WORKING PAPER SERIES

The Impact of the 1990s Economic Boom on Less-Educated Workers in Rural America

Elizabeth E. Davis
University of Minnesota

and

Stacie A. Bosley
Hamline University

RPRC Working Paper No.05-05

June 2005

Rural Poverty Research Center
http://www.rprconline.org/

RUPRI Rural Poverty Research Center
214 Middlebush Hall
University of Missouri
Columbia MO 65211-6200
PH 573 882-0316

RUPRI Rural Poverty Research Center
Oregon State University
213 Ballard Hall
Corvallis OR 97331-3601
PH 541 737-1442

The Impact of the 1990s Economic Boom on Less-Educated Workers in Rural America

Elizabeth E. Davis
University of Minnesota

and

Stacie A. Bosley
Hamline University

Contact author:
Dr. Elizabeth E. Davis
Department of Applied Economics
University of Minnesota
317E Classroom Office Building
1994 Buford Ave.
St. Paul, MN 55108-6040
Phone: (612) 625-3772
Fax: (612) 625-2729
Email: edavis@apec.umn.edu

ABSTRACT

This article uses National Longitudinal Survey of Youth (NLSY79) data to investigate the impact of local labor market conditions on the employment and earnings of rural non-college-educated workers. The results suggest that local economic conditions in the late 1990s did have a positive impact on wages, and the effect is larger for workers with no more than a high school degree compared to their college-educated counterparts. Further, there is evidence of a difference between rural and urban labor markets, suggesting that the 1990s boom helped urban less-educated workers but not those in rural areas. The rural/urban difference is most apparent for male workers.

KEYWORDS: employment, local labor markets, NLSY79, rural, unemployment, wages, wage curve.

The Impact of the 1990s Economic Boom on Less-Educated Workers in Rural America

Introduction

The expression “a rising tide lifts all boats” sums up the belief that economic growth raises income for everyone. Indeed, in the 1960s economic growth in the United States was a powerful force for the reduction of poverty. In more recent decades, economists have questioned whether the growing economy has continued to have the same impact on poverty. In particular, in the 1980s researchers found that the relationship between growth and poverty reduction was significantly weakened.

Even though the longest economic expansion in the U.S. ended with a recession beginning in March 2001, the period of sustained growth in the 1990s provides an opportunity to re-examine the impact of local economic conditions on disadvantaged workers. Studies to date suggest that in metropolitan areas of the U.S., the 1990s boom did help disadvantaged workers by increasing wages and decreasing unemployment. However, few studies have examined the impact of the 1990s expansion on worker outcomes in rural areas.

This article builds upon two main strands of the literature. The first is research that takes advantage of differences in local labor market conditions to examine the impact of overall economic conditions on individual outcomes, particularly for economically disadvantaged groups. As discussed below, most studies have found that in metropolitan areas, local economic conditions have a larger impact on less skilled or more disadvantaged workers than on more skilled workers. In addition, this article draws upon the literature related to the “wage curve” of Blanchflower and Oswald, who find a consistent negative short-run relationship between wages and unemployment rates across countries, regions, and time periods.

Conceptual Framework and Relevant Literature

Local labor market conditions may impact a worker's earnings and/or labor supply decision by affecting average wages or the likelihood of finding a job. For example, in a job search model, better economic conditions in a labor market are likely to impact the distribution of wage offers. For an individual job seeker, greater employment growth in a local area is likely to lead to an increase in the frequency of job offers, raising the probability of employment. It may also improve wage offers, increasing earnings, all else equal (Hoynes, 2000). In a job-queuing model, upward mobility into higher wage jobs may increase the wages and employment of disadvantaged workers as the local economy improves (Bartik 1996).

Two recent studies look at the effect of local economic conditions on worker welfare by using aggregate data. Hines, Hoynes and Krueger use aggregate measures of labor market outcomes at the MSA-level to estimate the impact of changes in unemployment over the business cycle. They find that employment, wages and hours worked for low-skilled workers increase during expansions and decrease during recessions, though the impact on wages is fairly small. Freeman examines the effect on state poverty rates of changes in the unemployment rate and average earnings. He concludes that expansions with low unemployment rates (4-5%) and rising real wages will reduce poverty, though he notes that many people will remain poor due to barriers to labor force participation.

As an alternative to using aggregate data, there are a growing number of studies that take advantage of differences in local labor market conditions to examine the impact of overall conditions on individual outcomes. Hoynes (1999) examines the impact of business cycles for different subgroups based on race, gender and education by relying on variations in economic conditions across MSAs (metropolitan statistical areas). She finds that wages of less skilled workers are affected more by economic conditions than those of more skilled workers. Freeman and Rodgers focus on the 1990s expansion and find that the impact of favorable local economic conditions has been greatest for younger men (under age 25) and for African American men. Bartik (1996) and Bound and Holzer also find that employment growth leads to wage increases for younger, less experienced workers in urban areas. This article follows a similar line of inquiry by investigating the relationship between local labor market conditions and individual worker wages.

In addition, this article builds on the literature about the "wage curve." Blanchflower and Oswald find a negative empirical relation between wages and unemployment rates across countries, regions, and time periods. This inverse relationship between wages and unemployment contrasts with a Harris-Todaro model of regional economies, in which areas with higher unemployment rates have higher wages (a compensating differential, in effect). Blanchflower and Oswald suggest that while the compensating differential model may hold in the long run, at a point in time the cross-sectional relationship between wages and unemployment is negative. They conclude that this relationship, which they refer to as the unemployment elasticity of wages, is approximately –0.1.

In support of their empirical findings, Blanchflower and Oswald present a number of labor contracting and wage efficiency models that could produce such a relationship. In particular, they note that workers with greater bargaining power should have wages that are less sensitive to changes in local labor market conditions. They cite findings of higher elasticities of wages with respect to unemployment for workers with less education as supporting this hypothesis. This would imply that the wages of less-educated workers would suffer more during a recession, when unemployment was high, and gain more, when unemployment was lower, relative to workers with more bargaining power.

The findings of Blanchflower and Oswald, as well as the other studies mentioned above, indicate that there is likely to be a relationship between local economic conditions and worker welfare, but that this relationship is not necessarily the same for all workers. This article examines the "rising tide" question for a specific group: less-educated rural workers. Two studies (Davis, Connolly and Weber, and Davis and Weber) directly address the question of differential local labor market impacts in rural areas, but both studies use data from only one state. In contrast, this article uses a national data set to estimate the "wage curve" model of Blanchflower and Oswald, and then expands on their work to examine rural versus urban areas. The main objective is to test specifically whether wages responded differently to unemployment changes in rural versus urban areas of the United States during the period of the 1990s economic boom.

Data and Methods

The primary source of data for this study is the 1979 National Longitudinal Survey of Youth (NLSY79). The Bureau of Labor Statistics began surveying a group of about 12,000 youth aged 14 to 22 in 1979 and has interviewed them annually since then (biannually since 1994). While the sample has undergone some revisions, the retention rate in 1998 for those who remain eligible was 84%. The survey includes extensive data on demographic and family characteristics, and work history and earnings. The NLSY79 geocode data also provides more detailed information on the location of respondents (e.g., county of residence).[1] This information allows estimation of the effects of local labor market conditions using more disaggregated definitions of local area, and to test specifically for rural versus urban differences in those effects.

Recent studies use various definitions of local labor markets. Several use metropolitan statistical areas (MSAs) (Bound and Holzer; Hoynes, 1999; Bartik, 1991, 1996; Freeman and Rogers; Cain and Finnie), while others use state-level data (Tokle and Huffman; Freeman). In analyses of local labor market conditions and welfare spells, Hoynes (2000) uses counties, and Fitzgerald uses both counties and Labor Market Areas as defined by the USDA Economic Research Service to define local labor markets. This article uses commuting zones as defined by Tolbert and Sizer as the relevant labor market for each individual. The Tolbert and Sizer commuting zones are counties grouped together based on actual commuting patterns found in Census data. The commuting zones typically include several counties and can cross state boundaries. As shown in table 1, Tolbert and Sizer classify commuting zones based on the size of the largest population center. For this study, “rural” labor markets include the non-metropolitan commuting zones, while urban labor markets include all counties in metropolitan commuting zones.[2]

One of the advantages of using the NLSY79 data is that it is a panel data set, tracking the same individuals over time, which makes it easier to control for unobserved individual effects. In addition, the geocode data can more accurately identify the type of labor market where the individual resides. However, there are some disadvantages to using the NLSY79 data for this type of study. The first drawback is the limited age range of respondents. By 2000, the respondents were between 35 and 43 years of age. Thus while the respondents are in their prime labor market years, we are unable to examine the impacts of local economic conditions on younger or older workers. Freeman and Rodgers, for example, find significant differences in the impacts on younger (under age 25) workers and others. A second drawback of the NLSY79 data for this study is that the number of respondents in the key category of interest, non-college-educated workers in rural areas, is fairly small (about 400 of the 665 individuals with non-missing data in the year 2000 are non-college-educated workers in rural areas).

In keeping with the wage curve literature, the measure of local labor market conditions in this article is the (natural log of) the area unemployment rate.[3] County unemployment rates from the Bureau of Labor Statistics Local Area Unemployment Statistics (LAUS) are used to compute the weighted average unemployment rate for each commuting zone (weighted by each county’s share of employment in the commuting zone). Figure 1 shows the trends in unemployment rates across types of commuting zones. Unemployment rates trended downwards in the 1990s in all categories and were similar by 2000 across commuting zone types. The decline in unemployment rates was larger in some of the rural commuting zones than in the urban categories. Unemployment rates also vary considerably within commuting zone types, though on average all improved during the 1990s expansion. The article focuses on the 1993-2000 period because we are most interested in the “trickle down” effects of the economic expansion, that is, whether the rising tide lifted all boats, including rural less educated workers.

Model and Estimation

In order to estimate the impact of local labor market conditions on wage and employment outcomes, a reduced form model of the following basic form is estimated:

$$\ln Y_i = \beta' X_i + \gamma' \ln U_i + e_i$$

where $\ln Y_i$ = the natural log of weekly wages of individual i; X_i = a vector of human capital and demographic variables, U_i = unemployment rate in the commuting zone, and e_i is a random error term. This approach is similar to that used by Blanchflower and Oswald, Bartik (1996), Bound and Holzer, and Freeman and Rodgers. All standard errors are estimated using the Huber-White robust method.[4]

Control variables in each model are fairly standard for wage employment equations. Socio-demographic variables included are the individual’s age, age squared, gender, highest grade completed, AFQT score[5], health status[6], marital status, number of children, race/ethnicity, total work experience and experience squared, length of time in current job (tenure) and tenure squared. In addition, dummy variables are included for union status, major industry and occupational categories, and rural (defined based on commuting zone category). Also included are dummies variables for the 9 Census subdivisions (omitting one) to control for characteristics of these areas that are timeinvariant. Blanchflower and Oswald note the importance of including regional controls in a wage curve model given that in the long run, higher structural unemployment rates or fewer local amenities are associated with higher wages. This issue is discussed further below.

Results: **The Wage Curve**

This section first provides estimates of the standard wage curve model for all workers and for more versus less educated workers. In order to examine the impact of local economic conditions on less educated versus more educated workers, "less educated" is defined to include those workers with no more than a high school degree. Next, results are presented showing the impact in rural versus urban areas to answer the question whether the "rising tide" is indeed helping less educated workers in rural areas. Lastly, gender differences are explored. The models are estimated first using cross-sectional data for each year (1993, 1994, 1996, 1998, and 2000), and secondly as a panel data set from 1993-2000 with a fixed effects model. A number of sensitivity analyses undertaken to assess the robustness of the results are described below.

The basic cross-sectional wage curve results are presented in table 2. Blanchflower and Oswald claim that the empirical relationship between wages and unemployment found across countries and over time is consistently a negative relationship, with an estimated elasticity of about –0.1. Looking at all workers in the NLSY79 sample (column 1 in table 2), the unemployment elasticity of wages is consistently negative and steadily grows in absolute value from –0.03 in 1993 to –0.15 in 2000. Taking a simple average across the five yearly estimates, the unemployment elasticity for all workers is approximately –0.09. While the unemployment elasticity is not statistically significant in the early years of the expansion (1993 and 1994,) it is significantly negative in 1996, 1998, and 2000. These findings are highly consistent with the Blanchflower and Oswald, who report a range of coefficient estimates for different years and different countries, with an average unemployment elasticity of about -0.1.

In addition to the expectation of a negative relationship between wages and unemployment, Blanchflower and Oswald also predict that workers with less bargaining power will have a higher wage-unemployment elasticity. In particular, the elasticity for workers with less education will be greater than that for those with higher levels of education. This hypothesis is strongly supported by the yearly cross-sectional estimates (columns 2 and 3 in table 2). In each year (except 2000), the elasticity is much larger in absolute value for workers with no more than a high school diploma than for workers with a college education. For more educated workers, the cross-sectional unemployment elasticity does not become significantly negative until the year 2000, while the elasticity for less-educated workers is significant is all but one of the years. Thus, better local economic conditions improved wage outcomes for workers with a high school education or less, suggesting that the economic boom did indeed help the bottom of the labor market, or “the rising tide lifted all boats.” These results are similar to those found by Blanchflower and Oswald, Freeman and Rodgers, and others using different data sets.

Are Rural Areas Different?

The central question of interest is whether the wage curve holds in rural labor markets, that is, whether better local labor market conditions help raise wages for workers in rural as well as urban areas. To test for a possible differential effect, an interaction term between a dummy variable for urban areas (which equals one if the person resides in a metropolitan commuting zone) and the local unemployment rate is included.[7] The model now has the form: $\ln Y_i = \beta' X_i + \gamma \ln U_i + \delta(\ln U_i * URBAN) + e_i$. The estimate of γ measures the unemployment elasticity in rural areas, and the sum of the estimated coefficients γ and δ measures the unemployment elasticity in urban areas. If the estimated coefficient on the interaction term (δ) is statistically significant, it supports the hypothesis that the unemployment elasticity of wages in urban areas is significantly different from that in rural areas.

Table 3 presents results of rural and urban wage-unemployment elasticities for all workers, while table 4 separates rural and urban workers by educational level. The results are consistent across years and models. The relationship between the unemployment rate and individual's weekly wages is negative and statistically significant in most years in the urban commuting zones, and is generally not significant for workers in rural areas. The results are even more compelling when looking at the two education groups, as discussed below.

Despite the difference in magnitude, the gap between the urban and rural unemployment elasticities is statistically significant in some years, but not all. Primarily the elasticity is significantly different in rural and urban areas for less-educated workers in the latter years of the expansion (1996-2000). The estimated standard errors are typically larger for the rural unemployment elasticity than the urban one, which may be due to the relatively small sample size in rural areas. While the results are not always significant, the pattern of findings is remarkably consistent and lends support to the hypothesis that the unemployment elasticity is different in rural areas.

Sensitivity Analyses

In order to better assess the robustness of these results, a number of additional model specifications were tested, including a selection-correction model and a fixed effects panel model. Most wage curve studies do not correct for selection and, in fact, it appears that the results are not largely affected. We also further investigate differences by gender and the impact of including a measure of the local long-run or trough unemployment rate.

Heckman Selection Model

Most of the wage curve studies estimate cross-sectional models and do not correct for selection. Results testing the wage curve hypothesis using a Heckman selection correction model to estimate wages conditional on employment are presented in table 5. As usual with selection models, the results are somewhat sensitive to the specification of the selection equation.[8] The basic pattern of findings from the uncorrected cross-sectional models holds in the selection models: the unemployment elasticity estimated over the entire sample ranges from -0.04 to –0.14 in the various years (results not shown). As seen in table 5 (column 2), the unemployment elasticity of wages is generally larger in absolute value terms for urban workers with less education than for those with college education. Yet in rural areas, the unemployment elasticity of wages is not statistically significant at conventional levels for either education group (column 1). Once again, the rural-urban difference is statistically significant in only some of the years, but the pattern is consistent, particularly for less-educated workers.

Fixed Effects Panel Model

The wage curve as described by Blanchflower and Oswald is essentially a cross-sectional relationship. However, by using the NLSY data, we can test for the relationship in a fixed effects model that will correct for unobserved individual characteristics that may bias the results. Table 6 shows the results using a fixed effects panel model to estimate the wage curve, estimated for all workers and separately by education group.[9] Again the local unemployment rate has a significant inverse relationship with weekly wages for workers with less than a college education, with an estimated coefficient of about –0.05. Now, however, workers with a college education also have a statistically significant unemployment elasticity and it is roughly the same size as the estimated elasticity for less-educated workers.

While the panel model shows different results than the cross sectional models for the relative elasticities based on educational level, there is little change in the rural-urban differential (columns 2 and 3 in table 6). The wage-unemployment elasticity continues to be significantly negative for urban workers and statistically insignificant for rural workers. This rural/urban difference is statistically significant for workers taken as a whole as well as statistically significant at the 10 percent level for workers without a college education.

Unemployment Elasticities and Gender

A remaining question is whether the wage-unemployment elasticity is different for males and females. Tables 7a and 7b present cross-sectional estimations with selection correction for males and females, separately. Table 8 then presents the fixed effects panel results, broken down by gender. Both the cross-sectional and panel results indicate that the difference in wage responsiveness in rural and urban areas is largely driven by males. While the elasticities for rural women are usually smaller than for their urban counterparts, the difference is rarely statistically significant. For males, especially from 1996 through 2000, there are statistically significant differences between urban and rural elasticities, particularly for males without a college education. Controlling for fixed individual effects in the panel model, it also now appears that females have a larger wage-unemployment elasticity than males. This finding contrasts with that of Blanchflower and Oswald, but could be due to the fact that they do not control for fixed individual effects in their estimations.

Long-run unemployment rate

Blanchflower and Oswald note that the long run relationship between unemployment and wages may be positive, as a compensating differentials model would suggest. Indeed, they suggest that cross-sectional models that do not control for fixed region effects often estimate a positive relationship between wages and unemployment. Using the NLSY79 data to estimate cross-sectional models without region dummies to test this idea, the overall unemployment elasticity of wages is not statistically significant in most years, and is significant and positive in rural areas in several of the years (results not shown). One might argue, however, that regional dummy variables are insufficient controls for local differences in long run unemployment rates. To test this hypothesis, two measures of long-run local unemployment rates are tested. First we included the average of the commuting zone's unemployment rates between 1992 and 2000 as an additional explanatory variable, and alternatively we included the 1992 unemployment rate (to represent the recessionary unemployment rate for that commuting zone). In both cases, the average or 1992 unemployment rate is usually not statistically significant, and the estimated coefficient on the current unemployment rate is similar to the previous estimates (results not shown). These results suggest that a measure of long-term local unemployment rates is not necessary in addition to the region dummies.

Conclusions

The sustained economic expansion of the 1990s in the United States appears to have helped "to lift all boats," by improving the wages and employment of non-college educated workers. Better local labor market conditions have a stronger impact on outcomes for less educated workers than for those with more than a high school education. Using the NLSY79 data, this article confirms findings from studies using alternative data sets about the impacts of local labor market conditions and the wage curve. In addition, unlike other studies, this study investigates whether this impact holds true in rural labor markets as well as metropolitan areas.

The results suggest that, in general, the impact of local labor market conditions on weekly wages is different for rural and urban workers. On the whole, weekly wages for urban workers without a college education were significantly improved when there was a lower local unemployment rate, all else equal. The weekly wages of rural less-educated workers, on the other hand, did not significantly respond to improved local economic conditions. This rural-urban difference is largest for male workers.

Why might economic expansions raise the tide generally for less-educated workers but leave rural workers behind to some degree, especially rural males? One possible answer might be the suggestion by Mills (2000, 2001) that lower employment density in rural areas raises the cost of job search for rural workers. This heightened cost then lowers wage pressure on employers. Another possibility, also suggested by Mills, is that the there may be a difference in the industries that are experiencing growth in urban and rural areas, so that the unemployment rate across locations may be the same while the effects of economic growth on worker wages might differ. The “wage curve” model suggests that short-run reductions in the unemployment rate will help raise workers’ wages, including those of less-educated workers, but these results suggest that relationship is more tenuous in rural than urban labor markets.

References

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

_____ "The Distributional Effects of Local Labor Demand and Industrial Mix: Estimates Using Individual Panel Data." *Journal of Urban Economics* 40 (1996): 150-178.

Blanchflower, D. G. and A. J. Oswald. *The Wage Curve*. Cambridge, MA: MIT Press, 1994.

Bound, John, and Harry J. Holzer. 2000. "Demand Shifts, Population Adjustments, and Labor Market Outcomes During the 1980s." *Journal of Labor Economics* v.18 (1, January), pp. 20-54.

Cain, Glen and Ross Finnie. 1990. "The Black-White Difference in Youth Employment: Evidence for Demand-Side Factors." *Journal of Labor Economics* v.8 (1, part 2), pp. S364-S395.

Davis, Elizabeth E., Laura Connolly and Bruce Weber, "Local Labor Market Conditions and the Jobless Poor: How Much Does Local Job Growth Help in Rural Areas?" *Journal of Agricultural and Resource Economics*, vol. 28 (3, December 2003): 503-518.

Davis, Elizabeth E. and Bruce A. Weber. "How Much Does Local Job Growth Improve Employment Outcomes of the Rural Working Poor?" *Review of Regional Studies*, vol.32, (no. 2, 2002): 255-274.

Fitzgerald, John M. 1995. "Local Labor Markets and Local Area Effects on Welfare Duration." *Journal of Policy Analysis and Management* 14 (1), pp.43-67.

Freeman, Richard. 2002. "The Rising Tide…?" In *Understanding Poverty*, S. Danziger and R. Haveman, ed., Cambridge: Harvard University Press.

Freeman, Richard B. and William M. Rodgers III. 1999. "Area Economic Conditions and The Labor Market Outcomes of Young Men in the 1990s Expansion." NBER Working Paper 7073. April.

Hines, James Jr., Hilary Hoynes, and Alan Krueger. 2001. "Another Look at Whether a Rising Tide Lifts All Boats." In *The Roaring Nineties: Can Full Employment Be Sustained*?" ed., A. Krueger and R. Solow. New York: Russell Sage Foundation, pp. 493-537.

Hoynes, Hilary W. 2000. "Local Labor Markets and Welfare Spells: Do Demand Conditions Matter?" *The Review of Economics and Statistics* 82 (3, August):351-368.

Hoynes, Hilary W. 1999. "The Employment, Earnings, and Income of Less-Skilled Workers over the Business Cycle." Madison WI: Institute for Research on Poverty Discussion Paper No.1199-99.

Mills, Bradford F. 2000. "Are Spells of Unemployment Longer in Nonmetropolitan Areas? Nonparametric and Semiparametric Evidence." *Journal of Regional Science* 40 (4):697-718.

Mills, Bradford F. 2001. "Unemployment Duration in Non-Metropolitan Labor Markets", *Growth and Change,* 32 (Spring): 174-192.

Tolbert Charles M. and Molly Sizer. 1996. "U.S. Commuting Zones and Labor Market Areas: a 1990 Update." U.S. Department of Agriculture Economic Research Service Staff Paper No. 9614. September.

Table 1: Categorization of Commuting Zones and Sample Size

	Type of Commuting Zone	Sample size in 2000	Percent of sample in 2000
1	Non-metropolitan with a small town center (population of largest place less than 5,000)	75	1.2
2	Non-metropolitan with a small urban center (population of largest place between 5,000 and 20,000)	332	5.2
3	Non-metropolitan with a larger urban center (population of largest place greater than 20,000, but smaller than a metropolitan area)	258	4.0
	TOTAL NON-METROPOLITAN	**665**	**10.4**
4	Small metro center (population of largest place less than 250,000)	762	11.9
5	Medium metro center (population of largest MSA between 250,000 and 1,000,000)	1,831	28.6
6	Major metro center (population at least 1,000,000) or part of a CMSA	3,142	49.1
	TOTAL METROPOLITAN	**5,735**	**89.6**
	SUM TOTAL	6,400	100

Notes: Sample size varies slightly year-to-year.
Commuting Zone designations from Tolbert Charles M. and Molly Sizer, 1996, "U.S. Commuting Zones and Labor Market Areas: a 1990 Update." U.S. Department of Agriculture Economic Research Service Staff Paper No. 9614. September. Categorization is based on the size of the largest population center in the commuting zone.

Table 2: Basic Wage Curve Results: Cross-sectional Estimates

	(1)	(2)	(3)
Dependent variable: Weekly wages (log)	Unemployment elasticity (all workers)	Unemployment elasticity for workers with less education	Unemployment elasticity for workers with more education
2000	-0.1455** (0.0306)	-0.1551** (0.0296)	-0.1304** (0.0408)
1998	-0.0979** (0.0279)	-0.1438** (0.0258)	-0.0573 (0.0401)
1996	-0.0868* (0.0349)	-0.1109** (0.0377)	-0.0581 (0.0393)
1994	-0.0621 (0.0406)	-0.0998* (0.0453)	-0.0143 (0.0488)
1993	-0.0343 (0.0404)	-0.0476 (0.0418)	-0.0186 (0.0462)

** Significant at the 1% level. * Significant at the 5% level. + Significant at the 10% level. Standard errors in parentheses are adjusted for non-independence of errors within commuting zones using Stata[c] "robust cluster" option. Control variables include age, age squared, age-adjusted AFQT score, highest grade completed, bad health indicator, race/ethnicity, gender, number of children, marital status, work experience and tenure with current employer, and a set of 7 industry, 3 occupation and 9 region dummies.

Table 3: Estimated Coefficients on Log Unemployment Rate for Workers in Rural versus Urban Areas

	(1)	(2)	(3)	(4)
Dependent variable: Weekly wages (log)	Rural unemployment elasticity	Urban unemployment elasticity	Rural elasticity significantly different from urban?	Sample size
2000	-0.0639 (0.0686)	-0.1532** (0.0322)	no	6,400
1998	0.1130+ (0.0616)	-0.1201** (0.0286)	yes**	6,620
1996	0.1257 (0.0878)	-0.1117** (0.0357)	yes*	6,763
1994	-0.0184 (0.0770)	-0.0676 (0.0437)	no	6,445
1993	0.0253 (0.0545)	-0.0437 (0.0453)	no	6,535

** Significant at the 1% level. * Significant at the 5% level. + Significant at the 10% level. Control variables are the same as listed in table 2.

Table 4: Estimated Coefficients on Log Unemployment Rate for Workers in Rural versus Urban Areas

	(1)	(2)	(3)	(4)
Dependent variable: Weekly wages (log)	Rural unemployment elasticity	Urban unemployment elasticity	Rural elasticity significantly different from urban?	Sample size
2000				
Less education	0.0091 (0.0709)	-0.1722** (0.0305)	yes*	3,423
More education	-0.1402 (0.1124)	-0.1296** (0.0427)	no	2,977
1998				
Less education	0.0961 (0.0732)	-0.1716** (0.0258)	yes**	3,597
More education	0.1168 (0.0888)	-0.0731+ (0.0421)	yes+	3,023
1996				
Less education	0.1628+ (0.0867)	-0.1435** (0.0384)	yes**	3,705
More education	0.1012 (0.1207)	-0.0763+ (0.0404)	no	3,058
1994				
Less education	-0.0348 (0.0932)	-0.1084* (0.0487)	no	3,593
More education	-0.0013 (0.0832)	-0.0158 (0.0525)	no	2,852
1993				
Less education	0.0502 (0.0672)	-0.0643 (0.0466)	no	3,582
More education	-0.0010 (0.0854)	0.0211 (0.0509)	no	2,953

** Significant at the 1% level. * Significant at the 5% level. + Significant at the 10% level. The category “less education” includes workers who have a high school degree or who dropped out of high school. The category “more education” includes workers who have some post-secondary education, vocational training, or a college degree. Control variables are the same as listed in table 2.

Table 5: Cross-Sectional Results Correcting for Selection Bias

	(1)	(2)	(3)	(4)
Dependent variable: Weekly wages (log)	Rural unemployment elasticity	Urban unemployment elasticity	Rural elasticity significantly different from urban?	Sample size
2000				
Less education	0.0074 (0.0715)	-0.1706** (0.0301)	yes*	3,968
More education	-0.1354 (0.1113)	-0.1295** (0.0424)	no	3,320
1998				
Less education	0.0847 (0.0730)	-0.1730** (0.0258)	yes**	4,211
More education	0.0816 (0.0973)	-0.0669 (0.0454)	no	3,344
1996				
Less education	0.1543+ (0.0853)	-0.1427** (0.0381)	yes**	4,430
More education	0.0954 (0.1410)	-0.0746 (0.0485)	no	3,415
1994				
Less education	-0.0618 (0.0918)	-0.1101* (0.0455)	no	4,609
More education	-0.0018 (0.0895)	0.0008 (0.0575)	no	3,271
1993				
Less education	0.0236 (0.0679)	-0.0713 (0.0444)	no	4,617
More education	-0.0173 (0.0878)	-0.0189 (0.0562)	no	3,396

** Significant at the 1% level. * Significant at the 5% level. + Significant at the 10% level. The category "less education" includes workers who have a high school degree or who dropped out of high school. The category "more education" includes workers who have some post-secondary education, vocational training, or a college degree. Control variables are the same as listed in table 2.

Table 6: Panel Fixed Effects Model

	(1)	(2)	(3)	(4)	(5)
Dependent variable: (log) Weekly wages	Unemployment elasticity (all areas)	Unemployment elasticity in rural areas	Unemployment elasticity in urban areas	Rural elasticity significantly different from urban?	Sample size
All workers	-0.0528** (0.0149)	0.0078 (0.0305)	-0.0592** (0.0151)	yes*	32,763
Less education	-0.0467* (0.0202)	0.0138 (0.0384)	-0.0544** (0.0207)	yes+	17,900
More education	-0.0561* (0.0221)	-0.0108 (0.0507)	-0.0599** (0.0225)	no	14,863

** Significant at the 1% level. * Significant at the 5% level. + Significant at the 10% level. The category "less education" includes workers who have a high school degree or who dropped out of high school. The category "more education" includes workers who have some post-secondary education, vocational training, or a college degree. Control variables are the same as listed in table 2.

Table 7a: Cross-sectional Estimates with Selection Correction: Men Only

	(1)	(2)	(3)	(4)	(5)
Dependent variable: Weekly wages (log)	Unemployment elasticity	Unemployment elasticity in rural areas	Unemployment elasticity in urban areas	Rural elasticity significantly different from urban?	Sample size
2000 weekly wage	-0.1608** (0.0351)	0.0082 (0.0862)	-0.1780** (0.0372)	yes*	3,532
Less education	-0.1665** (0.0364)	0.0391 (0.0900)	-0.1915** (0.0376)	yes*	2,062
More education	-0.1343** (0.0498)	-0.0290 (0.1485)	-0.1425 (0.0524)	no	1,470
1998 weekly wage	-0.1147** (0.0320)	0.1162 (0.0780)	-0.1184** (0.0336)	yes**	3,660
Less education	-0.1273** (0.0364)	0.0686 (0.0891)	-0.1524** (0.0369)	yes*	2,190
More education	-0.0415 (0.0469)	0.1751 (0.1191)	-0.0625 (0.0496)	yes+	1,470
1996 weekly wage	-0.0780 (0.0502)	0.2039+ (0.1092)	-0.1131* (0.0521)	yes**	3,884
Less education	-0.1038* (0.0512)	0.2530* (0.1148)	-0.1481** (0.0528)	yes**	2,348
More education	-0.0381 (0.0644)	0.1749 (0.1630)	-0.0649 (0.0664)	no	1,536
1994 weekly wage	-0.0841+ (0.0491)	-0.0085 (0.0830)	-0.0947+ (0.0533)	no	3,892
Less education	-0.0936 (0.0598)	-0.0157 (0.1132)	-0.0962 (0.0642)	no	2,422
More education	-0.0648 (0.0595)	-0.0051 (0.1155)	-0.0725 (0.0633)	no	1,470
1993 weekly wage	-0.0403 (0.0443)	-0.0315 (0.0640)	-0.0411 (0.0498)	no	3,952
Less education	-0.0209 (0.0510)	0.0327 (0.0956)	-0.0296 (0.0560)	no	2,421
More education	-0.0799 (0.0532)	-0.0645 (0.1130)	-0.0818 (0.0569)	no	1,531

** Significant at the 1% level. * Significant at the 5% level. + Significant at the 10% level. The category "less education" includes workers who have a high school degree or who dropped out of high school. The category "more education" includes workers who have some post-secondary education, vocational training, or a college degree. Control variables are the same as listed in table 2.

Table 7b: Cross-sectional Estimates with Selection Correction: Women only

	(1)	(2)	(3)	(4)	(5)
Dependent variable: Weekly wages (log)	Unemployment elasticity	Unemployment elasticity in rural areas	Unemployment elasticity in urban areas	Rural elasticity significantly different from urban?	Sample size
2000 weekly wage	-0.1250** (0.0396)	-0.1498+ (0.0891)	-0.1229** (0.0415)	no	3,756
Less education	-0.1323** (0.0411)	-0.0138 (0.0887)	-0.1418** (0.0430)	no	1,906
More education	-0.1246* (0.0559)	-0.2451+ (0.1420)	-0.1139+ (0.0587)	no	1,850
1998 weekly wage	-0.1147** (0.0320)	0.0968 (0.0765)	-0.1343** (0.0330)	yes**	3,895
Less education	-0.1694** (0.0295)	0.0999 (0.0926)	-0.1970** (0.0306)	yes**	2,021
More education	-0.0644 (0.0495)	0.0681 (0.1180)	-0.0747 (0.0514)	no	1,874
1996 weekly wage	-0.1042** (0.0306)	-0.0081 (0.0904)	-0.1144** (0.0321)	no	3,961
Less education	-0.1186** (0.0375)	0.0126 (0.1066)	-0.1338** (0.0395)	no	2,082
More education	-0.0900* (0.0407)	-0.0521 (0.1542)	-0.0945* (0.0419)	no	1,879
1994 weekly wage	-0.0547 (0.0399)	-0.0459 (0.1171)	-0.0547 (0.0416)	no	3,988
Less education	-0.0987+ (0.0533)	-0.0028 (0.1536)	-0.1118* (0.0497)	no	2,187
More education	0.0484 (0.0607)	-0.0703 (0.1533)	0.0611 (0.0644)	no	1,801
1993 weekly wage	0.0072 (0.0556)	0.1022 (0.1083)	-0.0078 (0.0599)	no	4,061
Less education	-0.0424 (0.0555)	0.1499 (0.1076)	-0.0791 (0.0577)	yes*	2,196
More education	0.0542 (0.0658)	-0.0026 (0.1317)	0.0620 (0.0731)	no	1,865

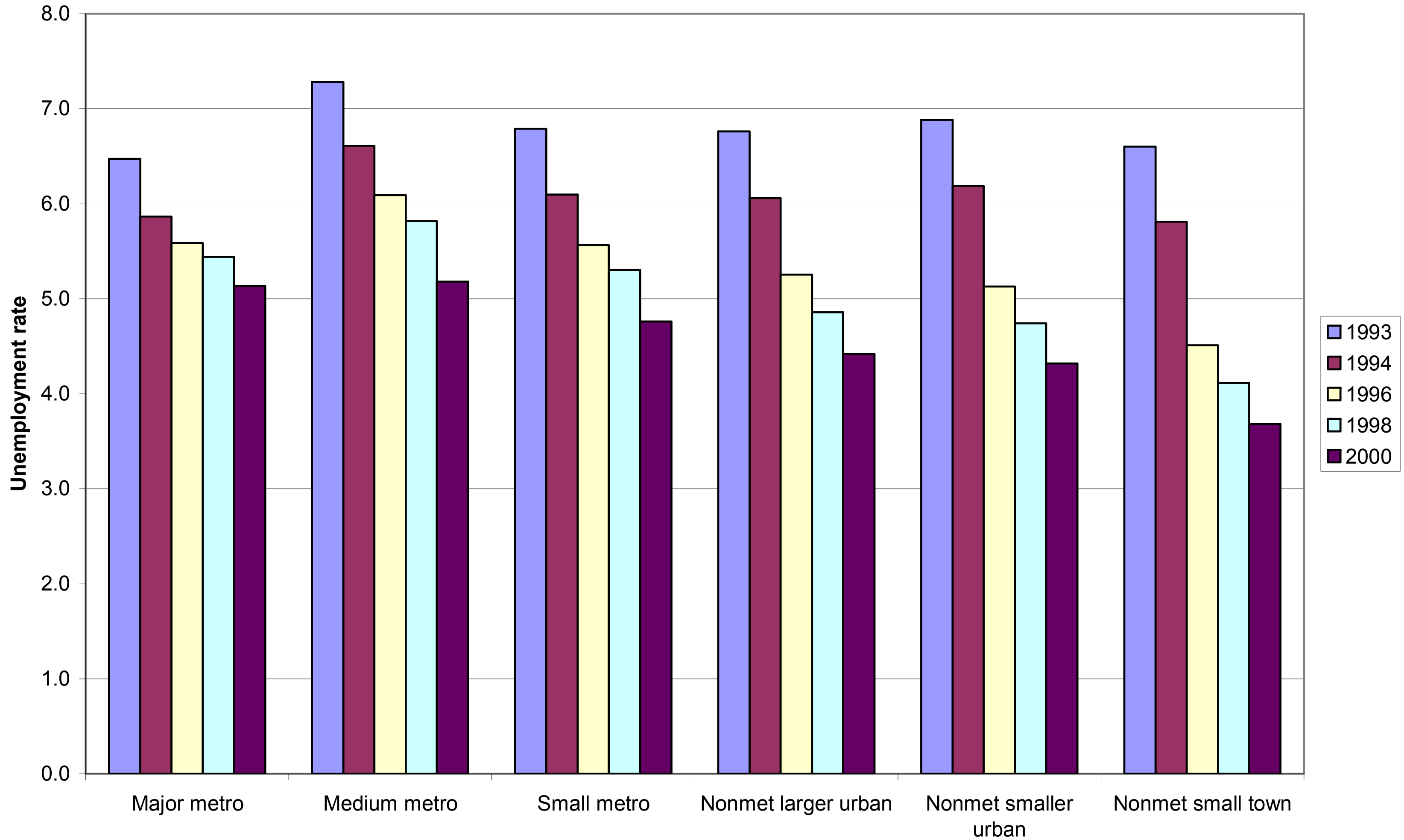
** Significant at the 1% level. * Significant at the 5% level. + Significant at the 10% level. The category "less education" includes workers who have a high school degree or who dropped out of high school. The category "more education" includes workers who have some post-secondary education, vocational training, or a college degree. Control variables are the same as listed in table 2.

Table 8: Fixed Effects Panel Results – By Gender

	(1)	(2)	(3)	(4)	(5)
Dependent variable: Weekly wages (log)	Unemployment elasticity (all areas)	Unemployment elasticity in rural areas	Unemployment elasticity in urban areas	Rural elasticity significantly different from urban?	Sample size
MEN	-0.0320+ (0.0194)	0.0701+ (0.0388)	-0.0438* (0.0197)	yes**	17,014
Less education	-0.0342 (0.0259)	0.0450 (0.0474)	-0.0459 (0.0265)	yes*	10,043
More education	-0.0172 (0.0295)	0.0691 (0.0694)	-0.0238 (0.0299)	no	6,971
WOMEN	-0.0790** (0.0231)	-0.0740 (0.0486)	-0.0795** (0.0234)	no	15,749
Less education	-0.0752 (0.0325)	-0.0597 (0.0654)	-0.0767* (0.0329)	no	7,857
More education	-0.0913** (0.0330)	-0.0694 (0.0736)	-0.0933** (0.0335)	no	7,892

** Significant at the 1% level. * Significant at the 5% level. + Significant at the 10% level. The category "less education" includes workers who have a high school degree or who dropped out of high school. The category "more education" includes workers who have some post-secondary education, vocational training, or a college degree. Control variables are the same as listed in table 2.

Figure 1: Average Unemployment Rate by Type of Commuting Zone



Footnotes

[1] Use of the confidential geocode data is subject to special agreement with the Bureau of Labor Statistics. Researchers wishing to use these data must apply to BLS directly.

[2] We also used the NLSY definitions of smsa (e.g., living in a metropolitan county) and rural (living in a county that is 0-49% urbanized) to compare results. While the samples are not identical, the results are qualitatively similar regardless which definition is used.

[3] A number of different variables have been used to measure labor market conditions: unemployment rates (Freeman and Rodgers; Fitzgerald); predicted employment growth, which is a proxy for labor demand calculated by weighting national sectoral growth rates by local industry sectoral shares (Bound and Holzer); changes in the "wage premium" implied by regional industry mix (Bartik, 1996); and employment growth (Bartik, 1991, 1996).

[4] The models were estimated using the robust cluster option in the Stata© statistical package to adjust the variance-covariance matrix for possible correlation of errors for individuals within the same commuting zone.

[5] AFQT is the Armed Forces Qualifying Test score taken in 1980. Each score is "age-standardized" by dividing the respondent's score by the mean score for his/her age.

[6] This variable indicates if poor health is limiting the respondent's ability to work.

[7] Alternatively we could estimate separately for the metropolitan and nonmetropolitan samples. Because of relatively small sample sizes, however, we estimate the models using the combined sample and test for a differential impact of unemployment in rural versus urban areas using an interaction term between the urban dummy and the unemployment rate.

[8] We face the common difficulties in specification of the selection equation. We include age, age squared, education, education squared, age-education interaction terms, health status, race, gender, marital status, number of children (in three distinct age groups), rural dummy, region dummies, and the local economic condition variable in the selection equation.

[9] We also estimated a random effects model but found that the Hausman test rejected the random effects assumption.