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

Did the Rising Tide Lift All Boats?

by

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ABSTRACT

We use national longitudinal survey data (NLSY79) to investigate the impact of local labor market conditions on the employment and earnings of rural non-college-educated workers. 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. We find little evidence of a difference between rural and urban impacts, suggesting that the 1990s boom helped both rural and urban less-educated workers. These results suggest that an expanding economy continues to be a powerful anti-poverty force.

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. has now officially ended with a recession beginning in March 2001, the period of sustained growth in the 1990s provides an unprecedented 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 research builds upon two main strands of the literature. First, we draw on research that takes advantage of differences in local labor market conditions to examine the impact of overall economic conditions on individual outcomes, particularly for low-income or 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 or older workers. In addition, our research draws upon the literature related to the "wage curve" of Blanchflower and Oswald, who find a negative relation between wages and unemployment rates across countries, regions, and time that is remarkably consistent.

In this paper we find that local economic conditions in the late 1990s did have a positive impact on wages, and that the impact is larger for workers with no more than a high school degree, compared to their more highly educated counterparts. We find little evidence of a difference between rural and urban impacts, suggesting that the 1990s boom helped both rural and urban less-educated workers. These results suggest that an expanding economy continues to be a powerful anti-poverty force. Given the end of the 1990s expansion in recent months, however, policymakers may once again be concerned about the wages and economic outlook for non-college educated workers.

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.[1] 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, higher employment growth in an 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, better local economic conditions may increase wages and employment of disadvantaged workers by both reducing unemployment and increasing upward mobility into higher wage jobs (Bartik 1996).

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, particularly for low-income or economically disadvantaged groups. Hoynes

[1] Labor supply is frequently modeled as a joint household decision in the case of married adults. Unfortunately our data do not allow us to model the labor supply decisions of husbands and wives jointly. Tokle and Huffman provide an example of estimation of a joint labor supply model.

(1988) 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.

In addition, our research is related to the literature on the "wage curve." Blanchflower and Oswald find a negative empirical relation between wages and unemployment rates across countries, regions, and time that is remarkably consistent. 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 this model may hold in the long run, at a point in time the cross-sectional relationship between wages and unemployment is negative. In support of their empirical findings, they present a number of labor contracting and wage efficiency models that could produce such a relationship.

Two recent papers address the "rising tide" question more directly 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 (2001) 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.

Data and Methods

In this study our primary source of data 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 NLSY79 includes extensive data on demographic and family characteristics, and work history and earnings. Under special agreement with the Bureau of Labor Statistics, we obtained the NLSY79 geocode data, which provides more detailed information on the location of respondents (e.g., county of residence).[2] This information allows us to compare findings using different definitions of "rural."

One of our main objectives in this study is to investigate the effect of using different geographical units and definitions of "rural" compared with other studies. 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)

[2] 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.

uses counties, and Fitzgerald uses both counties and Labor Market Areas as defined by the USDA Economic Research Service to define local labor markets.

In this study, we use 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, we define "rural" labor markets as non-metropolitan commuting zones.[3]

The commuting zone approach provides a more realistic approximation of the labor market opportunities faced by an individual. States are generally too large and counties too small to reflect a local labor market. Also, in order to examine the effect in rural areas, areas outside of MSA's must be included.

One of the advantages of using the NLSY79 data is that it is a panel data set, tracking the same individuals over time, so we can control for unobserved individual effects. In addition, by using the geocode data, we 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 1998, the respondents were between 33 and 41 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

[3] 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.

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 (less than 300).

Local Economic Conditions and Local Labor Markets

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). We use two alternative measures: total employment growth (percent change in total employment in the county) and area unemployment rate.

Figure 1 shows how average annual job growth has varied across the different types of commuting zones between 1993 and 1998. While total employment tended to increase faster in the metropolitan commuting zones in 1996 and 1998 than in the non-metropolitan areas, the same is not true earlier. In 1993 and 1994, jobs grew faster in two of the three non-metropolitan categories compared with most of the metropolitan ones. Only in the smallest, most rural commuting zones has job growth consistently been lower than elsewhere.

Figure 2 shows the trends in unemployment rates across commuting zones. Unemployment rates were slightly higher in 1993 and 1994 in the non-metropolitan commuting zones than the metro areas. Unemployment rates trended downwards in the mid to late 1990s in all categories and were similar by 1998 across commuting zone

types. Within commuting zone types, unemployment rates and employment growth rates varied considerably, though on average all improved during the 1990s expansion.

Model and Estimation

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

$$Y_i = \beta' X_i + \gamma' LM_i + e_i$$

where Y_i = the employment outcome for individual i; X_i = a vector of human capital and demographic variables, LM_i = measures of local labor market conditions in the county, and e_i is a random error term. This approach is similar to that used by Bartik (1996), Bound and Holzer, and Freeman and Rodgers. We estimate models for three outcome measures: hourly wage, weekly wage, and the probability of employment.[4] Each of the wage equations is estimated using the Heckman sample selection correction technique.[5] All standard errors are estimated using the Huber-White robust method.

Control variables in each model are fairly standard for wage employment equations.[6] Means and standard deviations for all variables are shown in table 2. Socio-demographic variables included are the individual's age, gender, highest grade completed, marital status, race/ethnicity, total work experience (hours) and experience

[4] We also estimated a multinomial logit model where the outcomes are employed, unemployed and out of the labor force. The results are similar to the model presented here in that factors that increase the probability of employment decrease the probability of unemployment.

[5] We face the common difficulties in specification of the selection equation. We include age, education, race, gender, marital status, number of children, education of parent, work experience and experience squared, south, and the local economic condition variable in the selection equation. Full results are shown in the appendix.

[6] We ran separate estimations for men and women and found that the coefficients on the local labor economic condition variables were quite similar for the wage equations, suggesting that pooling the data does not impact the key results. Not surprisingly, perhaps, the estimated equations on employment were quite different for men and women. In future work we will estimate these models separately for men and women.

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, south census region, and rural (defined based on commuting zone category).

Local labor market conditions are measured in two ways: local unemployment rate and change in local employment. We test whether the impact of local labor market conditions is different in rural versus urban areas by including an interaction term between the rural dummy and either the unemployment rate or the employment growth rate.

Results

In this section we first examine the impact of local economic conditions on less educated versus more educated workers, and compare these results to other studies. For the purposes of this study we define "less educated" to include those workers with no more than a high school degree. We then examine the impact in rural versus urban areas to answer the question whether the "rising tide" is indeed helping less educated workers in rural areas. We estimate the models two ways, first using cross-sectional data from 1998 and secondly as a panel data set from 1993-1998 with a fixed effects model. The key results are summarized in tables 3 and 4.[7]

Looking first at the cross-sectional results, it is clear that better local economic conditions in 1998 improved wage outcomes for workers with a high school education or less. For these non-college educated workers, a one percent reduction in the unemployment rate is associated with about a 0.1 percent increase in hourly or weekly wages (both unemployment rate and wage variables are in natural log form) (see table

[7] Complete results for the cross-sectional models are shown in the appendix, and the fixed effects results are available upon request from the authors.

3A). This estimate is very similar to the standard "wage curve" (Blanchflower and Oswald). Employment growth also exerts a significant impact on wages, raising wages by 2-3 percent for less educated workers (see table 4A). The impact of local economic conditions is weaker for workers with more than a high school education. While the estimated effects on hourly and weekly wages are significant for employment growth, they are somewhat smaller than for less educated workers. The impact of unemployment rate changes is not statistically significant at the 5 percent level for workers with more than a high school degree.

Using the 1998 data, we find that local economic conditions did not have a statistically significant impact on the likelihood of being employed for either group of workers. The estimated coefficients for the unemployment rate is negative (although not significant). Somewhat surprisingly, the estimated coefficients for employment growth are also negative (though not significant).

One of the concerns with cross-sectional estimates of wages is that unobserved characteristics of an individual may bias the results. Therefore we next used the 1993-98 NLSY79 data to estimate a fixed effects model.[8] Again we find that the local unemployment rate has a significant inverse relationship with hourly and weekly wages for workers with less than a high school education (see table 3B). The estimated coefficient is about half the size of the cross-sectional estimate. Unlike the 1998 cross-section result, the estimated impact of unemployment rate on the probability of employment is statistically significant using the 1993-98 panel. The estimated impacts of

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

unemployment rate on wages or employment for workers with more than a high school education are not statistically significant in the fixed effects model.

The fixed effects model results using employment growth as the measure of local economic conditions differ considerably from the cross sectional results. In the fixed effects model, the estimated coefficients on employment growth are not significant for either education group, for either weekly or hourly wages (see table 4B). Employment growth does have a significant positive effect on the likelihood of employment for less educated workers, however.

We used two methods to test whether the impact of local labor market conditions differed in rural versus urban areas: we estimated separate models for rural and urban residents, and we estimated models using the pooled urban and rural data including an interaction term between rural residence and the local economic variable. In both cases, the results were similar. We found no statistically significant differences between rural and urban areas in terms of the impact of either unemployment rate or employment growth on wages or employment status. Finding no effect may be due to small sample sizes, or may in fact indicate that the labor market impacts do not differ on average in rural areas.

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 study confirms findings from studies using alternative data sets about the impacts of local labor market conditions. In addition, unlike other studies, we investigate whether this impact holds true in rural labor markets as well as metropolitan areas. We find that the evidence suggests that, in general, the impact of local labor market conditions on weekly wages is similar for rural and urban workers. The impact on employment status is less clear and suggests the need for further work with better data for rural areas. In addition, improved labor market conditions will primarily help those who are able to participate in the labor market. Poor families facing barriers to labor force participation or unable to work full-time year round struggle despite a growing economy.

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Table 1
Categorization of Commuting Zones and Sample Size

Category	Type of Commuting Zone	1998 sample size	Percent of sample
1	Non-metro, small towns	108	1.3
2	Non-metro, small urban center	431	5.3
3	Non-metro, large urban center	327	4.0
4	Metro, small	974	11.9
5	Metro, medium	2315	28.2
6	Metro, major	4044	49.3
	TOTAL	8199	

Note: 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
Variable Definitions and Descriptive Statistics

	Abbreviated Name	Variable Description	Mean	Std. Dev.
1998 Outcomes				
Hourly Wage	hrwg	If employed in 1998, hourly wage for the respondent's main job.	15.3506	16.5954
Weekly Wage	wkwg	If employed in 1998, weekly wage for the respondent's main job.	621.4267	508.8708
Employed	empl	Indicates that the worker is employed at the time of the 1998 interview.	0.7991	0.4007
Out of the Labor Force	olf	Indicates that the worker is out of the labor force at the time of the 1998 interview.	0.1505	0.3576
Unemployed	unmp	Indicates that the worker is unemployed at the time of the 1998 interview.	0.0394	0.1946
Personal Characteristics				
Age	age79	Age of the respondent in 1998.	36.8982	2.3056
Years of Education	hgcslf	Highest grade completed by the respondent as of 1998.	13.0464	2.4628
Hispanic	hispanic	Indicates that the respondent is Hispanic.	0.1578	0.3646
Black	black	Indicates that the respondent is black.	0.2502	0.4331
Female	female	Indicates that the respondent is female.	0.4953	0.5000
Married	marrd	Indicates that the respondent is married at the time of the 1998 interview.	0.5570	0.4968
Years of Education for Parent	hgcparnt	Highest grade completed by the respondent's head parent.	10.8108	3.8788
Number of Children	children	Number of children the respondent has at the time of the 1998 interview.	2.0284	1.5465
South	so	Indicates that the respondent resides in the South at the time of the 1998 interview.	0.4057	0.4910
Rural	newrural	Indicates that the respondent resides in a rural area at the time of the 1998 interview. Rural is defined as one of the following: Non-Metro Small Town, Non-Metro Small Urban, or Non-Metro Larger Urban. Urban then defined as one of the following: Small Metro, Medium Metro, or Major Metro.	0.1056	0.3074
Experience and Tenure				
Total Work Experience (hours)	tothr	Hours of work experience the respondent has accumulated as of the 1998 interview.	23520.3900	14406.8700
Job Tenure (weeks)	tenure	If employed in 1998, weeks of tenure the respondent has with his/her main employer.	290.9466	275.5144

Table 2, continued

Job Characteristics				
Union Status	union	If employed in 1998, union status for the respondent's main job.	0.0510	0.2200
Industry Category		If employed in 1998, industry category for the respondent's main job.		
	indbc1	Non-Service	0.3452	0.4755
	indbc2	Professional Service	0.3037	0.4599
	indbc3	Retail Service	0.1262	0.3322
	indbc4	Commercial Service	0.2248	0.4175
Occupation Category		If employed in 1998, occupation category for the respondent's main job.		
	occbc1	Trade	0.2386	0.4263
	occbc2	Lower-Skilled Business	0.1579	0.3647
	occbc3	Higher-Skilled Business	0.1956	0.3967
	occbc4	Lower-Skilled Service	0.2013	0.4010
	occbc5	Professional Service	0.2066	0.4049
Local Economic Conditions				
Employment Growth	total	Employment growth from 1997 to 1998 associated with the county the respondent resides in at the time of the 1998 interview.	0.0252	0.0184
Unemployment Rate	lnurate	Natural log of the March 1998 unemployment rate associated with the county the respondent resides in at the time of the 1998 interview.	5.1548	0.0277

Descriptive statistics are for 1998.

Table 3
Summary of Results: Impact of Local Unemployment Rate on Wage and Employment Outcomes

	High School or Less		More Than High School	
	Ln(Unemployment Rate)	Rural Interaction Term	Ln(Unemployment Rate)	Rural Interaction Term
Table 3A: Cross-Section 1998				
Ln(Hourly Wage)	-0.1130 ** (0.0235)	0.0846 (0.0543)	-0.0442 (0.0237)	0.0446 (0.0951)
Ln(Weekly Wage)	-0.1182 ** (0.0269)	0.0196 (0.0817)	-0.0399 (0.0312)	-0.0655 (0.1241)
Employment	-.0435 (0.1111)	-0.5318 (0.3658)	-0.0979 (0.1398)	0.5710 (0.5726)
Table 3B: Panel Data 1993-1998				
Ln(Hourly Wage)	-0.0666 ** (0.0205)	0.0523 (0.0609)	-0.0014 (0.0181)	-0.0919 (0.0714)
Ln(Weekly Wage)	-0.0461 * (0.0230)	0.0357 (0.0683)	0.0203 (-0.0214)	-0.1004 (0.0844)
Employment	-0.0236 * (0.0119)	-0.0666 (0.0394)	0.0047 (0.0110)	-0.0144 (0.0453)

Table 4
Summary of Results: Impact of Local Employment Growth on Wage and Employment Outcomes

	High School or Less		More Than High School	
	Annual Job Growth	Rural Interaction Term	Annual Job Growth	Rural Interaction Term
Table 4A: Cross-Section 1998				
Ln(Hourly Wage)	2.8541 ** (0.5480)	-0.7258 (1.5992)	2.1005 ** (0.6738)	-3.1187 (2.0221)
Ln(Weekly Wage)	3.0854 ** (0.5952)	2.0482 (1.9716)	1.9949 * (0.8338)	-1.7194 (2.5876)
Employment	-4.8521 (2.5765)	7.3376 (6.3915)	-4.1335 (3.8682)	-9.7994 (11.1990)
Table 4B: Panel Data 1993-1998				
Ln(Hourly Wage)	-0.3302 (0.2862)	-0.5457 (0.6482)	0.1350 (0.2927)	-0.2254 (0.7389)
Ln(Weekly Wage)	-0.2690 (0.3203)	-1.0486 (0.7254)	0.2468 (0.3464)	0.8859 (0.8747)
Employment	0.3792 * (0.1680)	0.0451 (0.3774)	0.0666 (0.1757)	-0.3471 (0.4271)

Figure 1

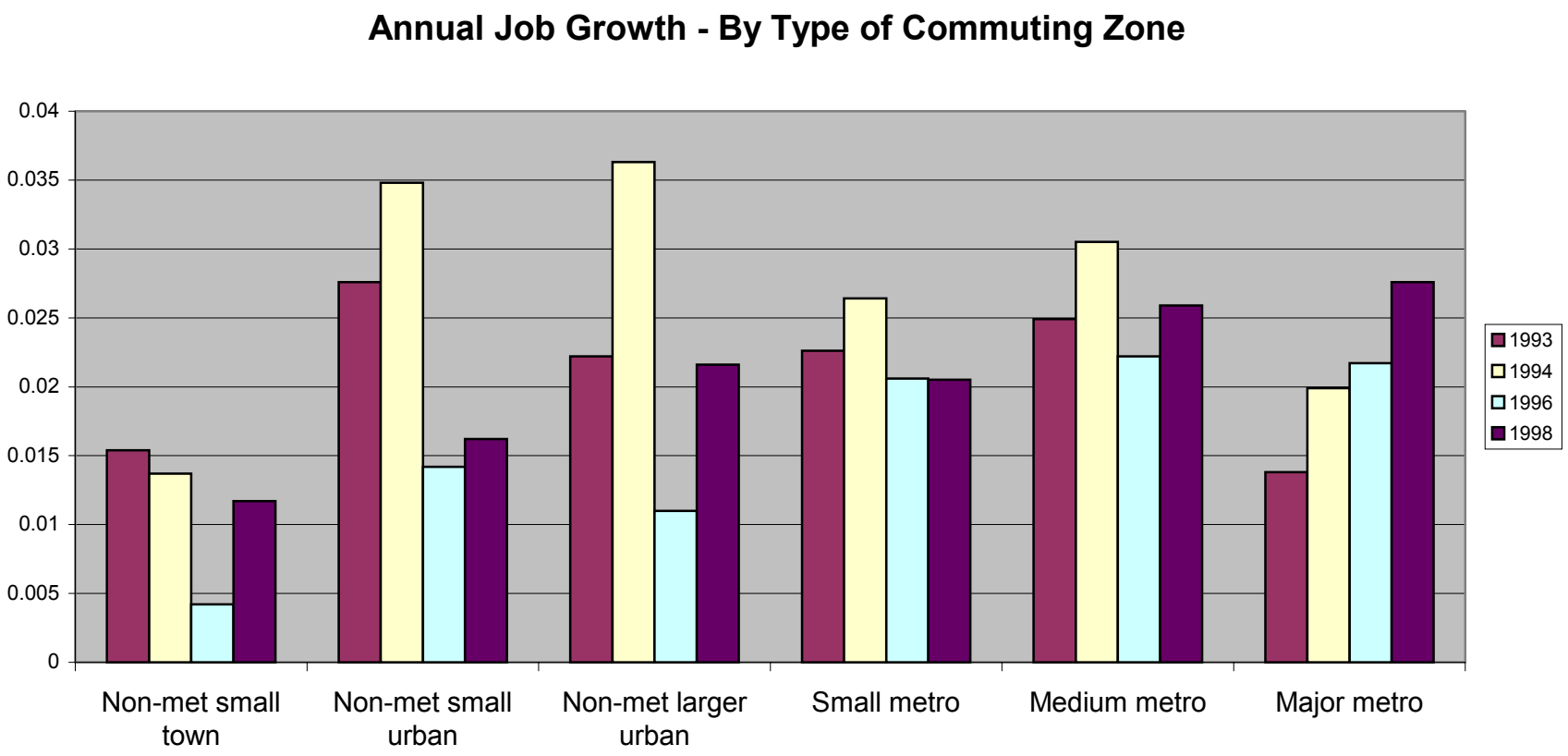
Annual Job Growth - By Type of Commuting Zone
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
Non-met small town
Non-met small urban
Non-met larger urban
Small metro
Medium metro
Major metro
1993
1994
1996
1998

Figure 2

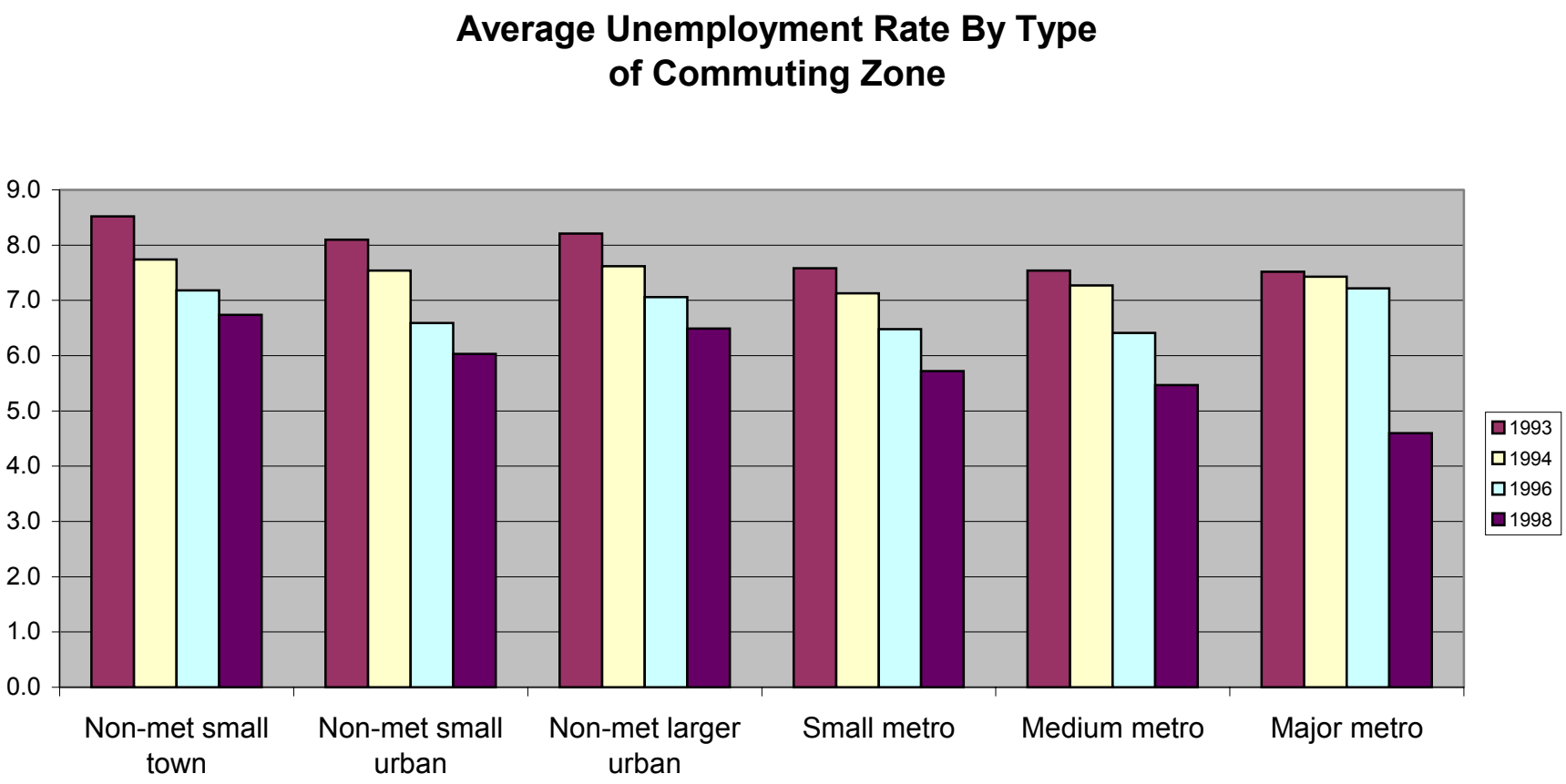
Average Unemployment Rate By Type of Commuting Zone
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Non-met small town
Non-met small urban
Non-met larger urban
Small metro
Medium metro
Major metro
1993
1994
1996
1998

Table A.1: 1998 Hourly Wage Estimation With Local Unemployment Rate – High School Education or Less

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Heckman selection model                         Number of obs      =      3546
(regression model with sample selection)        Censored obs       =      1005
                                                Uncensored obs     =      2541

                                                Wald chi2(21)      =    434.64
Log likelihood = -3265.757                      Prob > chi2        =    0.0000

------------------------------------------------------------------------------
             |               Robust
             |      Coef.   Std. Err.       z     P>|z|       [95% Conf. Interval]
-------------+----------------------------------------------------------------
lnhrwg       |
       age79 |  -.0032116   .0041414     -0.775   0.438      -.0113286    .0049055
      hgcslf |   .0399347   .0087568      4.560   0.000       .0227718    .0570977
    hispanic |   .0117269   .0308861      0.380   0.704      -.0488087    .0722625
       black |  -.0620607   .0252616     -2.457   0.014      -.1115724    -.012549
      female |  -.1023033   .0254831     -4.015   0.000      -.1522494   -.0523573
       marrd |   .0284369   .0194959      1.459   0.145      -.0097744    .0666482
          so |  -.0988534   .0214922     -4.600   0.000      -.1409773   -.0567295
       union |  -.0179135   .0526235     -0.340   0.734      -.1210537    .0852268
      indbc1 |   .0334642   .0290664      1.151   0.250      -.0235049    .0904332
      indbc2 |  -.0428138   .0381695     -1.122   0.262      -.1176246    .0319971
      indbc3 |  -.1528852   .0328403     -4.655   0.000       -.217251   -.0885195
      occbc1 |  -.1583059   .0405208     -3.907   0.000      -.2377253   -.0788865
      occbc2 |  -.1286459   .0376436     -3.417   0.001       -.202426   -.0548657
      occbc3 |   .0097676   .0469066      0.208   0.835      -.0821675    .1017028
      occbc4 |  -.3153684   .0411119     -7.671   0.000      -.3959462   -.2347906
      tenure |   .0006072   .0001062      5.718   0.000       .0003991    .0008153
     tenure2 |  -4.13e-07   1.08e-07     -3.841   0.000      -6.24e-07   -2.02e-07
       tothr |   .0000176   4.31e-06      4.078   0.000       9.12e-06    .000026
      tothr2 |  -1.19e-10   7.12e-11     -1.673   0.094      -2.59e-10    2.04e-11
    newrural |  -.2854531   .0955027     -2.989   0.003      -.4726349   -.0982713
     lnurate |  -.1130204    .023458     -4.818   0.000      -.1589973   -.0670436
    nrlurate |   .0845757   .0543379      1.556   0.120      -.0219246     .191076
       _cons |   6.426452    .150074     42.822   0.000       6.132312    6.720592
-------------+----------------------------------------------------------------
wageobs      |
       age79 |  -.0284001   .0097146     -2.923   0.003      -.0474405   -.0093598
      hgcslf |   .0296838   .0166058      1.788   0.074      -.0028631    .0622306
    hispanic |   .0025449   .0641634      0.040   0.968      -.1232131    .1283029
       black |    .067915    .056518      1.202   0.229      -.0428583    .1786882
      female |   .1768272   .0474558      3.726   0.000       .0838155    .2698389
       marrd |   .1988318   .0457379      4.347   0.000       .1091871    .2884765
          so |   .1072951   .0468797      2.289   0.022       .0154126    .1991777
    newrural |   .6971023   .2998196      2.325   0.020       .1094666    1.284738
     lnurate |  -.0599792   .0558314     -1.074   0.283      -.1694068    .0494485
    nrlurate |  -.3062882   .1643737     -1.863   0.062      -.6284547    .0158783
    hgcparnt |  -.0067575    .006767     -0.999   0.318      -.0200206    .0065056
    children |   .0078364   .0140644      0.557   0.577      -.0197294    .0354022
       tothr |   .0000878   6.93e-06     12.666   0.000       .0000742    .0001013
      tothr2 |  -6.02e-10   1.45e-10     -4.142   0.000      -8.87e-10   -3.17e-10
       _cons |  -1.049633   .2698891     -3.889   0.000      -1.578606   -.5206606
-------------+----------------------------------------------------------------
     /athrho |   .0481632   .0362872      1.327   0.184      -.0229583    .1192848
    /lnsigma |  -.7572299     .06248    -12.120   0.000      -.8796884   -.6347714
-------------+----------------------------------------------------------------
         rho |    .048126   .0362031                         -.0229543    .1187222
       sigma |   .4689637   .0293008                          .4149122    .5300566
      lambda |   .0225694   .0168387                         -.0104339    .0555727
------------------------------------------------------------------------------
Wald test of indep. eqns. (rho = 0): chi2(1) =     1.76   Prob > chi2 = 0.1844
------------------------------------------------------------------------------
```

Table A.2: 1998 Weekly Wage Estimation With Local Unemployment Rate – High School Education or Less

```
Heckman selection model                         Number of obs      =      3546
(regression model with sample selection)        Censored obs       =      1005
                                                Uncensored obs     =      2541

                                                Wald chi2(21)      =    483.04
Log likelihood = -3713.324                      Prob > chi2        =    0.0000

------------------------------------------------------------------------------
             |               Robust
             |      Coef.   Std. Err.       z     P>|z|       [95% Conf. Interval]
-------------+----------------------------------------------------------------
lnwkwg       |
       age79 |  -.0165649   .0051561     -3.213   0.001      -.0266707   -.0064592
      hgcslf |   .0423919   .0100579      4.215   0.000       .0226788    .0621049
    hispanic |   .0433566   .0327889      1.322   0.186      -.0209085    .1076217
       black |  -.0055492   .0291054     -0.191   0.849      -.0625948    .0514964
      female |  -.1483837   .0306611     -4.839   0.000      -.2084784   -.0882889
       marrd |   .0009578   .0227744      0.042   0.966      -.0436791    .0455947
          so |  -.0827034   .0256274     -3.227   0.001      -.1329322   -.0324745
       union |   .0499202   .0635247      0.786   0.432      -.0745859    .1744264
      indbc1 |   .0789229   .0323944      2.436   0.015       .0154311    .1424147
      indbc2 |  -.0781284   .0458268     -1.705   0.088      -.1679472    .0116904
      indbc3 |  -.1878674   .0376676     -4.988   0.000      -.2616945   -.1140403
      occbc1 |  -.1312854   .0495055     -2.652   0.008      -.2283143   -.0342565
      occbc2 |  -.1451947   .0459813     -3.158   0.002      -.2353165    -.055073
      occbc3 |   .0543836   .0550616      0.988   0.323      -.0535352    .1623024
      occbc4 |   -.394743   .0514919     -7.666   0.000      -.4956654   -.2938207
      tenure |    .000616   .0001216      5.065   0.000       .0003776    .0008545
     tenure2 |  -4.42e-07   1.23e-07     -3.596   0.000      -6.83e-07   -2.01e-07
       tothr |   .0000223   4.77e-06      4.673   0.000       .0000129    .0000317
      tothr2 |  -5.86e-11   7.50e-11     -0.781   0.435      -2.06e-10    8.84e-11
    newrural |  -.1869535   .1360517     -1.374   0.169        -.45361    .0797031
     lnurate |  -.1182485   .0269484     -4.388   0.000      -.1710663   -.0654306
    nrlurate |   .0196388   .0817732      0.240   0.810      -.1406336    .1799113
       _cons |   10.09611   .1765426     57.188   0.000        9.75009    10.44212
-------------+----------------------------------------------------------------
wageobs      |
       age79 |   -.028383   .0097138     -2.922   0.003      -.0474217   -.0093442
      hgcslf |   .0294054   .0165954      1.772   0.076      -.0031209    .0619318
    hispanic |   .0030406   .0642275      0.047   0.962      -.1228429    .1289242
       black |   .0675499   .0566369      1.193   0.233      -.0434564    .1785563
      female |   .1778179   .0474051      3.751   0.000       .0849055    .2707303
       marrd |   .1984602   .0457723      4.336   0.000       .1087482    .2881722
          so |   .1084716   .0468613      2.315   0.021       .0166252    .2003181
    newrural |    .699225   .2995782      2.334   0.020       .1120626    1.286387
     lnurate |  -.0590462   .0557801     -1.059   0.290      -.1683732    .0502808
    nrlurate |  -.3075786   .1642827     -1.872   0.061      -.6295668    .0144096
    hgcparnt |   -.006452   .0067556     -0.955   0.340      -.0196927    .0067887
    children |   .0084394   .0142032      0.594   0.552      -.0193984    .0362772
       tothr |   .0000876   6.97e-06     12.576   0.000        .000074    .0001013
      tothr2 |  -5.99e-10   1.46e-10     -4.094   0.000      -8.86e-10   -3.12e-10
       _cons |   -1.05248   .2703205     -3.893   0.000      -1.582298   -.5226611
-------------+----------------------------------------------------------------
     /athrho |   .0142742   .0260695      0.548   0.584      -.0368212    .0653695
    /lnsigma |  -.5815187   .0486971    -11.942   0.000      -.6769632   -.4860742
-------------+----------------------------------------------------------------
         rho |   .0142732   .0260642                          -.0368045    .0652765
       sigma |   .5590487    .027224                           .5081578    .6150362
      lambda |   .0079794   .0145125                          -.0204646    .0364234
------------------------------------------------------------------------------
Wald test of indep. eqns. (rho = 0): chi2(1) =     0.30   Prob > chi2 = 0.5840
------------------------------------------------------------------------------
```

Table A.3: 1998 Employment Estimation With Local Unemployment Rate – High School Education or Less

```
Logit estimates                                   Number of obs   =       4476
                                                  Wald chi2(13)   =     150.03
                                                  Prob > chi2     =     0.0000
Log likelihood =  -1780.914                       Pseudo R2       =     0.2529

------------------------------------------------------------------------------
             |               Robust
empstat2 |      Coef.   Std. Err.       z     P>|z|       [95% Conf. Interval]
-------------+----------------------------------------------------------------
   age79 |   -.038997   .0191304     -2.038   0.042       -.076492   -.0015021
  hgcslf |   .0522084   .0293522      1.779   0.075      -.0053208    .1097376
hispanic |  -.0350557   .1270233     -0.276   0.783      -.2840168    .2139054
   black |   .1649882   .1112068      1.484   0.138       -.052973    .3829495
  female |   .2569812   .0968328      2.654   0.008       .0671924      .44677
   marrd |   .3917761   .0923647      4.242   0.000       .2107445    .5728077
      so |   .0412786   .0937623      0.440   0.660      -.1424921    .2250494
newrural |   1.108178   .6703686      1.653   0.098      -.2057205    2.422076
 lnurate |  -.0435404   .1111463     -0.392   0.695      -.2613832    .1743024
nrlurate |  -.5318026   .3658203     -1.454   0.146      -1.248797     .185192
hgcparnt |  -.0175824   .0134722     -1.305   0.192      -.0439875    .0088227
children |   .0137491   .0279403      0.492   0.623      -.0410129    .0685111
   tothr |   .0001357   .0000135     10.018   0.000       .0001092    .0001623
  tothr2 |  -6.80e-10   2.97e-10     -2.285   0.022      -1.26e-09   -9.67e-11
   _cons |  -1.563708    .524104     -2.984   0.003      -2.590933   -.5364832
------------------------------------------------------------------------------
```

Table A.4: 1998 Hourly Wage Estimation With Local Unemployment Rate – More Than High School Education

```
Heckman selection model                         Number of obs      =      2623
(regression model with sample selection)        Censored obs       =       464
                                                Uncensored obs     =      2159

                                                Wald chi2(21)      =   1055.22
Log likelihood = -2406.127                      Prob > chi2        =    0.0000

------------------------------------------------------------------------------
             |               Robust
             |      Coef.   Std. Err.       z     P>|z|       [95% Conf. Interval]
-------------+----------------------------------------------------------------
lnhrwg       |
       age79 |   -.003278    .004657    -0.704   0.481      -.0124055    .0058495
      hgcslf |   .0746036   .0069005    10.811   0.000       .0610788    .0881284
    hispanic |   .0115946   .0307419     0.377   0.706      -.0486583    .0718476
       black |  -.0505677    .025415    -1.990   0.047      -.1003803   -.0007552
      female |   -.141477   .0260566    -5.430   0.000       -.192547    -.090407
       marrd |   .0890568   .0225463     3.950   0.000       .0448669    .1332468
          so |  -.0448759   .0219863    -2.041   0.041      -.0879681   -.0017836
       union |   .0138956   .0406387     0.342   0.732      -.0657548    .0935459
      indbc1 |  -.0623271   .0283327    -2.200   0.028      -.1178581    -.006796
      indbc2 |  -.2048047   .0283809    -7.216   0.000      -.2604303   -.1491792
      indbc3 |  -.3755569   .0418602    -8.972   0.000      -.4576014   -.2935123
      occbc1 |  -.2962722   .0349711    -8.472   0.000      -.3648144   -.2277301
      occbc2 |  -.3090146    .032733    -9.440   0.000        -.37317   -.2448591
      occbc3 |   .0113783   .0270073     0.421   0.674      -.0415551    .0643118
      occbc4 |   -.421747   .0444355    -9.491   0.000      -.5088389    -.334655
      tenure |   .0005646   .0001267     4.455   0.000       .0003162     .000813
     tenure2 |  -3.61e-07   1.36e-07    -2.649   0.008      -6.29e-07   -9.40e-08
       tothr |   .0000233   4.77e-06     4.879   0.000       .0000139    .0000326
      tothr2 |  -1.76e-10   7.34e-11    -2.402   0.016      -3.20e-10   -3.24e-11
    newrural |  -.2801946   .1712129    -1.637   0.102      -.6157657    .0553765
     lnurate |     -.0442   .0237119    -1.864   0.062      -.0906745    .0022745
    nrlurate |      .0446   .0951201     0.469   0.639      -.1418319    .2310319
       _cons |   5.958565   .1586367    37.561   0.000       5.647643    6.269488
-------------+----------------------------------------------------------------
wageobs      |
       age79 |  -.0474519   .0124887    -3.800   0.000      -.0719292   -.0229746
      hgcslf |   .0594139   .0163717     3.629   0.000       .0273259    .0915018
    hispanic |   -.089979   .0845531    -1.064   0.287         -.2557    .0757419
       black |   .1409946   .0750637     1.878   0.060      -.0061276    .2881167
      female |  -.4103127    .061392    -6.683   0.000      -.5306389   -.2899866
       marrd |  -.0468879   .0633527    -0.740   0.459      -.1710569    .0772811
          so |   .0753175   .0565224     1.333   0.183      -.0354644    .1860993
    newrural |  -.4549338   .4747455    -0.958   0.338      -1.385418    .4755503
     lnurate |  -.0826528    .063155    -1.309   0.191      -.2064344    .0411287
    nrlurate |   .3466509   .2724349     1.272   0.203      -.1873118    .8806135
    hgcparnt |   -.035238   .0079059    -4.457   0.000      -.0507331   -.0197428
    children |  -.0391356   .0205149    -1.908   0.056       -.079344    .0010729
       tothr |   .0000789   .0000137     5.740   0.000        .000052    .0001058
      tothr2 |  -3.20e-10   2.80e-10    -1.141   0.254      -8.69e-10    2.30e-10
       _cons |  -.1307772   .3984428    -0.328   0.743      -.9117108    .6501564
-------------+----------------------------------------------------------------
     /athrho |    .121973   .0503845     2.421   0.015       .0232211    .2207249
    /lnsigma |  -.7316999   .0416312   -17.576   0.000      -.8132955   -.6501042
-------------+----------------------------------------------------------------
         rho |   .1213717   .0496423                       .0232169    .2172088
       sigma |   .4810905   .0200284                       .4433945    .5219914
      lambda |   .0583908   .0232907                       .0127419    .1040396
------------------------------------------------------------------------------
Wald test of indep. eqns. (rho = 0): chi2(1) =     5.86   Prob > chi2 = 0.0155
------------------------------------------------------------------------------
```

Table A.5: 1998 Weekly Wage Estimation With Local Unemployment Rate – More Than High School Education

```
Heckman selection model                         Number of obs      =      2623
(regression model with sample selection)        Censored obs       =       464
                                                Uncensored obs     =      2159

                                                Wald chi2(21)      =   1057.26
Log likelihood = -2863.122                      Prob > chi2        =    0.0000

------------------------------------------------------------------------------
             |               Robust
             |      Coef.   Std. Err.       z     P>|z|       [95% Conf. Interval]
-------------+----------------------------------------------------------------
lnwkwg       |
       age79 |   -.016645   .0059231     -2.810   0.005       -.028254   -.0050359
      hgcslf |   .0782242   .0087204      8.970   0.000       .0611325    .0953158
    hispanic |   .0265021   .0366793      0.723   0.470       -.045388    .0983923
       black |   .0138561   .0318003      0.436   0.663      -.0484715    .0761836
      female |  -.2832273   .0310051     -9.135   0.000      -.3439962   -.2224583
       marrd |   .0146067   .0280975      0.520   0.603      -.0404634    .0696768
          so |   .0035801    .026987      0.133   0.894      -.0493135    .0564736
       union |   .1114947   .0500679      2.227   0.026       .0133633     .209626
      indbc1 |  -.0394343    .033515     -1.177   0.239      -.1051224    .0262539
      indbc2 |  -.2569128   .0355916     -7.218   0.000       -.326671   -.1871546
      indbc3 |  -.4295369   .0496005     -8.660   0.000      -.5267521   -.3323216
      occbc1 |  -.2734558   .0452227     -6.047   0.000      -.3620907    -.184821
      occbc2 |  -.2840817   .0409974     -6.929   0.000      -.3644351   -.2037282
      occbc3 |   .0917785   .0321893      2.851   0.004       .0286887    .1548683
      occbc4 |  -.5363156   .0606841     -8.838   0.000      -.6552542   -.4173769
      tenure |   .0007194   .0001516      4.746   0.000       .0004223    .0010164
     tenure2 |  -5.20e-07   1.62e-07     -3.215   0.001      -8.38e-07   -2.03e-07
       tothr |   .0000311   6.42e-06      4.849   0.000       .0000185    .0000437
      tothr2 |  -1.31e-10   9.12e-11     -1.433   0.152      -3.09e-10    4.80e-11
    newrural |  -.0775503   .2201435     -0.352   0.725      -.5090237    .3539231
     lnurate |  -.0399386   .0312427     -1.278   0.201      -.1011731    .0212959
    nrlurate |  -.0655251   .1241189     -0.528   0.598      -.3087936    .1777435
       _cons |   9.544031   .2146691     44.459   0.000       9.123288    9.964775
-------------+----------------------------------------------------------------
wageobs      |
       age79 |  -.0475314   .0125072     -3.800   0.000      -.0720451   -.0230178
      hgcslf |   .0572595   .0162471      3.524   0.000       .0254159    .0891032
    hispanic |  -.0789846    .084584     -0.934   0.350      -.2447663     .086797
       black |   .1535051    .075195      2.041   0.041       .0061256    .3008845
      female |  -.4109185   .0617366     -6.656   0.000      -.5319201   -.2899169
       marrd |   -.044109   .0633131     -0.697   0.486      -.1682004    .0799823
          so |   .0780984   .0567403      1.376   0.169      -.0331104    .1893073
    newrural |  -.4407172    .475791     -0.926   0.354      -1.373251    .4918161
     lnurate |  -.0798842   .0634085     -1.260   0.208      -.2041626    .0443942
    nrlurate |   .3370651   .2730267      1.235   0.217      -.1980573    .8721876
    hgcparnt |  -.0335657   .0077711     -4.319   0.000      -.0487969   -.0183346
    children |   -.039284   .0206007     -1.907   0.057      -.0796607    .0010926
       tothr |   .0000784   .0000138      5.661   0.000       .0000512    .0001055
      tothr2 |  -3.08e-10   2.83e-10     -1.090   0.276      -8.62e-10    2.46e-10
       _cons |  -.1236542   .3980171     -0.311   0.756      -.9037535     .656445
-------------+----------------------------------------------------------------
     /athrho |  -.0076302   .0336773     -0.227   0.821      -.0736364     .058376
    /lnsigma |  -.5222819   .0319841    -16.329   0.000      -.5849696   -.4595942
-------------+----------------------------------------------------------------
         rho |  -.0076301   .0336753                         -.0735036    .0583098
       sigma |   .5931655   .0189719                          .5571228    .6315399
      lambda |  -.0045259   .0199686                         -.0436637    .0346119
------------------------------------------------------------------------------
Wald test of indep. eqns. (rho = 0): chi2(1) =     0.05   Prob > chi2 = 0.8208
------------------------------------------------------------------------------
```

Table A.6: 1998 Employment Estimation With Local Unemployment Rate – More Than High School Education

```
Logit estimates                                   Number of obs   =       3407
                                                  Wald chi2(13)   =      90.10
                                                  Prob > chi2     =     0.0000
Log likelihood = -1034.6596                       Pseudo R2       =     0.2369

------------------------------------------------------------------------------
             |               Robust
empstat2 |      Coef.   Std. Err.       z     P>|z|       [95% Conf. Interval]
-------------+----------------------------------------------------------------
   age79 |  -.0683365   .0255739     -2.672   0.008      -.1184604   -.0182125
  hgcslf |   .1221394   .0357527      3.416   0.001       .0520655    .1922133
hispanic |  -.1711292   .1805652     -0.948   0.343      -.5250305    .1827722
   black |   .2589687   .1538562      1.683   0.092      -.0425839    .5605214
  female |  -.7507444   .1402474     -5.353   0.000      -1.025624   -.4758645
   marrd |   -.112712   .1313885     -0.858   0.391      -.3702288    .1448048
      so |  -.0328751   .1251301     -0.263   0.793      -.2781257    .2123754
newrural |  -.7151046   1.021848     -0.700   0.484       -2.71789    1.287681
 lnurate |  -.0978523   .1397925     -0.700   0.484      -.3718405    .1761359
nrlurate |   .5709972   .5725789      0.997   0.319      -.5512368    1.693231
hgcparnt |  -.0655911   .0171563     -3.823   0.000      -.0992168   -.0319655
children |  -.0543416   .0414384     -1.311   0.190      -.1355594    .0268762
   tothr |   .0001014   .0000281      3.606   0.000       .0000463    .0001565
  tothr2 |   2.58e-10   6.20e-10      0.416   0.677      -9.58e-10    1.47e-09
   _cons |  -.0975307   .8237348     -0.118   0.906      -1.712021     1.51696
------------------------------------------------------------------------------
```