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In August 1996, welfare reform legislation was enacted in the U.S. with the passing of the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA). PRWORA represented a dramatic transformation of the welfare system with greater emphasis being placed on promoting self-sufficiency and increased personal responsibility to find work, coupled with incentives and support programs to help make the transition from welfare to work. The timing of welfare reform coincided with a significant upturn in domestic economic conditions. At 4.2%, the average unemployment rate in 1999 was the lowest in 30 years. Annual inflation was at a low of 2-3%. The number of welfare caseloads declined by about 50% between 1994 and 2000, and after stagnating for decades, a rise in the wages of low-skilled workers was observed in the mid-1990s. The aim of reducing caseloads and increasing labor force participation has serious implications for America's poor population, especially for those living in rural areas.

This paper attempts to explore interactions between welfare reform, employment growth and poverty rates across all U.S. counties for the period 1989 to 1999. What is the relationship between family assistance payments and employment rates at the county level? How does a changing employment rate affect poverty? Are these relationships similar across metro and nonmetro counties? These are the key questions that motivate this research. This research builds upon Goetz, Rupasingha and Zimmerman that models the relation between county-level change in food stamps per capita and the unemployment rate. Spatial autocorrelation is explicitly considered in a simultaneous equation context.

We estimate models for the U.S. overall as well as separate models for metro and nonmetro counties, to consider differentiated impacts by residence. There has been a general consensus that welfare reform seems to be successful because of increased labor participation rates and reduced caseloads. But it cannot be assumed that individuals who have dropped off welfare rolls are now automatically better off.

Variables and Data Sources

Family poverty rates as measured by the U.S. Census Bureau are used here as an indicator of economic well-being. The official poverty rate has documented shortcomings – it does not account for geographic differences in cost-of-living, is based on income as opposed to consumption and does not account for government transfer payments and does not adjust for changes in consumption patterns. However, the alternatives that have been proposed have not yet been incorporated into the official statistics (Jensen, Goetz and Swaminathan). Counties are the unit of analysis and county-level data are available from secondary sources: the 1990 and 2000 U.S. Census of Population and Housing, Summary File 3, County Business Patterns, USA Counties and the Regional Economic Information System from the Department of Commerce.

The paper first estimates the impact of a change in per capita family assistance receipts (1989-99) on the change in the employment rate (1989-99). We then examine the impact of the 1989-99 change in employment on the change in family poverty rates for the same period (insert footnote 1 here). Change in per capita family assistance reflects changing welfare expenditures at the county level in response to PRWORA. This

variable captures changes in intensity of program use (welfare dependency) since implementation. The poverty equation specification is guided by Goetz and Rupasingha.

Variables in the employment change and poverty change equations are measured at the initial time period, 1990, to reduce problems of endogeneity. Individual-level characteristics (age composition, educational attainment, race, percent of foreign-born population, prevalence of self-employment, percent of female-headed households), aggregated at the county level are included in the analyses (insert footnote 2 here). A dissimilarity index (ISC) is used to capture changing industrial structure. This index is based on the sum of absolute changes in the share of one-digit industry employment between two periods divided by two and captures a lack of diversity in the local economy (Goetz and Rupasingha). Percentage of employment in selected industries and initial family poverty rate are also included. Construction employment is used as the reference category. Two variables are used to control for the social and political characteristics of the county: social capital and political competition. The social capital index (SCI) is a composite measure that includes data on membership associations, voting records, the county-level response rate to the Census Bureau's decennial census, and the number of tax-exempt non-profit organizations from the National Center for Charitable Statistics that were compiled from a number of sources, including County Business Patterns (Goetz and Rupasingha). The political competition variable is based on the absolute difference between the county vote for the Democratic Presidential candidate and the national average for that candidate in the elections. This variable is essentially a measure of the dominance of a single party at the county level.

Availability of child care and lack of public transportation services are factors that can impede employment, and we use the number of child care centers, and inter-city/rural bus services available per 10,000 residents at the county-level. The rural-urban continuum (Beale) codes are used to construct dummy variables for categorizing nonmetro counties based on adjacency to a metro area and their population density.

Methods

Simultaneity. Recognizing that the dependent variables, *i.e.,* change in family assistance receipts, change in employment rates and change in family poverty at the county level are jointly determined, the paper uses an instrumental variables approach. Changing safety-net use is expected to be related to labor force participation rates and, hence, to employment rates. The change in the employment rate is estimated using the two-stage-least squares (2SLS) technique, with the change in family assistance receipts per capita as an endogenous regressor. The change in poverty equation is also estimated using 2SLS where we treat the change in employment rate variable as an endogenous regressor (insert footnote 3 here). The number of Aid to Families with Dependent Children caseloads per capita and number of food stamp caseloads per capita at the state level were used to achieve identification in the employment change model. The industry dissimilarity index, 1990 employment rate, and numbers of child care centers and inter-city/rural bus services were the identifying variables in the poverty change equation. The equations estimated are:

(1) $\Delta emprate = f(\Delta fareceipt, \mathbf{x}_1) + u_1$

(2) $\Delta familypoverty = f(\Delta emp, \mathbf{x}_2) + u_2$

where Δ*emprate* is the change in the employment rate, Δ*familypoverty* is the change in the family poverty rate, Δ*fareceipt* is the (predicted) change in per capita family assistance receipts, Δ*emp* is the (predicted) change in the employment rate, $\boldsymbol{x}_1$ and $\boldsymbol{x}_2$ are a set of exogenous regressors, and finally, u_1 and u_2 are the error terms.

Spatial Issues. There is a growing literature on the spatial characteristics and clustering of poverty. The spatial clustering of poverty implies that welfare dependency will also exhibit a similar spatial pattern. Figure 1 shows a spatial clustering in the change in per capita family assistance receipts for 1989-99 at the county level. This clustering reflects those areas of the country where poverty has been historically high. Clustering of changes in employment and poverty rates are also evident (see figures 2 and 3). Not correcting for spatial dependence can lead to model misspecification that may result in biased and inconsistent OLS estimates (Anselin).

Two different specifications are available to correct for the resulting spatial dependence bias. In the spatial auto-regressive model, spatial dependence operates through a spatially-lagged dependent variable. The spatial error model is relevant in cases where spatial dependence operates through a disturbance term. When spatial dependence exists in both spatially lagged dependent variables and the disturbance, the general spatial model is appropriate. This model nests the spatial lag and the spatial error structures:

(3) $$y = \rho W(y) + x\beta + u$$

$$u = \lambda W u + \varepsilon$$

$$\varepsilon \sim N(0, \sigma^2 I_n)$$

where y is an $nx1$ vector of the dependent variable, x is an nxk matrix of independent variables, and W is a spatial weights based either on distance or contiguity. The spatial autoregressive parameter is denoted ρ (a scalar), while λ is the (scalar) spatial error coefficient and β represents the k parameters of the explanatory variables to be estimated. If spatial dependence exists in the error structure based on a spatial autoregressive model estimation, this is the appropriate model (LeSage). We use LeSage's Spatial Econometrics Toolbox for MATLAB™ to estimate the spatial econometric models.

The appropriate specification for the poverty and employment equations is the general spatial model, as the results will later show that both λ (error coefficient) and ρ (autoregressive parameter) are significant. Simultaneity in spatial models is handled by the technique described in Henry, Schmitt and Piguet. They report two ways of correcting the bias – the first method suggested by Anselin involves regressing the dependent variable on the exogenous variables to obtain predicted values, which are then multiplied by the spatial weight matrix. The second method uses the predicted values of the dependent variables obtained by regressing the spatially lagged dependent variables on the instruments. Following Goetz, Rupasingha and Zimmerman, we use the first method.

Econometric Results

Increases in the employment rate. The overall U.S. employment rate increased over 1989-99, resulting in an endogenous variable with an upward trend. Thus, a positive estimated coefficient in the employment change equation indicates a beneficial effect on employment rates. A negative coefficient detracts from employment growth.

The model results in table 1 show that areas with higher initial 1990 employment rates had smaller increases in employment rates. Inclusion of this variable serves to control for initial conditions, and had the expected result: counties where employment rates were initially high, employment grew less than where unemployment rates were high at the beginning of the 1990s. Further, counties characterized by higher levels of education also saw less improvement, implying that those counties with the lowest levels of education witnessed greater employment increases.

However, the results also show that areas with the higher rates of family poverty also were also less likely to be affected by the higher employment growth observed elsewhere in the 1990s. Higher local concentrations of female-headed households and nonblack minorities had similar results. Neither the child care nor public transportation variable coefficient was statistically significant. Further, the predicted change in family assistance coefficient, while statistically significant and negative in the uncorrected equations, was no longer statistically significant in the corrected (spatial) equations. This result shows the importance of correcting for the effects of spatial autocorrelation.

Reductions in poverty rates. Over the 1990s, poverty rates were observed to decline in the U.S., as previously noted. Thus, in the estimated models which reflect 1989-99 changes in poverty rates (1999 minus 1989), a positive estimated coefficient indicates that the variable has the effect of worsening poverty relative to the mean reduction in poverty; a negative coefficient shows that the variable contributes to improvement (reductions) in poverty rates (Jensen, Goetz and Swaminathan).

The results of the spatially-corrected models in table 2 show that, in general, poverty rates over the 1990s declined more in those counties with higher poverty rates at the beginning of the decade. It is reasonable to expect that counties already characterized by low poverty rates would have lower reductions in poverty rates compared to places where poverty is more prevalent. Educational attainment variables also show reasonable results: higher concentrations of high school graduates and those with some college or vocational training contributed to lower poverty rates than where lower levels of education were more predominant. Counties with the highest college completion rates did not show appreciable differences from those with higher concentrations of the very poorly educated. This result hints that it the most highly-educated counties (as measured by the college educated) and the most poorly-educated counties (as measured by the reference category) showed no difference in reduction rates in poverty (both low) but that counties characterized by high school graduates and vocational school, were better off.

Poverty rates in metro areas declined less, on average, where greater concentrations of female-headed households were observed and (in metro areas and overall) when the foreign-born population was more concentrated. Poverty in rural areas declined less in areas with higher concentrations of nonblack minorities (primarily Hispanic or Latino populations). In rural areas, higher levels of social capital and more self-employment reduce county-wide poverty rates. Further, poverty declined less in the 1990s with less political competition at the local level; however, this variable may be endogenous with poverty.

Finally, in metro areas, increases in employment also translated into reductions in the poverty rate. But this is not the case for the nonzero counties where greater employment failed to reduce poverty rates, likely reflecting the lower wage levels and greater prevalence of seasonal and involuntary part-time employment there. Other forces contributed to the reductions in poverty witnessed in nonzero areas.

Discussion

Changes in welfare policy under PRWORA were accompanied by reductions in welfare caseloads and poverty rates, as employment rates increased. A key question for rural areas was whether changes in policy that sought to put poor people on welfare assistance to work was whether this policy change could reduce poverty rates in rural areas, due to the weak job prospects there. For rural areas, it appears that the answer to this important question is no. This effect is only found for metro areas.

Further, the results of the estimated models hint that not everyone in the U.S. benefited to the same extent by the rising employment rates of the 1990s. The study results show that the greatest increases in employment rates occurred in counties where there was room for improvement in employment rates but not where populations facing greater barriers, e.g., female household heads and minorities, were more concentrated. For these populations, the relationships between their employment, their continuation in poverty and their receipt of public assistance are extremely complex. 'People' in these 'places' pose the greatest challenge.

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Footnotes

1. The family assistance variable is available from the Regional Economic Information System. Through 1995, it consists of emergency assistance and Aid to Families with Dependent Children (AFDC). From 1998, it consists of benefits provided under Temporary Assistance to Needy Families (TANF). For 1996-97, it consists of payments under all three of these programs.

2. The race/ethnicity variable used in this paper is nonblack minority (principally Hispanic or Latino), since African-American black was highly correlated with female-headed household.

3. Ideally, we should be using a three-stage-least squares (3SLS) approach where all the three equations are jointly determined and which also allows for correlation between the error terms of the equations. We are unable to estimate such a model, because to the best of our knowledge, techniques to incorporate spatial dependence in 3SLS have not yet been developed.

Table 1. Changes in County-Level Employment in the 1990s, United States

	All Counties		Metro		Nonmetro	
Variables	**2SLS**	**Spatial**	**2SLS**	**Spatial**	**2SLS**	**Spatial**
Constant	33.1310***	32.8946***	52.1789***	51.5676***	30.6416***	30.9999***
Family poverty rate, 1989	-0.0531***	-0.0575***	-0.1129***	-0.1207***	-0.0474***	-0.0493***
% Age 18-24 years, 1990	-0.1245***	-0.1488***	-0.1621***	-0.1691***	-0.1177***	-0.1425***
% Age 25-64 years, 1990	-0.0092	-0.0145	-0.0623*	-0.0439*	0.0042	-0.0056
% Age >= 65 years, 1990	-0.0424***	-0.0488***	-0.0540**	-0.0438**	-0.0414**	-0.0470***
% Non-African American minority, 1990	-0.0357***	-0.0462***	-0.0212*	-0.0133	-0.0380***	-0.0518***
% Female-head, 1990	-0.1466***	-0.1122***	-0.2073***	-0.1870***	-0.1323***	-0.0983***
% Grades 9-12, 1990	-0.0586***	-0.0536***	-0.0734**	-0.0855***	-0.0594***	-0.0559***
% High school grad., 1990	-0.0623***	-0.0573***	-0.1031***	-0.1011***	-0.0557***	-0.0507***
% Some college or assoc. degree, 1990	-0.0963***	-0.0775***	-0.1175***	-0.1124***	-0.0965***	-0.0774***

% College degree, 1990	-0.0364***	-0.0315**	-0.0818***	-0.0875***	-0.0274	-0.0245
Beale code 4	0.0127	0.0658	--	--	--	--
Beale code 5	-0.1408	-0.1405	--	--	-0.1649	-0.2086
Beale code 6	0.3011**	0.3443***	--	--	0.2828	0.2626
Beale code 7	0.0311	-0.0471	--	--	0.0236	-0.0639
Beale code 8	0.0618	0.1230	--	--	0.0139	0.0331
Beale code 9	0.1298	0.1118	--	--	0.1094	0.0873
% Manufacturing, 1990	-0.0046	-0.0088	0.0181	0.0155	-0.0118	-0.0173
% Ag. and related, 1990	-0.0735***	-0.0578***	-0.1112***	-0.0845***	-0.0756***	-0.0633***
% Trans. and related, 1990	-0.0217	-0.0209	-0.0352	-0.0260	-0.0145	-0.0210
% Trade, 1990	0.0071	0.0160	0.0538**	0.0466**	-0.0026	0.0109
% FIRE, 1990	0.0227	-0.0119	0.0879**	0.0544	-0.0032	-0.0356
% Services, 1990	-0.0632***	-0.0618***	-0.0014	-0.0013	-0.0756***	-0.0730***
ISC, 1988-90	0.0310***	0.0255***	0.8658***	0.8938***	0.0281***	0.0253***
Child care, 1990	0.0045	0.0211	-0.0956	-0.0285	0.0168	0.0281

Public trans., 1990	-0.1516	-0.0146	-0.0217	-0.0260	0.0690	0.1946
Predicted change in public assistance, 1989-99	-0.0134***	-0.0029	-0.0117***	-0.0065	-0.0135***	-0.0021
Employment, 1990	-0.2102***	-0.2152***	-0.3689***	-0.3737***	-0.1894***	-0.1982***
ρ	--	0.3180***	--	0.3040***	--	0.2810***
λ	--	0.0590***	--	0.0900***	--	0.0490***
Number observations	3047	3047	801	801	2246	2246
R^2	0.2732	0.3405	0.4158	0.4830	0.2543	0.3019

***, **; and * denote significance level at 0.01, 0.05 and 0.10, respectively.

Table 2. Changes in County-Level Poverty in the 1990s, United States

	All Counties		Metro		Non-metro	
Variables	**2SLS**	**Spatial**	**2SLS**	**Spatial**	**2SLS**	**Spatial**
Constant	9.9667***	11.8432***	8.8072***	5.3276***	13.1950***	14.3641***
Family poverty rate, 1989	-0.4796***	-0.4835***	-0.4048***	-0.3854***	-0.4963***	-0.5023***
% Age 18-24 years, 1990	-0.0512**	-0.0519***	-0.0401	-0.0032	-0.0788***	-0.0779***
% Age 25-64 years, 1990	-0.0434**	-0.0591***	-0.0486*	-0.0347*	-0.0521**	-0.0649***
% Age >= 65 years, 1990	-0.0173	-0.0201	0.0246	0.0210	-0.0436**	-0.0456**
% Non-African American minorities, 1990	0.0462***	0.0484***	0.0064	0.0088	0.0470***	0.0504***
% Female-head, 1990	0.2248***	0.2206***	0.1129***	0.1426***	0.2307***	0.2281***
% Foreign pop., 1990	0.0583***	0.0440***	0.1317***	0.1073***	0.0345	0.0302
% Grades 9-12, 1990	0.0155	0.0057	0.0470	0.0491*	0.0012	-0.0057
% High school grad., 1990	-0.0628***	-0.0719***	-0.0415**	-0.0315**	-0.0803***	-0.0862***
% Some college or assoc.	-0.0625***	-0.0709***	-0.0365**	-0.0209*	-0.0786***	-0.0852***

degree, 1990						
% College degree, 1990	-0.0170	-0.0221	-0.0380**	-0.0276	-0.0082	-0.0115
Social capital index, 1990	-0.2715***	-0.2692***	-0.0356	-0.0610	-0.3150***	-0.3210***
Political competition,1988	0.0185***	0.0190***	0.0078	0.0103	0.0222***	0.0227***
% Manufacturing, 1990	-0.0424***	-0.0425***	-0.0485***	-0.0410***	-0.0464***	-0.0439***
% Ag. and related, 1990	0.0421***	0.0358***	-0.0284	0.0018	0.0404***	0.0385***
% Trans. and related,	-0.0161	-0.0150	-0.0379	-0.0302	-0.0140	-0.0105
1990						
% Trade, 1990	-0.0462***	-0.0497***	-0.0050	0.0020**	-0.0619***	-0.0633***
% FIRE, 1990	-0.1580***	-0.1420***	-0.0977***	-0.0769**	-0.1605***	-0.1682***
% Services, 1990	-0.0336**	-0.0333***	-0.0369**	-0.0177	-0.0379**	-0.0354**
% Self-employed, 1990	-0.01211*	-0.0324***	-0.0360***	-0.0446***	-0.0292***	-0.0215*
Beale code 4	0.4569**	0.4449**	--	--	--	--
Beale code 5	0.7856***	0.7855***	--	--	0.3322	0.3352
Beale code 6	0.1094	0.1012	--	--	-0.3736*	-0.3667*

Beale code 7	0.6041***	0.6132***	--	--	0.1391	0.1444
Beale code 8	0.1156	0.1507	--	--	-0.4431*	-0.3890
Beale code 9	0.7741***	0.8002***	--	--	0.2701	0.2958
Predicted emp. chg,	-0.0311	-0.0660	-0.2431***	-0..1033*	-0.0385	-0.0625
ρ	--	0.0460**	--	0.1100***	--	0.0130***
λ	--	0.0908***	--	0.0800***	--	0.0730***
Number observations	3047	3047	801	801	2246	2246
R^2	0.5203	0.5325	0.6137**	0.6199	0.4864	0.4953

***, **; and * denote significance level at 0.01, 0.05 and 0.10, respectively.

Figure 1. Changes in Per Capita Family Assistance Receipts, 1989-99

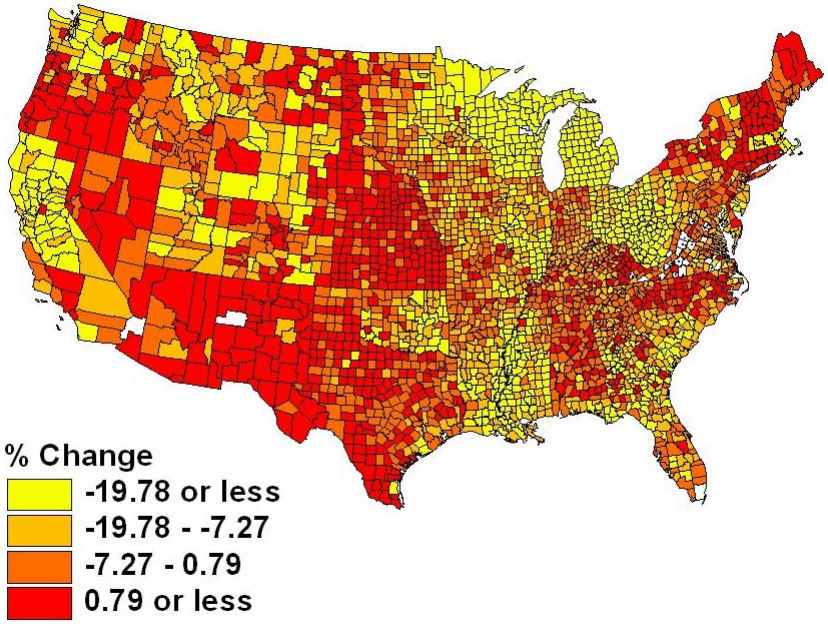

Figure 2. Changes in Employment Rates, 1989-99

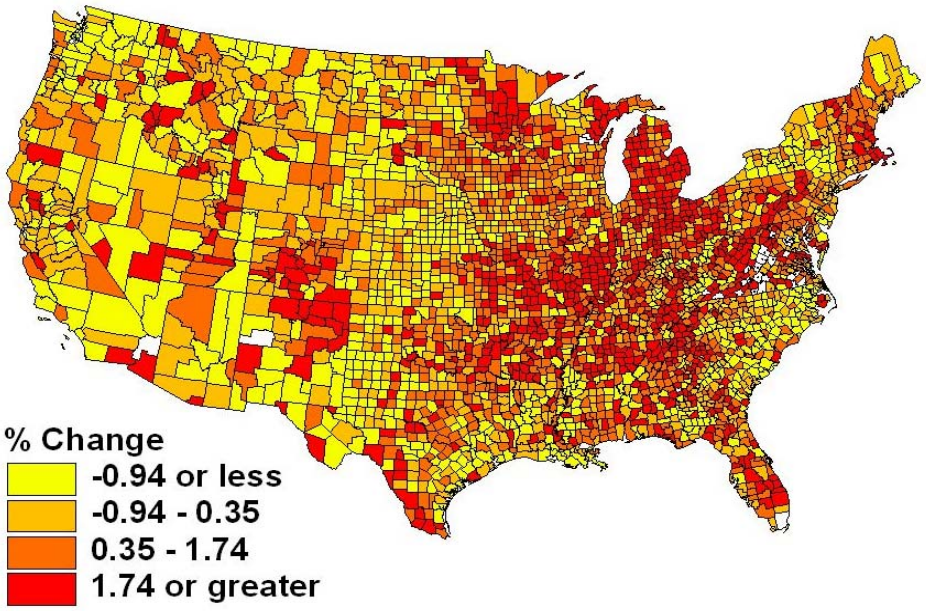

Figure 3. Changes in Family Poverty Rates, 1989-99