ignores differences in skills across workers and any general equilibrium effects of welfare reform on workers' income.

[11] See, for example, Mishel and Schmitt (1995) and Bernstein (1997).

that labor supply and demand elasticities for very low–skilled workers (and single parents in the case of federal welfare reform) may not be the same as those estimated for workers in general. For example, although most studies tend to find that labor supply among all workers is not very responsive to wages, Juhn, Murphy and Topel (1991) provide evidence that this may not be true among very low–skilled workers.

There is even deeper disagreement over the magnitude of the elasticity of labor demand. For example, closely related to the labor market effects of welfare reform is how labor markets respond to the influx of new, largely unskilled, immigrants. Most recent studies tend to find that immigrant inflows to specific U.S. cities had very small effects on the earnings of native–born workers.[12] Though small employment declines are found, these results suggest that labor demand may be quite elastic. The elasticity of labor demand also influences the employment effect of increases in the minimum wage. Although a range estimates exist in the literature, most studies find relatively modest effects of minimum wages on employment, which points to a relatively inelastic demand for labor.[13] This lack of guidance about the relevant elasticities makes it very difficult to draw clear inferences from past work about wage and employment changes in the aftermath of welfare reform, and underscores the value of examining the impacts of the Michigan GA reform.

In the context of the effect of wage subsidies for low–wage workers, Katz's (1996) "best guess" are elasticities of labor demand and supply of -0.5 and 0.4. In this case, a four percent increase in the labor force would lead to a 4.4 percent decline in wages and a 1.8 percent decrease in employment among high school dropouts (who were not on GA) in Michigan. Total employment (including the former GA recipients) would increase by 2.2 percent. In this scenario, for each 100 new entrants to the labor market, there are only 55 new jobs and wages decline significantly.

These predicted changes in wages and employment are, however, quite sensitive to the assumed elasticities. For example, if the elasticity of labor demand is assumed to equal to -3 instead of -0.5, while the elasticity of labor supply remains 0.4, then wages would decline by only 1.2 percent; employment among those already in the labor market would decrease by only 0.5 percent; and total employment would rise by 3.5 percent. In contrast to the first scenario, 88 percent of the increase in employment represents new jobs and wage declines

[12]See, for example, the survey by Borjas (1994), as well as Borjas, Freeman and Katz (1992), Card (2001), and Schoeni (1997).

[13]See Card and Krueger (1995) and Neumark and Wascher (1996).

are quite modest. Thus, depending on whether one believes the elasticity of demand for low–skilled labor is small in absolute value ($\eta = -.05$) or large ($\eta = -3.0$), the elimination of the GA program in Michigan would be expected to have a fairly large or fairly small impact on the low–skilled labor market.

4 Data and a Descriptive Comparison of Michigan and the Comparison States

To study the elimination of the Michigan GA program, this paper uses employment data for individuals in the twelve monthly Current Population Survey samples in each year from 1989 to 1993, and wage data that were collected from one–quarter of the sample in each month (individuals in the so–called "outgoing rotation groups"). Thus, up to eight observations per person are available for employment outcomes and up to two observations for earnings. The data include civilians aged 16 to 54. The self–employed, individuals with hourly earnings below $2 per hour (in 1995 dollars), and those with missing data are dropped from the sample. Employment is measured by an indicator for whether the respondent was employed during the survey week. Hourly wages are measured as the ratio of weekly earnings to weekly hours on the job during the past week. There are 1,559,034 employment observations (192,237 in Michigan) and 265,461 wage observation (32,340 in Michigan).

Before turning to an analysis of the employment and wage outcomes, it is useful to examine the characteristics of GA recipients in Michigan and the comparison states prior to the elimination of the program. Table 1 presents descriptive statistics drawn from the 1990 through 1992 March CPS for the general population and people who received "public assistance" income (excluding AFDC) in the previous year.[14] Public assistance recipients in both Michigan and the comparison states are disproportionately nonwhite, unmarried, and poorly educated relative to the general population. Contrary to some popular notions, public assistance serves men and women in nearly equal numbers. Only 27 percent of public

[14]Beginning in 1976 the March Supplement to the CPS asked respondents whether they received income during the previous calendar year from AFDC or another public assistance program. Most of the major federal cash transfer programs, such as Social Security and SSI, are separately identified in the CPS. Thus "public assistance" primarily covers those who receive income from General Assistance programs, though in principle it could include other programs as well. The demographic and labor market variables in the table refer to the week prior to the March interview and do not necessarily reflect individuals' status while on public assistance. The group of comparison states refers to the larger set of eleven states. The figures presented here are similar to statistics from State of Michigan administrative data presented in Danziger and Kossoudji (1995).

assistance recipients in Michigan have children, compared to 49 percent of recipients in the comparison states (this pattern also holds among female and married recipients). Public assistance recipients are roughly as urbanized as is the general population. Finally, and not surprisingly, people who were on public assistance in the prior year had very low employment rates and very high rates of unemployment and labor market nonparticipation at the time of the survey. In Michigan, 26 percent of the public assistance group were employed at the time of the survey and 50 percent were not participants in the labor market.

In the empirical analysis below, the comparison states provide the counterfactual estimate of how labor market outcomes in Michigan would have changed had the GA program not been eliminated. Since this identifying assumption cannot be tested, the strategy employed in this study is to use two separate comparison groups, each with different strengths. The first group is Indiana, Ohio, and Wisconsin, which are Michigan's closest neighbors in terms of geography and industrial composition.[15] These three states are likely to be subjected to the same regional shocks that may have affected Michigan. The second group includes these states plus Massachusetts, Missouri, New Hampshire, New Jersey, New York, Pennsylvania, Virginia, and West Virginia. While this group is composed of states geographically further from Michigan, the larger sample size allows for more precise estimates of the counterfactual change in outcomes. Table 2 provides descriptive evidence on the comparability of Michigan and the other states. 19.5% of the labor force in Michigan is in the durable manufacturing sector, compared to 16.7% in the first comparison group and 11.7% in the second. The distribution of educational attainment is quite similar between Michigan and both comparison groups.

A more direct method to assess the comparability of Michigan with the comparison states is to examine the trends in employment rates. These are plotted in Figure 2 for high school dropouts from 1979 to 2000. The vertical lines in the graph indicate the pre– and post–reform periods used in the estimates below. Prior to 1992 the employment rates in Michigan and the comparison groups follow a similar trend, though the employment level was lower in Michigan. Following a decline in the employment rates in all states between 1989 and 1991, the rate in Michigan began to trend upward in 1991, while the rate in the comparison

[15]Illinois and Minnesota are not included in the group of comparison states because of several large changes to their General Assistance programs in the early 1990s. Wisconsin began numerous AFDC demonstration projects as early as 1987, but did not implement a widespread reform (the so–called "Wisconsin Works" plan) to move people off welfare and into employment until 1996. Wiseman (1996) documents the welfare policy initiatives in Wisconsin.

states continued to decline until 1993 or 1994. The increase in employment in Michigan is consistent with the timing of the elimination of the GA program in October, 1991. Finally, the employment trends were similar in all states between 1994 and 2000. The similarity in industrial composition, educational attainment, and employment trends suggests that the comparison states provide a credible counterfactual estimate for how labor market outcomes would have evolved in Michigan had the GA program not been eliminated.

5 Econometric Specification and Results

This section begins with a simple comparison of the changes in employment and hourly wages among people in Michigan between 1989 and 1993 with changes in the comparison states. Because increased labor market participation by former GA recipients in Michigan may not have been the only source of differences in labor market outcomes, subsequent models include the college–educated male unemployment rate and unobserved shocks to control for confounding factors.

To facilitate estimation of nonlinear models later in this section, individuals in the sample are assigned to one of eighteen skill groups, where the groups are defined by three age ranges (16–29, 30–39, and 40–54), three levels of education (less than a high school degree, exactly a high school degree, and more than a high school degree), and gender. Individuals are also classified as living either in Michigan or in any of the comparison states. Each group is observed over twenty quarters between 1989 and 1993, which leads to 720 group–state–quarter cells (18 groups × 2 "states" × 20 quarters).

The group average employment and hourly wage rates are estimated in a regression framework that also controls for additional demographic characteristics that may differ by group, state or time. Let j index the skill group and s index whether the person lives in Michigan or the group of comparison states. The employment indicator or log wage rate, denoted by y_{ijst}, of person i in quarter t is modeled as

$$y_{ijst} = x_{ijst}\lambda + d_{jst} + \epsilon_{ijst} \tag{4}$$

where x_{ijst} is a set of individual characteristics, including a spline in age and its square within each of the three age ranges, and indicators for people who have a college degree or post–graduate education, are married, nonwhite, both married and nonwhite, and for those who live in a central–city area. d_{jst} represents a set of 720 group–state–time indicators that capture the average outcome of people in each cell; and ϵ_{ijst} is an unobservable term that reflects individual attributes that influence economic outcomes. The log hourly wage regression is estimated only among workers. The ordinary least squares regressions of equation 4 produce estimated average employment rates and log hourly wages, $\hat{d}_{jst}$, among people in each skill group–state–time cell, adjusted for differences in the individual covariates, x_{ijst}. These adjusted employment and log wage rates form the dependent variables for the remainder of the analysis.

A first estimate of the effect of the elimination of the GA program is obtained by a simple "difference–in–differences" between the change in employment and wages in Michigan and in the comparison states before and after the GA program was eliminated in Michigan.[16] The group–level employment rates and hourly wages are modeled as

$$\hat{d}_{jst} = \alpha_0 + \alpha_1 \text{Post}_t + \alpha_2 \text{Michigan}_s + \alpha_3 (\text{Post} \times \text{Michigan})_{st} + \xi_{jst} \quad (5)$$

where Post_t is an indicator for observations on or after the fourth quarter of 1991 (when the GA program was eliminated). Michigan_s is an indicator for Michigan groups. $(\text{Post} \times \text{Michigan})_{st}$ is an interaction variable indicating observations of groups from Michigan after the GA program was eliminated. Finally, ξ_{jst} is an error term that represents unobserved influences on economic outcomes, as well as sampling error in the estimated cell means.

The coefficient α_3 on $(\text{Post} \times \text{Michigan})_{st}$ is the difference in the change in outcomes in Michigan compared to the change within the comparison states. The change in the comparison states, α_1, represents the counterfactual change that would have occurred in Michigan had the GA program not been eliminated. α_3 is therefore a valid estimate of the effect of the elimination of the GA program in Michigan if there were no shocks to the Michigan labor market after 1991 that did not also affect the comparison states (formally, this requirement is that $(\text{Post} \times \text{Michigan})_{st}$ and ξ_{jst} are independent).

The estimates of α_3 for models of employment and log wages, stratified by education and gender, appear in row 1 of Tables 3 and 4. These estimates compare outcomes in Michigan to those in the large group of comparison states. The results that use only Indiana, Ohio, and Wisconsin as a comparison group are similar and are discussed below. The standard errors of the estimates account for both multiple observations of the same individual over time and multiple observations within the same household in the individual–level data. The details

[16] This type of estimator is studied by Meyer (1995).

of the standard error calculation are described in the appendix. The group–state–quarter observations are weighted by their relative sample size.

The estimates reveal that, compared to the change in employment in the comparison states, total employment increased by nearly two percentage points in Michigan following the elimination of the General Assistance program in 1991. The change was largest among the least educated, with employment increasing by about four percentage points among both male and female high school dropouts.

How reasonable is the magnitude of this employment effect? A four percent increase in employment among the 500,000 people without a high school degree in Michigan corresponds to 20,000 people. About half of the 82,000 former GA recipients did not have a high school degree and, thus, a back–of–the–envelope estimate is that about half of the former GA recipients became employed after the program was eliminated, which is certainly within the realm of possibility. This figure is a lower bound on the labor supply response among former GA recipients, however, if some GA recipients who entered the labor market displaced the employment of non–GA recipients.

In Table 4, there is no evidence of changes in hourly earnings in Michigan relative to the comparison states. However, the statistical precision of the wage estimate is quite low, and wage increases or decreases of four percent would fall within the 90 percent confidence interval.[17] When stratified by gender, the estimates reveal a 3 percent rise among male dropouts in Michigan and a 4 percent decline among female dropouts, although neither of these estimates are statistically different from zero.

The difference–in–differences estimates above may confound the effect of the elimination of the GA program with other labor market shocks that differentially affected Michigan and the comparison states. The remainder of this section presents several more robust methods to control for such shocks. A simple method to control for differences in the business cycle is to include the quarterly unemployment rate among male college–graduates as a regressor in equation 5. The elimination of the GA program likely affected the unemployment rate among low–educated workers, which precludes using it as a control variable. The rate among college graduates is arguably unaffected by the program elimination, yet is correlated with the demand for low–skilled workers.

[17] More precisely, a wage increase or decrease of 0.04 log units would fall within the 90 percent confidence interval. I employ the common approximation that a change in 0.01 log units represents a one percent change.

A generalization of including the unemployment rate in the regression is to allow people in different skill groups to vary in their responsiveness to changes in the unemployment rate. That is, a one percentage point decrease in the unemployment rate among college–educated workers may be associated with a larger increase in employment or earnings among low–educated workers than among better educated workers. Equation 5 becomes

$$\hat{d}_{jst} = \alpha_{j0} + \alpha_1 \text{Post}_t + \alpha_2 \text{Michigan}_s + \alpha_3 (\text{Post}\times\text{Michigan})_{st} + \gamma_j \text{U}_{st} + \xi_{jst} \qquad (6)$$

where U_{st} is the unemployment rate in state s in quarter t, and γ_j is a factor loading that allows the coefficient on the unemployment rate to differ by group.[18] The model also allows for group fixed effects (α_{j0}).

Rows 2 and 3 in Tables 3 and 4 present estimates of α_3 when the college–educated male unemployment rate is included in the model. Controlling for the unemployment rate (row 2) reduces the estimated employment gain among high school dropouts in Michigan from 4.0 to 1.9 percentage points; the standard error on the estimate is 1.0, so the gain remains statistically different from zero. Allowing the unemployment rate to have group–specific effects (row 3) has little effect on the estimated employment gain. The gains among men and women are not statistically different from each other.

Controlling for the unemployment rate does not alter the earlier finding that hourly earnings among low–educated workers did not change. The point estimates continue to indicate that wages among male dropouts rose by about three percent and wages among female dropouts fell by four percent, though neither of these point estimates are statistically different from zero.

There are virtually no estimated effects on high school or college graduates. This is an important validity check on the empirical model since it is implausible that the average outcomes among these larger groups of workers could have been affected by increased labor force participation among welfare recipients. It also suggests that if there were unobserved shocks to the Michigan labor market that occurred at the same time as the elimination of the GA program, they must have been concentrated among the least educated. The next set of models controls for such a possibility.

To control for influences on labor market outcomes that may not be captured by including the college–educated male unemployment rate in the model, the next set of models allow

[18] The results are not statistically different when the factor loading is allowed to vary by both group and state.

for unobserved shocks that may have had different impacts across groups and states. These models relax the assumption that the error term ξ_{jst} is independent of $(\text{Post}\times\text{Michigan})_{st}$.

A first generalization is to model the error term as having a component that uniformly affects all groups in a state at a particular time (denoted by κ_{st}) and a component unique to each group–state–time cell (η_{jst}). In this model κ_{st} reflects state–wide trends that are not captured by the unemployment rate. The error term is thus given by

$$\xi_{jst} = \kappa_{st} + \eta_{jst} \tag{7}$$

Since increased labor supply by former GA recipients should not have affected average outcomes among high school or college graduates, the state–time effect (κ_{st}) can be controlled for by estimating the employment and wage changes among high school dropouts relative to the change among better educated individuals observed in the same state and at the same time. To implement this estimator, define No HS_j to be an indicator for cells of people without a high school degree. Introducing this effect and interactions between it and the other variables in the model, the regression equation becomes

$$\begin{aligned}\hat{d}_{jst} &= \alpha_{j0} + \alpha_1 \text{Post}_t + \alpha_2 \text{Michigan}_s + \alpha_3 (\text{Post}\times\text{Michigan})_{st} \\ &+ \beta_0 \text{No HS}_j + \beta_1 (\text{No HS}\times\text{Post})_{jt} + \beta_2 (\text{No HS}\times\text{Michigan})_{js} \\ &+ \beta_3 (\text{No HS}\times\text{Post}\times\text{Michigan})_{jst} + \gamma_j \text{U}_{st} + \eta_{jst} \end{aligned} \tag{8}$$

This model is estimated using only high school dropouts and high school graduates. The coefficient β_3 measures the differential change among high school dropouts in Michigan compared to people with a high school degree, relative to this difference among people in the comparison states. The identification assumption in this "difference–in–difference–in–differences" model is that η_{jst}, but not necessarily κ_{st}, is independent of $(\text{No HS}\times\text{Post}\times\text{Michigan})_{jst}$.

Since the earlier models indicated little employment or wage change among better educated people in Michigan, it is not surprising that measuring the impact of Michigan's welfare reform as the relative change in outcomes among dropouts delivers results similar to the absolute change among dropouts. These results are presented in row 4 of Tables 3 and 4. The estimated increase in employment among high school dropouts declines slightly, from 2.1 to 1.7 percentage points, with most of the change attributable to a decline in the effect among men. As in earlier models, there is no change in hourly earnings among dropouts when men and women are pooled together, though the point estimates indicate a 4 percent rise in wages among men and a 6 percent fall among women. None of the wage effects are statistically different from zero.

A more realistic alternative to the assumption that the unobservable shock κ_{st} in equation 7 affects all groups in the state uniformly is to assume groups are affected by the observable business cycle shocks U_{st} and an unobservable shock θ_{st} to the same degree. That is, if γ_j measures the effect of both the unemployment rate and the unobserved state–time effect on group j outcomes, then the error term can be written as $\xi_{jst} = \gamma_j \theta_{st} + \eta_{jst}$, and equation 6 can be rearranged to yield

$$\begin{aligned}\hat{d}_{jst} &= \alpha_{j0} + \alpha_1 \mathrm{Post}_t + \alpha_2 \mathrm{Michigan}_s + \alpha_3 (\mathrm{Post}\times\mathrm{Michigan})_{st} + \gamma_j(\mathrm{U}_{st} + \theta_{st}) + \eta_{jst} \\ &= \alpha_{j0} + \alpha_1 \mathrm{Post}_t + \alpha_2 \mathrm{Michigan}_s + \alpha_3 (\mathrm{Post}\times\mathrm{Michigan})_{st} + \gamma_j \tilde{\theta}_{st} + \eta_{jst} \qquad (9)\end{aligned}$$

This formulation makes clear that the combined shock to each group at time t in state s is given by the product $\gamma_j \tilde{\theta}_{st}$. Nonlinear least squares is used to estimate the model since both γ_j and $\tilde{\theta}_{st}$ are unobserved.[19]

The two previous cases can be combined to allow for a common unobserved shock to all groups in each state at a particular time (κ_{st}), as well as a shock that affects each group by the factor γ_j. That is, the unobservables are modeled as

$$\xi_{jst} = \gamma_j \theta_{st} + \kappa_{st} + \eta_{jst} \qquad (10)$$

The final model is given by substituting ξ_{jst} into equation 8, and rearranging the terms in an fashion analogous to equation 9. Note that it is not possible to control for an unrestricted group–state–time unobserved shock because there is no variation in $(\text{No HS}\times\text{Post}\times\text{Michigan})_{jst}$ within each group–state–time cell.

The results for the final two estimators are given in rows 5 and 6 of Tables 3 and 4. Without the uniform state–time shock (Table 3, row 5), the estimates indicate an employment gain of 3.4 percentage point in Michigan. When the state–time unobserved shock is controlled for (row 6), the relative increase in employment is 2.4 percentage points; 1.3 percentage points among males and 3.4 percentage points among females. These estimates are in the same range as those found from the earlier, more restrictive models.

The point estimates in Table 4 show no change in hourly earnings among pooled male and female dropouts. When stratified by gender the estimates point to a 5.0 percent increase in

[19]The nonlinear model is identified by normalizing one of the group fixed effects (α_{j0}) to be zero and one of the group loading factors (γ_j) to be one.

wages among men and a 3.7 percent decrease among women, which are similar in magnitude to the earlier results. Again, however, the standard errors are quite large and a wide range of alternative wage changes cannot be ruled out, including that there was no change in wages among either men or women.

Restricting the group of comparison states to Indiana, Ohio, and Wisconsin does not alter the basic conclusions about employment and wage changes. The point estimates for these models are presented in Table 5. Controlling for either the college–educated male unemployment rate (rows 2–4) or a less–restrictive unobserved shock (rows 5 & 6) reveals an increase in employment in Michigan of between 1.7 and 2.6 percentage points. The wage changes tend to be negative among high school graduates, but are not statistically different from zero. (The estimated decline in wages among female dropouts is close to 10 percent in the nonlinear model, which seems implausibly large, but is nevertheless not statistically different from zero.) Overall, though, the close similarity between the estimates based on this selected group of comparison states and the larger group of states suggests that the conclusions reached above are not driven by the peculiarities of any one state or small group of states.

The estimates from Tables 3 through 5 indicate that employment increased by between two and four percentage points among high school dropouts, or by 25 to 50 percent of the original 82,000–person GA caseload. There is no evidence of changes in hourly wages. These effects are consistent with an infinitely elastic demand for low–skilled labor. In this scenario, employment increases one–for–one with increases in the labor force and there is no employment decline among workers who were in the labor market prior to the elimination of the GA program. The stability of hourly wages is also consistent with the effects of the program elimination being spread through trade to markets outside of Michigan.

The lack of statistical precision in the wage estimates suggests that we cannot rule out a modest decline in wages. To draw out the possible implications of this, Table 6 uses the wage and employment changes among low–educated women in Michigan to illustrate a plausible range of labor demand elasticities and employment displacement. These calculations assume the elasticity of labor supply is 0.4 and are found by plugging in the wage and employment changes into equations 1 through 3 in Section 3, and then solving for the elasticity of labor demand and the magnitude of the labor force increase. An alternative approach is to use an estimate of the labor force increase and then solve for the elasticities of both supply and demand. I employ the first strategy because there is relatively little disagreement about the elasticity of the labor supply, while there is little direct evidence on the number of former GA recipients who entered the labor market when the program was eliminated.

Three estimates are presented based on the employment and wage changes from specifications one, four and six in Tables 3 and 4. The coefficients from the simple difference–in–differences model and the more robust final model deliver labor demand elasticities of -1.1 and -0.9, whereas the intermediate model that controls for the college–educated male unemployment rate delivers an elasticity estimate of -0.4, closer to Katz's (1998) "best guess" of -0.5. These estimates also imply increases in the labor force of between 4.2 and 5.9 percent. The ratios of employment to labor force increases indicate that for each 100 new labor market entrants, there are between 47 and 70 new jobs created. Given the large standard errors on the wage estimates, these figures are only illustrative. However, they suggest the possible degree of wage declines and employment declines that may have resulted from the elimination of the GA program.

6 Conclusion

Welfare reform has been claimed as one of the great political achievements of the 1990s. Recipients are required to work and are limited to two consecutive years or five years in their lifetime of benefit receipt. State governments must meet strict targets for moving welfare recipients into the workforce and are given increased flexibility in the design of programs. The criteria for evaluating such a large change in policy must include the degree to which self–sufficiency has been promoted among the at–risk welfare population, the decline or advancement in material health and well–being among that population, as well as the "transition" costs of the reform. In particular, it is important to understand how increased labor force participation among former recipients will impact the overall labor market for very low–skilled workers.

This study takes a first step in that direction by evaluating how local labor markets in Michigan were affected when General Assistance, a sizable program for low–income people who did not qualify for federal assistance, was eliminated in 1991. The results suggest that increased labor force participation among former GA recipients led to increases in employment among high school dropouts of two to four percentage points. Although the standard errors do not rule out modest wage changes, the point estimates suggest that hourly earnings among low–educated workers were unaffected by the labor force increase and there was no decline in employment among low–skilled workers who were in the labor market prior to the program elimination.

7 Appendix: Standard error construction

The standard errors of the estimates in section 5 are computed using a bootstrap estimate of the full variance–covariance matrix of the cell means (the $\hat{d}_{jst}$'s). The following makes this procedure precise for the linear regression case: let Z be the (N × K) matrix of explanatory variables in equations 5, 6, and 8, and denote as $\hat{D}$ the (N × 1) column vector of either employment or wage outcomes. These linear regressions can then be represented as

$$\hat{D} = Z\Pi + \xi \tag{11}$$

where Π is the parameter vector and ξ is vector of error terms. The weighted least squares estimate of Π is then given by

$$\hat{\Pi} = (Z'GZ)^{-1}Z'G\hat{D} \tag{12}$$

where G is an (N × N) diagonal weighting matrix in which the nth diagonal element is the ratio of the number of people in nth skill group–state–quarter cell to the total number of people in the sample.

If there is no specification error in equation 11 and the only source of error derives from sampling error in the estimation of the cell means, then the variance–covariance matrix of the cell means can be used to compute the standard errors of the parameter estimates. Let $\hat{\Sigma}$ be an estimate of the variance–covariance matrix of D; then the variance matrix of $\hat{\Pi}$ is given by

$$\text{var}(\hat{\Pi}) = (Z'GZ)^{-1}Z'G\hat{\Sigma}GZ(Z'GZ)^{-1} \tag{13}$$

Note this is not equal to the variance matrix computed with the weighted least squares formula since Σ does not equal G^{-1}.[20] For the nonlinear least squares models, the matrix Z in equation 13 is replaced by the matrix of derivatives of the regression equation 9.

[20]If there is specification error in equation 11, as well as sampling error in the cell means, computation of the correct variance of $\hat{\Pi}$ is more complicated and requires additional assumptions about the correlation between the sampling error and the specification error, as well as the correlation in the sampling errors of different cells. See, for example, Chamberlain (1994). When equation 11 is estimated on the individual–level data, rather than the cell means, bootstrapped standard errors are very close to those computed with equation 13, which suggests specification error is not a problem.

Because of the unique design features of the Current Population Survey, an estimate of the variance–covariance matrix of the cell means obtained from the vector of residuals from an OLS estimate of equation 4 is biased since each individual is observed in the data up to eight times and serial correlation in the unobservable component in equation 4 is likely. Furthermore, because all members of a household participate in the CPS survey, the unobservable component will be correlated among members of the same household.

To surmount these issues, the bootstrap method is used to obtain an unbiased estimate of the variance matrix of the cell means. To mimic the randomization in the CPS sample design, households are drawn with replacement from the set of all households appearing in the data between 1989 and 1993. For each household chosen, all individuals associated with that household at any time are included in the dataset. This randomization procedure is replicated fifty times, producing fifty different "random samples" of data, upon which equation 4 is estimated. The empirical covariance matrix of the fifty sets of cell means is an unbiased estimate of the true variance matrix.[21]

[21] Given an unbiased estimate of the variance–covariance matrix, it could be used directly as a weight matrix an a generalized least squares estimate of equation 11. However, unless the number of bootstrap replications in the construction of the variance matrix is at least as large as the number of observations (the seven hundred twenty cell means), the variance matrix is not invertible and therefore cannot be used in such a procedure. To see this, let $c(r)$ be a column vector of the deviation of the coefficients from the rth bootstrap replication from the mean of the fifty coefficients. If there are R bootstrap replications, the bootstrap estimate of the variance–covariance matrix is given by $V = (1/R)\sum_r c(r) * c(r)'$. The rank of $c(r)$ is one, and thus the rank of $c(r) * c(r)'$ is one. Since V is is the sum of R matrices each with a rank of one, the rank of V is at most R, and thus not invertible if there less bootstrap replications than the number of cell means. I thank David Card for pointing this out to me.

Even if the estimated variance matrix was invertible, any sampling error in the variance of the cell means is correlated with sampling error in the estimated variance matrix. Altonji and Segal (1996) show that this leads to a small sample bias when the inverse of the variance matrix is used as a weight in a GMM procedure.

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Table 1: Characteristics of Public Assistance Recipients and the Overall Population, 1989–1991

	Michigan		Control States	
	Public Assistance	Overall	Public Assistance	Overall
Women	50.3%	50.0%	62.6%	51.2%
Any kids	26.9	51.7	49.0	51.3
Nonwhite	44.8	15.6	48.5	16.0
Married	15.8	51.6	21.8	53.7
No HS degree	48.1	18.6	45.8	18.0
HS degree	32.4	38.6	38.8	39.6
College	19.4	42.8	15.3	42.4
MSA resident	82.0	83.1	80.9	76.9
Large MSA resident	47.9	50.1	48.0	29.1
Employed	23.6	70.0	19.7	72.9
Unemployed	53.0	10.2	42.8	7.3
Not in labor force	49.9	22.1	65.6	21.4
Hourly wage (1995$)	$5.89	$14.00	$7.43	$14.07
Age	35.0	33.7	33.9	33.9
CPS sample size	154	10,397	890	78,444
Population estimate	81,269	5,143,867	447,195	43,887,789

Source: Author's tabulation of March Current Population Survey, respondents aged 16 to 54.
Notes: Observations are weighted using the March Supplement weights. Large MSA's include Boston, Nassau–Suffolk counties, New York City, Newark, Pittsburgh, Philadelphia, and Detroit. The public assistance group includes all people who reported receiving any income from a cash assistance program other than AFDC during the previous calendar year. All other variables refer to the respondent's status during the week prior to the interview. Unemployment refers to people who are in the labor market, but not currently employed. The population estimate is based on the CPS weights and is an annual average between 1989 and 1991.

Table 2: Labor Force Characteristics in Michigan and the Comparison States, 1989–1991

	Percent of	Manufacturing					No HS	HS or
	sample	Durable	Non–durable	Services	Trade	Other	degree	less
Indiana	3.3	20.2	5.7	28.0	26.2	20.0	15.6	64.1
Ohio	12.9	15.7	8.2	30.7	26.8	18.8	13.9	59.1
Wisconsin	4.0	15.0	10.1	30.6	26.0	18.4	11.7	58.2
Massachusetts	11.0	12.1	6.7	36.6	27.1	17.6	13.2	47.3
Missouri	3.1	10.4	8.1	30.6	28.9	22.1	15.1	59.0
New Hampshire	2.4	19.3	5.5	29.4	27.8	17.9	13.2	51.1
New Jersey	11.9	7.8	9.8	32.4	28.4	21.6	12.1	51.8
New York	19.2	8.5	6.5	36.3	28.0	20.8	13.6	51.2
Pennsylvania	12.1	11.6	9.0	32.7	26.8	19.9	11.7	61.0
Virginia	4.3	7.8	7.1	32.2	25.7	27.1	15.6	52.3
West Virginia	3.5	7.4	7.0	29.5	26.4	29.8	15.4	66.7
3 midwestern states		16.7	8.0	30.0	26.3	19.0	13.8	60.1
All comparison states		11.7	7.8	32.7	27.2	20.7	13.4	55.8
Michigan	12.3	19.5	6.3	30.6	27.2	16.4	14.1	56.7

Source: Author's tabulation of March Current Population Survey, respondents aged 16 to 54 who report being employed or looking for work in the week prior to the interview.

Note: The percent of the sample from each state is calculated from the CPS monthly data from 1989 to 1993, described later in the text, and refers to people both in and out of the labor force. The industry category "Trade" includes wholesale and retail trade; and finance, insurance, and real estate. "Other" includes agriculture, mining, construction, transportation, communications, utilities, forestry and fisheries, public administration, and the armed forces. All observations are weighted by the CPS weights (column 1) or the March Supplement weights (columns 2 through 8).

Table 3: Estimates of the Percentage Point Change in Employment in Michigan by Gender and Education

	Specification	All	College	High school	High school dropouts: All	High school dropouts: Men	High school dropouts: Women
(1)	Difference–in–differences without additional controls	1.9	0.8	1.3	4.0	3.9	4.3
		(0.3)	(0.4)	(0.6)	(1.0)	(1.3)	(1.4)
	Controlling for the college–educated male unemployment rate						
(2)	with a uniform effect for all groups	0.9	-0.1	0.5	1.9	2.0	2.2
		(0.4)	(0.5)	(0.6)	(1.0)	(1.4)	(1.4)
(3)	with group–specific effects	0.8	0.1	0.4	2.1	1.9	2.2
		(0.4)	(0.5)	(0.6)	(1.0)	(1.4)	(1.4)
(4)	with group–specific effects plus an unrestricted state–time effect				1.7	1.3	2.0
					(1.2)	(1.6)	(1.6)
	Controlling for an unrestricted state–time shock with group specific effects						
(5)		1.2	0.7	1.1	3.4	3.9	4.3
		(0.4)	(0.4)	(0.7)	(1.1)	(1.4)	(1.4)
(6)	plus a uniform unrestricted state–time effect				2.4	1.3	3.4
					(1.9)	(2.8)	(2.8)

Source: Author's tabulation of the monthly Current Population Survey, 1989–1993.

Note: Each cell is from a separate regression and shows the estimated percentage point change in employment in Michigan following the elimination of the GA program in October, 1991. Row 1 contains estimates of the coefficient α_3 from equation 5; rows 2 and 3 contain estimates of α_3 from equation 6, first with γ_j constrained to be equal for all j and then without the constraint; row 4 contains estimates of β_3 from equation 8; and rows 5 contains estimates of α_3 from equation 9. The equation corresonding to row 6 is not given in the text, but is described on page 15. Standard errors in parentheses.

Table 4: Estimates of the Change in Log Hourly Wages in Michigan by Gender and Education

					High school dropouts		
	Specification	All	College	High school	All	Men	Women
(1)	Difference–in–differences without additional controls	-0.002	-0.018	0.010	0.001	0.030	-0.040
		(0.006)	(0.009)	(0.009)	(0.024)	(0.027)	(0.040)
	Controlling for the college–educated male unemployment rate						
(2)	with a uniform effect for all groups	-0.002	-0.015	0.007	0.000	0.028	-0.041
		(0.007)	(0.011)	(0.010)	(0.025)	(0.028)	(0.042)
(3)	with group–specific effects	-0.009	-0.012	-0.004	-0.009	0.015	-0.042
		(0.007	(0.011)	(0.010)	(0.025)	(0.028)	(0.041)
(4)	with group–specific effects plus an unrestricted state–time effect				-0.004	0.037	-0.056
					(0.028)	(0.032)	(0.044)
	Controlling for an unrestricted state–time shock with group specific effects						
(5)		-0.003	-0.004	0.003	0.000	0.032	-0.037
		(0.014)	(0.010)	(0.013)	(0.029)	(0.033)	(0.041)
(6)	plus a uniform unrestricted state–time effect				0.001	0.050	-0.037
					(0.055)	(0.065)	(0.082)

Source: Author's tabulation of the monthly Current Population Survey, 1989–1993.

Note: Each cell is from a separate regression and shows the estimated change in the log of hourly wages among workers in Michigan following the elimination of the GA program in October, 1991. Row 1 contains estimates of the coefficient α_3 from equation 5; rows 2 and 3 contain estimates of α_3 from equation 6, first with γ_j constrained to be equal for all j and then without the constraint; row 4 contains estimates of β_3 from equation 8; and rows 5 contains estimates of α_3 from equation 9. The equation corresonding to row 6 is not given in the text, but is described on page 15. Standard errors in parentheses.

Table 5: Sensitivity Analysis with an Alternative Comparison Group

Percentage Point Change in Employment in Michigan

		All	College	High School	High School Dropouts: All	High School Dropouts: Men	High School Dropouts: Women
(1)	Difference–in–differences	1.2	-0.2	0.9	2.6	2.1	3.4
	Controlling for the college–educated male unemployment rate						
(2)	with a uniform effect for all groups	1.0	-0.2	0.7	2.5	2.1	3.1
(3)	with group–specific effects	0.9	-0.1	0.6	2.6	2.0	3.1
(4)	with group–specific effects plus an unrestricted state–time effect				1.9	0.6	3.2
	Controlling for an unobserved state–time shock with group specific effects						
(5)		0.6	-0.2	0.8	2.5	2.0	3.5
(6)	plus a uniform unrestricted state–time effect				1.7	0.5	1.0

Change in Log Hourly Earnings in Michigan

		All	College	High School	High School Dropouts: All	High School Dropouts: Men	High School Dropouts: Women
(1)	Differences–in–differences	-0.014	-0.034	-0.002	-0.011	0.023	-0.059
	Controlling for the college–educated male unemployment rate						
(2)	with a uniform effect for all groups	-0.011	-0.030	0.001	-0.006	0.025	-0.050
(3)	with group–specific effects	-0.015	-0.024	-0.009	-0.013	0.016	-0.051
(4)	with group–specific effects plus an unrestricted state–time effect				-0.004	0.034	-0.053
	Controlling for an unobserved state–time shock with group specific effects						
(5)		-0.035	-0.055	-0.033	-0.039	-0.035	-0.127
(6)	plus an unrestricted state–time effect				-0.027	0.020	-0.099

Source: Author's tabulation of the monthly Current Population Survey, 1989–1993.

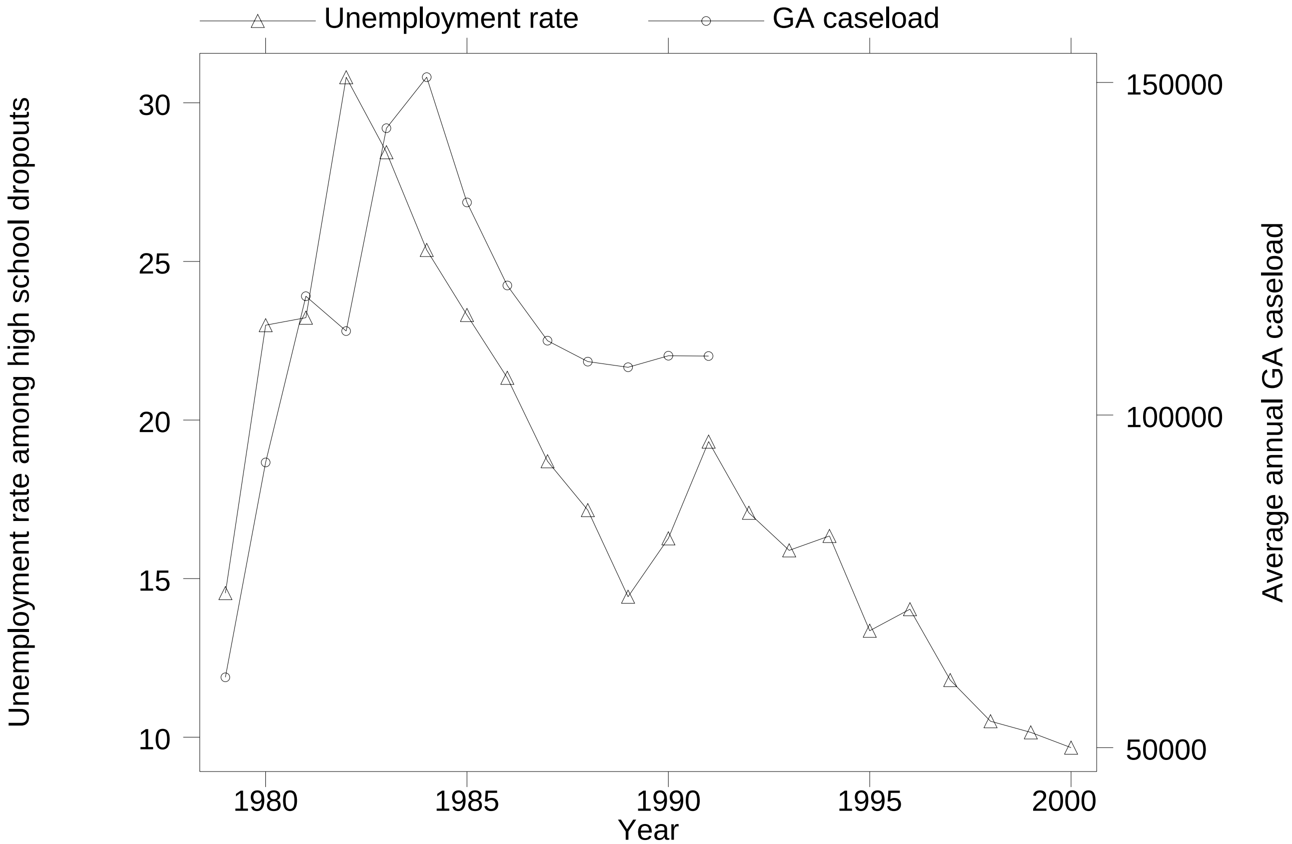
Note: Each cell is from a separate regression and shows the change in employment and log hourly earnings among workers in Michigan relative to that in Indiana, Ohio, and Wisconsin.

Table 6: Estimated Magnitudes of the Elasticity of Labor Demand, the Increase in Labor Force Participation, and Employment Displacement Among Low–educated Women in Michigan

	Model specification		
	(1) Difference–in–differences	(4) College–educated male unemployment rate	(6) Unobserved state–time shock
Percent change in total employment	4.3	2.0	3.4
Percent change in wages	-4.0	-5.6	-3.7
Labor demand elasticity	-1.1	-0.4	-0.9
Percent change in labor force	5.9	4.2	4.9
Ratio of employment to labor force increase	0.73	0.47	0.70

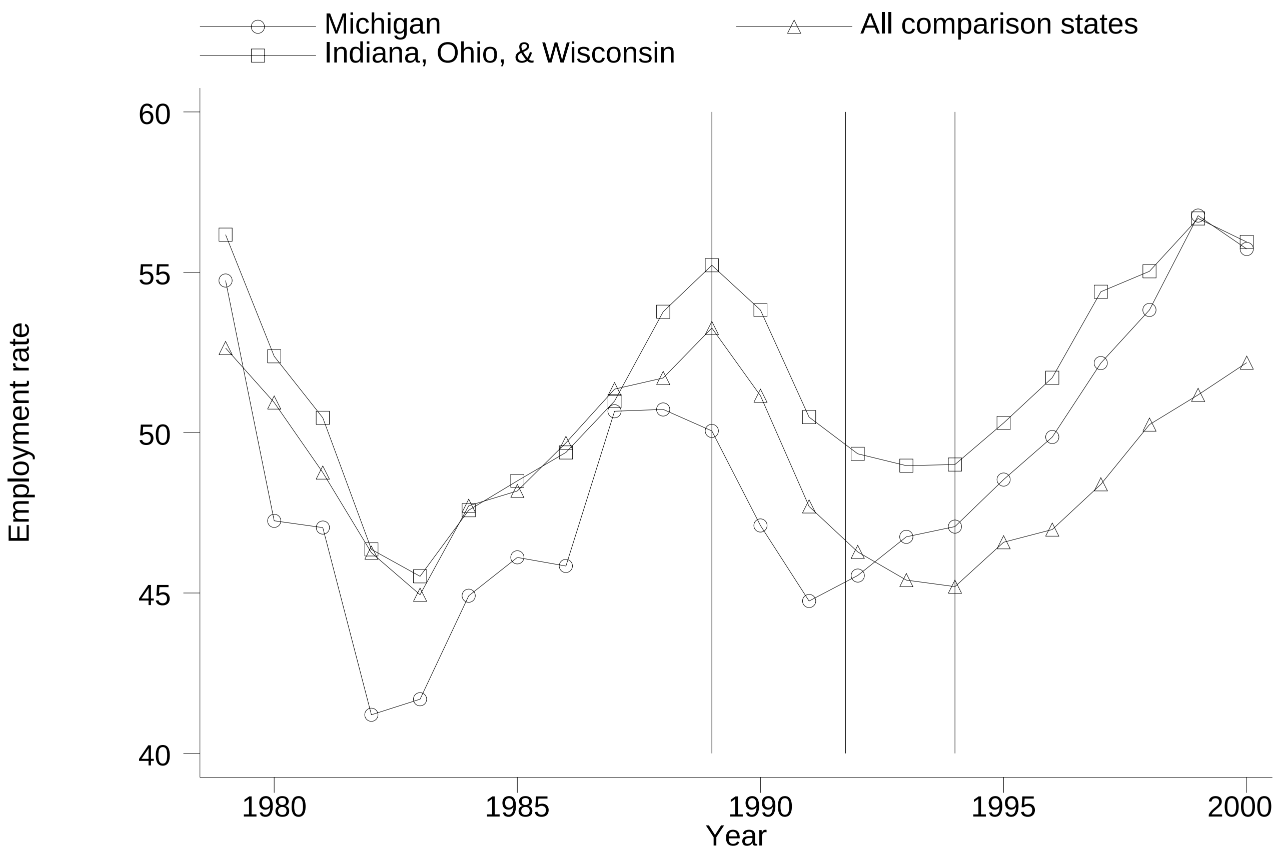
Note: Estimates are calculated from equations 1 and 3 assuming an elasticity of labor supply of 0.4. The column numbers (1), (4), and (6) above indicate the row number from Tables 3 and 4 where the employment and wages changes used in the calculations are found.

Figure 1: Unemployment Rate and General Assistance Caseload in Michigan



Source: The unemployment rate is calculated from the outgoing rotation groups of the Current Population Survey, and refer to individuals' labor force status at the time of the interview. The CPS sample includes labor force participants without a high school degree who are aged 16 to 54. GA caseload data is from the State of Michigan *Assistance Payment Statistics*, various months. Both series are expressed as annual averages.

Figure 2: Employment Rates in Michigan and Comparison States States Among People Without a High School Degree, 1979–2000



Source: Author's tabulation of the outgoing rotation groups of the Current Population Survey, 1979–2000. The sample includes high school dropouts aged 16 to 54.
Note: The vertical lines at the beginning of 1989, the fourth quarter of 1991, and 1994 indicate the pre– and post–reform periods used in the analysis. The full group of comparison states is composed of Indiana, Ohio, Wisconsin, Massachusetts, Missouri, New Hampshire, New Jersey, New York, Pennsylvania, Virginia, and West Virginia.