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Changes in the Well-Being of Nonmetropolitan Single-Mother Families: A Semi-Parametric Analysis

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In nonmetropolitan areas of the United States, single-mother families contain a majority of children living below the poverty line. Changes between 1992 and 2000 in the economic well-being of nonmetropolitan single-mother families are examined using kernel density estimation and density reweighting methods. The results show that increased educational levels of single mothers and the strengthening of area economic conditions explain much of the observed gains in the economic well-being of this family group. But temporal changes in propensities to work and to be on welfare from 1992 to 2000 have also contributed to observed gains.

Key words: family well-being, nonmetropolitan, nonparametric estimation, single mothers, welfare reform

Introduction

The 1996 Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) represents the most important change in U.S. social welfare policy in recent decades. The basic goal of this welfare reform legislation is to move family heads off welfare and into the workforce through work requirements and time eligibility restrictions on the receipt of federally funded cash assistance. Single-mother families, as the primary recipient group of federally funded cash assistance payments, stand to be most affected by reforms. Special concern for the well-being of this group is justified by equity considerations. According to U.S. Bureau of the Census 1993 *Current Population Survey* data, in 1992, before significant implementation of state-specific waiver programs that were precursors to welfare reform initiatives, 50% of nonmetropolitan single mothers lived below the poverty line, while another 10.4% were near-poor (with income levels between 1.0 and 1.25 times the poverty line). Further, over half of all nonmetropolitan children in poverty lived in single-mother families (U.S. Department of Commerce, Bureau of the Census).

Families that become ineligible for welfare benefits due to reform measures, but whose head does not enter the workforce, face the loss of a significant source of income. Thus welfare reform measures have the potential to reduce the income levels of some poor and near-poor single-mother families and increase the need for communities to find alternative forms of assistance to ameliorate economic hardships.

Several studies have expressed concerns that single mothers may face particular difficulties in transiting from welfare to work in nonmetropolitan areas due to relatively

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weak demand for the labor market skills of family heads, greater childcare and transportation barriers to workforce participation, and economies of scale in delivery of public programs to assist in transition (see, among others, Whitener; Goetz and Freshwater; Findeis and Jensen). However, observed changes in the well-being of nonmetropolitan single-mother families immediately following the implementation of reform measures generally do not support these concerns.

Studies using data from the period immediately following the implementation of welfare reform measures have typically focused on three factors: changes in welfare caseloads, changes in workforce participation, and changes in family economic well-being (for a review of studies, see Weber, Duncan, and Whitener). Findings from these analyses show welfare caseloads have generally declined less in nonmetropolitan areas than in metropolitan areas (Henry et al.; Ziliak and Figlio), while workforce participation by single mothers has increased in both nonmetropolitan and metropolitan areas (McKernan et al.; Mills and Hazarika). The analysis of changes in the economic well-being of single-mother families is more limited, but Lichter and Jensen report a moderate decline in the incidence of poverty among nonmetropolitan single-mother families between 1989 and 1998. Linking changes in these factors directly to welfare reform measures is complicated by the fact that a key welfare reform component—work requirements—was just becoming binding for welfare recipients in most states in 1998.

More recent aggregate indicators of economic well-being presented in this paper suggest that as of 2000, nonmetropolitan single-mother families have still made economic gains during the implementation of welfare reform initiatives. Yet, the underlying sources of these economic gains and their distribution among families remain unclear. Are gains attributable to incentives created by work requirements and lifetime benefit limits for single mothers to leave welfare and enter the workforce? Alternatively, are observed economic gains the result of changes in the human capital and other characteristics of single mothers or changes in economic conditions in areas where they live? After all, there have been significant concurrent changes in public assistance programs, economic conditions, and family characteristics. The objective of this study is to identify the underlying causes of recent shifts in the economic well-being of nonmetropolitan single-mother families over the period 1992 through 2000.

Creating Incentives for Workforce Participation

The most notable reform under PRWORA is the replacement of the Aid to Families with Dependent Children (AFDC) program for public cash assistance payments with state-specific cash assistance programs funded by federal Temporary Assistance to Needy Families (TANF) block grants. The move from federal matching funds to block grants allows states to retain cost savings as caseloads decline. Further, TANF grant guidelines require that able-bodied single mothers perform community service within two months of receiving assistance, work within two years of receiving assistance, and set five-year cumulative limits on the receipt of TANF funds. A number of exemptions are attached to these requirements. The most notable is that states can exclude up to 20% of families from cumulative time limits and can exclude mothers with children under six years of age from work requirements if childcare is unavailable.

As part of the emphasis on work, greater restrictions are placed on the amount of time spent in education and workforce training activities which can be applied to workforce participation requirements, and states are penalized with grant reductions for

failures to meet specific workforce participation targets among current caseloads. The autonomy to set more stringent cash assistance eligibility requirements than mandated under TANF is also provided to states (see Gallagher et al. for a review of state guidelines). Jointly, the reforms provide states with clear incentives to reduce welfare rolls. The incentives to ensure that recipients work after leaving welfare are less direct.

At the same time constraints to the continued participation in public cash assistance programs were being developed, wage subsidies significantly increased the expected earnings of working single mothers. The minimum wage increased from $4.41 to $5.15 in real 1999 dollars between 1989 and 1998 (Blank 2000). The Earned Income Tax Credit (EITC), which provides an earnings subsidy to low-income workers, increased even more dramatically. Between 1989 and 1998, the maximum annual EITC for a single mother with one child increased by $1,074 in 1999 dollars, while the maximum subsidy for a family with two children increased by $2,559.

Information on nonmetropolitan area-specific factors underlying shifts in the economic well-being of single-mother families is particularly valuable in light of the above changes because TANF block grants can be used for a wide array of activities to assist needy families and to end dependency of families on government benefits. Further, the 1997 Balanced Budget Act allocated $3 billion in "Welfare-to-Work" grants to match state funding of activities specifically designed to move TANF recipients into unsubsidized employment. For example, if welfare-to-work transitions and observed gains in economic well-being are found to be strongly associated with increases in the human capital of nonmetropolitan single mothers, regional initiatives to support human capital investments can be developed. Alternatively, if economic conditions in poor areas create a major barrier to successful welfare-to-work transitions, then states can differentiate targeted assistance to economically depressed nonmetropolitan regions.

Data

The 1993 and 2001 annual demographic files of the *Current Population Survey* (CPS) (U.S. Department of Commerce, Bureau of the Census) are the main data sets used in the analysis. The CPS is a nationally representative survey of U.S. families. The 1993 CPS measures family well-being in 1992, the period immediately prior to the implementation of state-specific waiver programs which were precursors to welfare reform initiatives. The 2001 CPS is the most recently available and depicts economic well-being in 2000, when federal workforce participation requirements for TANF recipients had become binding. The CPS annual demographic files contain data on earnings, public assistance, and "other" receipts of nonmetropolitan single-female-headed families over the previous calendar year, as well as family-head and family characteristics. The value of all 1992 receipts is adjusted to December 2000 dollars using the Urban Consumer Price Index (CPI).

Public assistance receipts include public cash assistance payments and the imputed value of benefits from Food Stamp and Medicaid programs.[1] "Other" receipts include

[1] Imputed values of noncash benefits are based on CPS datafile calculations. Food Stamp receipts are set equal to their face value. Medicaid receipts are imputed as the amount of family income, up to the amount of mean Medicaid outlays for families in the risk class, available for medical care after basic food and housing needs were met. For more information on the progressive discounting of Medicaid benefits among poorer families, see U.S. Department of Commerce (1992). No attempt is made to impute the noncash benefits from employment, such as health insurance, in the analysis. Similarly, costs associated with employment, like childcare, are not included.

social security, supplemental security benefits, disability payments, unemployment compensation, retirement payments, dividend and interest payments, child support and alimony, financial assistance, and the imputed value of Medicare.

Samples of 1,022 and 747 nonmetropolitan single mothers 18 to 64 years of age are drawn from the 1993 and 2001 surveys, respectively. The smaller number of single-mother families in the 2001 CPS is due to fewer families of all types, as single-mother families represent 9.5% of all nonmetropolitan families in both the 1993 CPS and the 2001 CPS.

Nonmetropolitan residence is based on 1993 U.S. Bureau of the Census county designations. Generally, nonmetropolitan counties have no city or population cluster greater than 50,000 persons and a total population of less than 100,000 persons (75,000 persons in New England). Because the specific county of residence within a state is withheld in the *Current Population Survey* data, average 1992 and 2000 area unemployment rates are calculated for nonmetropolitan areas of each state by aggregating Bureau of Labor Statistics employment and unemployment data for nonmetropolitan counties within the state.

Descriptive statistics on family per capita receipts and the earnings, public assistance, and "other" components of receipts are presented in table 1. Average nonmetropolitan per capita receipts of single-mother families show a significant increase in real December 2000 dollars from 1992 to 2000. This average increase is fueled by growth in the "earnings" component of per capita receipts, as average cash and noncash payments from public assistance programs show a significant decline over the same period and "other" income remained essentially level.

Descriptive statistics on attributes of single mothers also show significant shifts between 1992 and 2000.[2] In 1992, 22.6% of nonmetropolitan single mothers did not have a high school degree, but by 2000, this statistic had dropped to 19.3%. Similarly, the proportion of nonmetropolitan single mothers with education beyond high school showed a significant increase from 35.6% in 1992 to 42.7% in 2000.[3] On the other hand, nonmetropolitan single mothers are noticeably less likely to have been previously married in 2000 than in 1992. Nonmetropolitan single mothers are also less likely to be Black in 2000 than in 1992. This finding is consistent with the recent national increase in the rate of illegitimate births among Whites, but a constant rate among Blacks (Murray). Single mothers are also more likely to be Hispanic in 2000 than in 1992.

Nonmetropolitan area economic conditions also improved dramatically between 1992 and 2000. Single mothers faced an average unemployment rate of 8% for all nonmetropolitan counties within the state in 1992. In 2000, the average area unemployment rate had declined to 5.1%. Concurrent with the above changes, the proportion of nonmetropolitan single mothers who did not report working in the calendar year declined from 28.3% to 17.2% between 1992 and 2000, while the portion on welfare decreased more rapidly, from 27.5% to 11.1% over the same period (table 1).

[2] Note that the CPS sample frame changed between 1993 and 1994, but these changes had little impact on the composition of the sample (Cohany, Polivka, and Rothgeb).

[3] See Meyer and Sullivan for evidence of similar national changes in education levels of single mothers during the 1990s using alternative data sets.

Table 1. Receipts and Attributes of Nonmetropolitan Area Single-Mother Families, 1992 and 2000

	1992		2000	
Variable	Mean	Std. Error	Mean	Std. Error
Per Capita Total Receipts ($): [a]	6,984.33**	175.97	8,351.59	279.74
Earnings	4,529.48**	166.18	6,276.94	262.78
Other	1,465.61	93.93	1,469.93	100.91
Public assistance	989.24**	42.38	604.73	32.01
Area Unemployment (%)	0.080**	0.001	0.051	0.001
Education:				
Below high school	0.226*	0.013	0.193	0.014
High school degree	0.418	0.015	0.380	0.018
Some college	0.274**	0.014	0.321	0.017
College degree	0.082*	0.009	0.106	0.011
Age (years)	34.513	0.253	34.976	0.331
Children:				
Under age 6	0.546	0.024	0.534	0.028
Age 6 to 17	1.309	0.032	1.308	0.037
Race (White = 0):				
Black	0.183**	0.012	0.137	0.013
Other non-White	0.062	0.008	0.064	0.009
Ethnicity (non-Hispanic = 0):				
Hispanic	0.052**	0.007	0.111	0.012
Never Married	0.235**	0.013	0.325	0.017
Work/Welfare Status (%):				
Not in workforce, not on welfare	11.8		12.5	
In workforce, not on welfare	60.7		76.4	
In workforce, on welfare	11.0		6.4	
Not in workforce, on welfare	16.5		4.7	
No. of Observations	1,022		747	

Sources: U.S. Department of Labor/Bureau of Labor Statistics; U.S. Department of Commerce/Bureau of the Census, *Current Population Surveys*, March 1993 and March 2001.

Notes: Single and double asterisks (*) denote 1992 and 2000 nonmetropolitan means are significantly different at the $p = 0.10$ and $p = 0.05$ levels, respectively, based on a two-tailed t-test.

[a] All receipts are in December 2000 real dollars. Earnings are defined as wage and self-employment income (including farming). Other income is defined as unemployment, social security, supplemental social security, veterans, disability, retirement, interest, dividend, rental property, child support, alimony, educational assistance, and other miscellaneous income sources. Public assistance income is defined as cash public assistance payments, as well as the imputed value of Food Stamps, Medicaid, and federal housing subsidy programs.

Nonparametric Density Estimates

A comparison of means provides limited information on the nature of shifts in the underlying distribution of per capita total receipts of nonmetropolitan single-mother families between 1992 and 2000. For example, welfare reform measures and wage subsidies may have induced some single mothers to enter the workforce and increase the economic well-being of their families. However, these gains may have been partially offset by a worsening of well-being among the families of single mothers who left the welfare rolls due to work requirements, but were not able to enter the workforce.

Therefore, nonparametric kernel density estimators are employed to visualize the distributions and identify where shifts occurred without imposing the rigid assumptions associated with a parametric specification of the distribution.

Kernel Density Estimation

The kernel density estimator can be specified as:

$$\hat{f}(w) = \frac{1}{nh}\sum_{i=1}^{n} K\left(\frac{w - W_i}{h}\right), \tag{1}$$

where n is the number of observations, W_i are sample observations, h is the bandwidth of the kernel estimator, and K denotes the kernel. The choice of bandwidth is crucial in density estimation. An adaptive bandwidth estimator is employed that minimally increases in the mean square error for normal distributions and does not exhibit the same tendency to oversmooth skewed unimodal and bimodal distributions as the optimal bandwidth selector for normal distributions (Silverman).[4]

Because the number of observations in the 1993 and 2001 CPS samples of nonmetropolitan single mothers differs, the bandwidth for initial density estimates is calculated using the pooled 1993 and 2001 samples. Calculation of the bandwidths with pooled data ensures the separate density estimates for well-being in 1992 and 2000 are undersmoothed, a less serious problem for exploratory data analysis than oversmoothing. Density estimates are less dependent on the choice of kernel than on the choice of bandwidth. The Epanechnikov kernel is used because it is optimal among nonnegative kernels in minimizing the integrated mean square error (Silverman).

Results of Kernel Density Estimation

Kernel density estimates of the distributions of the logarithms of 1992 and 2000 real per capita annual family receipts are presented in figure 1A.[5] A graph of the change in estimated density between 1992 and 2000 at each per capita receipt level is presented at the bottom of figure 1A. The graph suggests economic gains have been broad based. The decrease in estimated density between $1,000 and $6,000 per year indicates a decrease in the share of families with per capita receipts in this range. Similarly, an increase in density above $6,000 indicates an increase in the share of families with these higher levels of per capita receipts.

This rightward shift at the upper end of the distribution is consistent with the widely publicized growth in single motherhood among older and relatively well-off women. A Kolmogorov-Smirnov test of the equality of the 1992 and 2000 distributions reveals the rightward shift in the 2000 distribution is statistically significant at the $p = 0.01$ level. The potential impact of changes in age and other characteristics of family heads which may be associated with this general increase in economic well-being between the two cross-sectional data sets will be accounted for later in the analysis. It is also worth noting that a very small increase occurred in the share of families with very low levels of per capita receipts (less than $1,000 per year).

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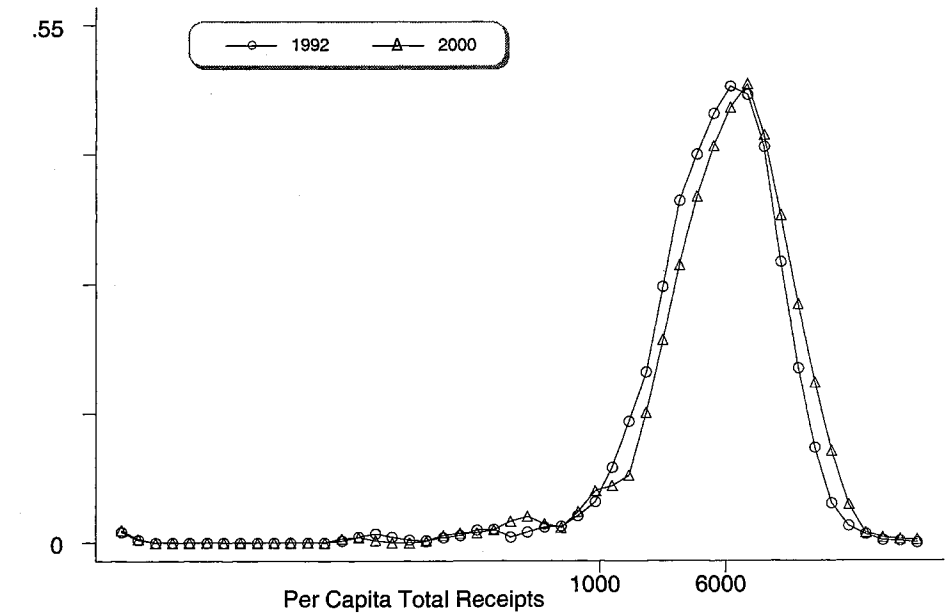
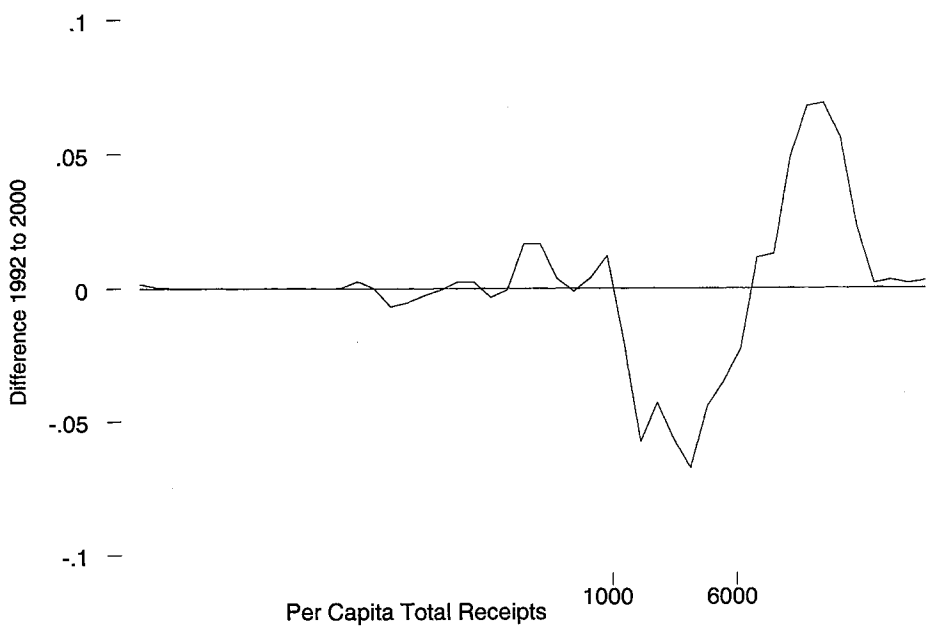
[4] The adaptive bandwidth formula is written as: $h = 0.9An^{-1/5}$, where A = min(standard deviation, interquartile range/1.34).

[5] Bandwidths used in per capita total receipts kernel density estimates, as well as earnings and public assistance components of total receipts density estimates, are also reported in the figures.





Notes: Bandwidth = 0.168; the horizontal axis for all figures is log-scaled.

Figure 1A. Nonparametric density estimates: Nonmetropolitan per capita total cash and noncash receipts

The distribution of the per capita earnings component of per capita receipts also shows a significant rightward shift ($p = 0.01$ level in a Kolmogorov-Smirnov test) between 1992 and 2000 (figure 1B). The increased share of families with positive wage and self-employment earnings accounts for a major portion of this shift. As indicated in the graph depicting the change in density at the bottom of figure 1B, the share of single-female-headed families with zero per capita earnings and per capita earnings slightly under $2,000 per year decreased, while the share with per capita earnings above $2,000 per year increased.

The distribution for per capita public assistance, by contrast, shows a significant ($p = 0.01$ level in a Kolmogorov-Smirnov test) leftward shift between 1992 and 2000 (figure 1C). Density estimates for per capita public assistance in both periods are concentrated around zero and relatively low positive levels. However, when compared to the 1992 distribution, the 2000 distribution of per capita public assistance payments reveals a slight increase in families with no public assistance receipts and receipts in the $150 to $1,200 per year range, as well as a decrease in per capita public assistance benefits in the $1,500 to $15,000 per year range. The density for the residual "other" category of cash and noncash receipts (not shown) also reveals a weak rightward shift from 1992 to 2000 (at the $p = 0.10$ level in a Kolmogorov-Smirnov test).

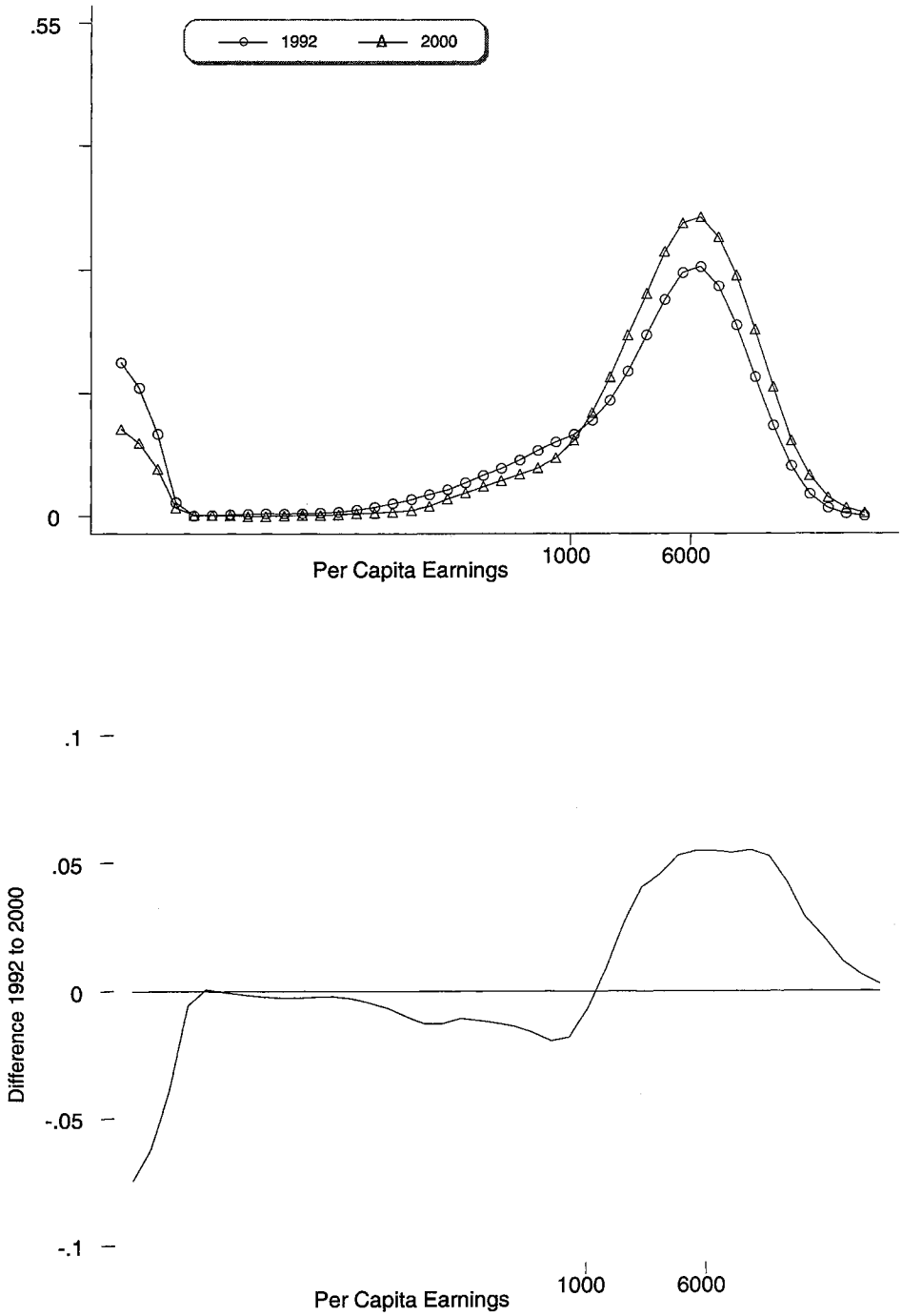
Overall, the results indicate that decreases in public assistance had a negative influence on the distribution of per capita receipts from 1992 to 2000. But the positive influence of per capita earning gains on per capita receipts appears to have more than offset the negative influence of public assistance decreases during the period, and generated widely distributed increases in economic well-being. Density reweighting methods are employed next to identify factors which have contributed to observed shifts in the distribution of per capita receipts between 1992 and 2000.

Reweighting the 2000 Density

Many factors influence the economic well-being of single-mother families (w) by impacting the family head's work/welfare participation decision. For example, welfare reform legislation and other polices to increase workforce participation (such as Earned Income Tax Credits) directly influence the joint work/welfare participation decision of family heads by creating incentives for single mothers to work and constraints to remaining on welfare.

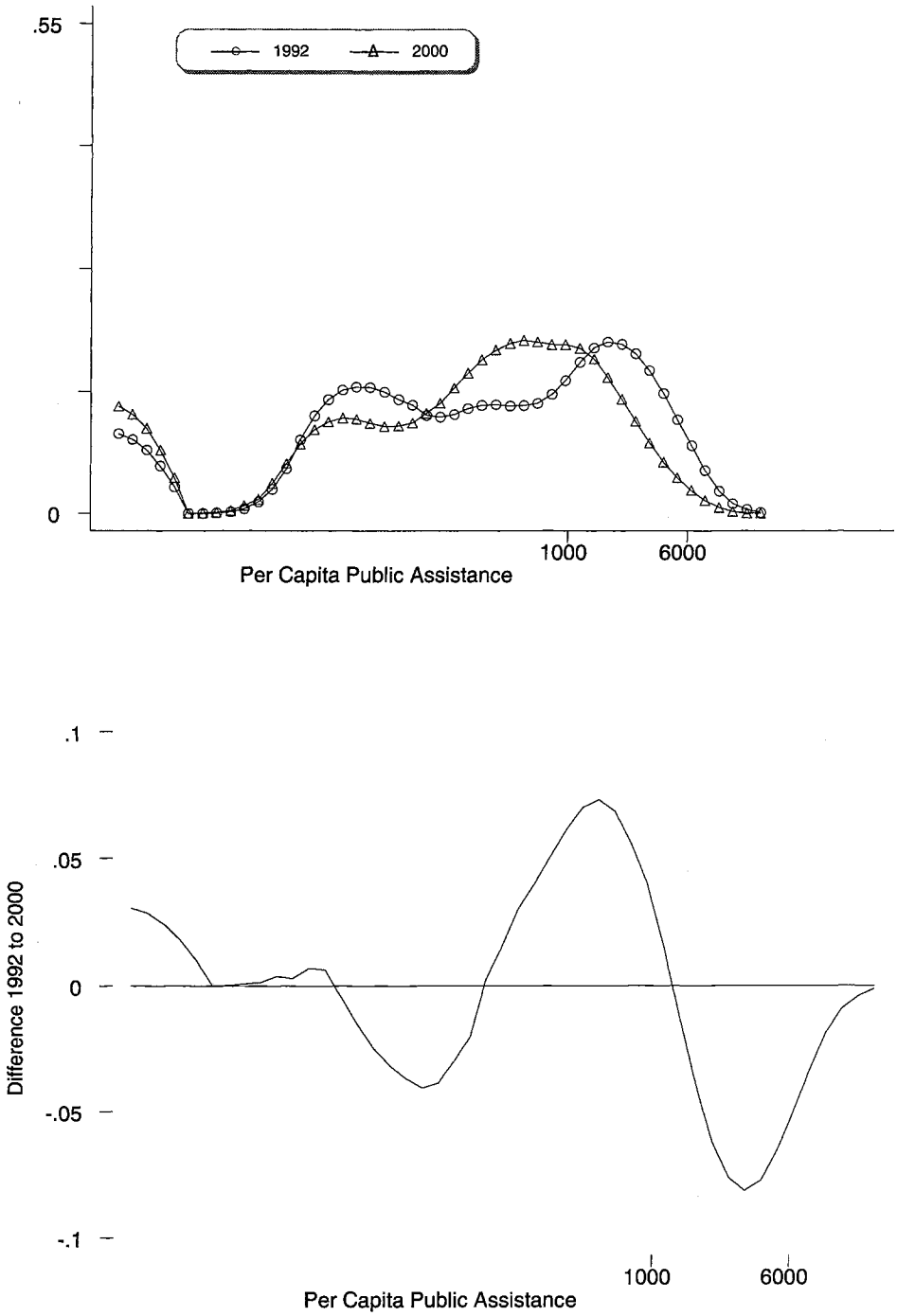
Denote z as the four possible discrete states of work/welfare participation: (a) working/not on welfare, (b) not working/not on welfare, (c) working/on welfare, and (d) not working/on welfare. Work/welfare states in turn influence family economic well-being. If welfare reform policies have been effective, single mothers, controlling for family and area economic attributes, should be more likely to be working and less likely to be on welfare.

Similarly, human capital levels of family heads, other family attributes, and area economic conditions (x) may influence work/welfare states and, indirectly, economic well-being. Family and area economic conditions may also directly influence family economic well-being. Therefore, the economic well-being of single mothers can be expressed as a function of the work/welfare state, the relationship between work/welfare states and family/area attributes, and family/area attributes: $w = f(z, z(x), x)$.



Note: Bandwidth = 0.460

Figure 1B. Nonparametric density estimates: Nonmetropolitan per capita earnings



Note: Bandwidth = 0.530

Figure 1C. Nonparametric density estimates: Nonmetropolitan per capita public assistance

In this section, four experiments are performed by reweighting observations in the 2000 per capita receipts distribution to isolate the contributions of these factors to changes in family economic well-being.[6] The four experiments examine, separately, the influences on 1992 to 2000 shifts in per capita receipts of changes in the frequencies of work/welfare states, changes in propensities to work and to be on welfare, changes in family and area economic attributes, and changes in propensities to work and to be on welfare stemming directly from improvements in area economic conditions. The procedures for generating these experiments are described in appendix A.

EXPERIMENT 1. 1992 Work / Welfare Participation Levels

This experiment asks the question, "What would be the 2000 distribution of economic well-being if the frequency of work/welfare states were at 1992 levels, but the 2000 distribution of economic well-being within each state remained?" To conduct the experiment, observations in the 2000 sample are reweighted so that the frequency of work/welfare states is the same as the frequency observed in the 1992 sample. As shown in table 1, single mothers were significantly more likely to be working and less likely to be on welfare in 2000 than in 1992. Thus, the experiment highlights the portion of the total 1992 to 2000 change in per capita receipts that can be explained by increased participation in the workforce and decreased welfare participation.

The results, shown in the upper half of figure 2, reveal the reweighted distribution is situated to the left of the observed 2000 per capita receipts distribution. This shift means that if the frequency of work/welfare participation combinations was set to 1992 levels, but the relationship between workforce/welfare participation and per capita receipts remained as it existed in 2000, then well-being of single-female-headed families would be worse than observed in 2000.

In the bottom half of figure 2, the difference between the reweighted distribution and the observed 2000 distribution is compared to the difference between the 1992 distribution and the 2000 distribution (previously shown in figure 1A). The two lines have similar shapes, implying that changes in workforce/welfare participation levels between 1992 and 2000 explain a significant portion of the 1992 to 2000 shift in per capita total receipts. In fact, the association between the difference of the reweighted density to the 2000 density and the difference of the 1992 density to the 2000 density is measured at 0.70 using a Kolmogorov distance function (KDF), where $KDF_{ij} = 1$ suggests no correspondence between the changes and $KDF_{ij} = 0$ suggests a perfect correspondence.[7] Shifts in the lower tail and upper tail of the per capita receipts distribution, however, cannot be completely accounted for by shifts of single mothers off of welfare and into the workforce. Fewer families are observed at the lowest levels of the per capita total receipts and more families are observed at the upper end of the distribution than would be expected based solely on changes in workforce/welfare participation.

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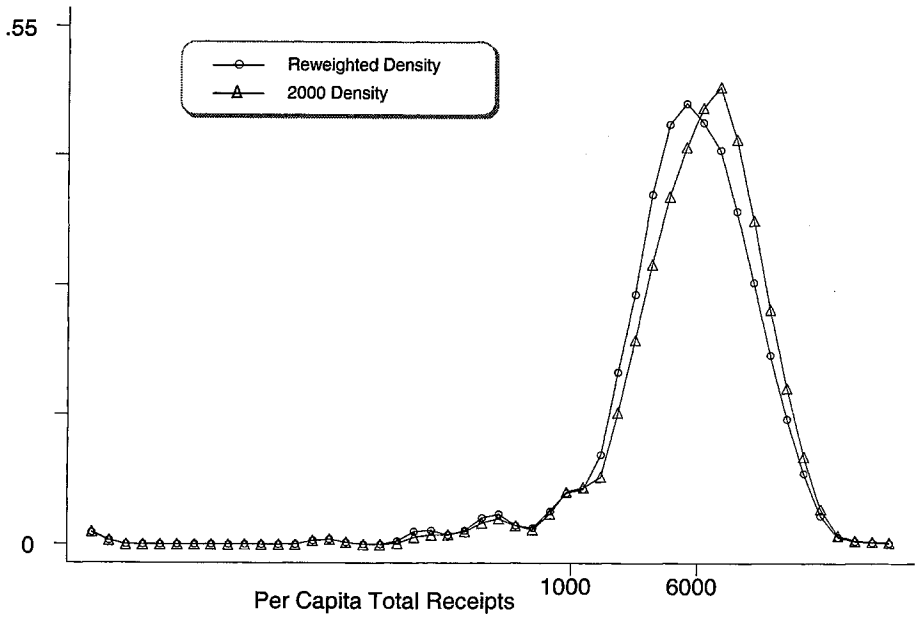
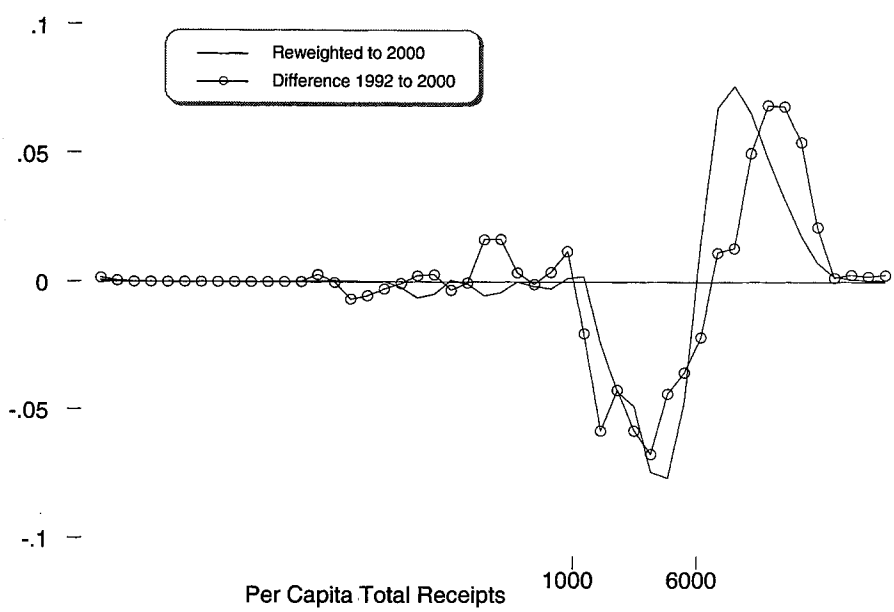
[6] See DiNardo, Fortin, and Lemieux for one of the first economic applications of density reweighting methods.

[7] Formally the relative Kolmogorov distance function is

$$KDF_{ij} = \frac{\frac{1}{2}\int |f_i(w) - f_j(w)|\, dw}{\int |f_i(w)|\, dw},$$

where $f_i(w)$ represents the change in density at y between the 1992 and 2000 distributions, and $f_j(w)$ represents the change in density at y between the reweighting and the 2000 distribution.





Notes: The reweighted density represents the 2000 nonmetropolitan distribution of per capita receipts that would have prevailed if the 1992 frequency of work/welfare states remained; KDF = 0.70.

Figure 2. The 2000 nonmetropolitan per capita receipts density reweighted for 1992 work/welfare levels

EXPERIMENT 2. 1992 Propensities to Work and to Be on Welfare

The second experiment asks the question, "What would be the 2000 distribution of economic well-being if family heads had 1992 propensities to work and to be on welfare given their attributes, but 2000 family and area economic attributes?" A major goal of welfare reform is to increase single mothers' propensity to work and decrease their propensity to rely on cash public assistance. Shifts in work/welfare levels highlighted in table 1 and examined in experiment 1 may stem from changes in these propensities. But, as noted, changes in work/welfare participation may also stem from changes in the underlying characteristics of single mothers and changes in area economic conditions that make them more likely to work and less likely to be on welfare. This experiment examines the contributions to changes in economic well-being of shifts in work/welfare propensities, holding family and area attributes constant.

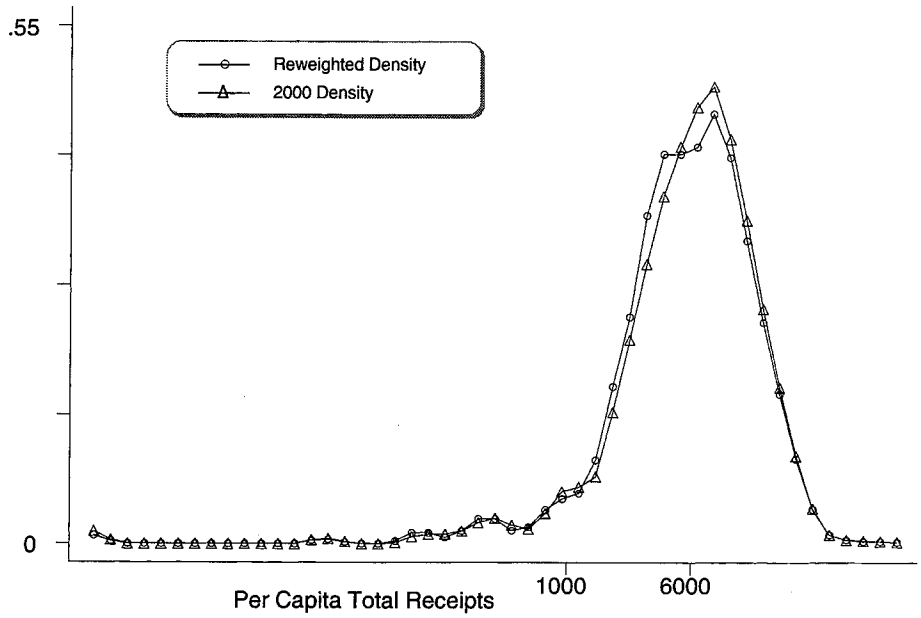
The per capita total receipts distribution resulting from reweighting the 2000 data for 1992 propensities to work and to be on welfare, but with family head characteristics and area economic conditions from 2000, is presented in the top portion of figure 3. The reweighted 2000 distribution of per capita receipts clearly shows a leftward shift relative to the initial 2000 distribution. This result is confirmed by a comparison of the difference in density between the reweighted 2000 distribution and the observed 2000 distribution to the difference in density between the 1992 and 2000 distributions in the bottom portion of figure 3. The associated KDF measure is 0.80, closer to 1 than in the previous experiment. Thus, changes in propensities to work and to be on welfare, for a given set of family head characteristics and area economic conditions, appear to account for a moderate portion of the observed shift in the distribution of economic well-being of single-mother families.

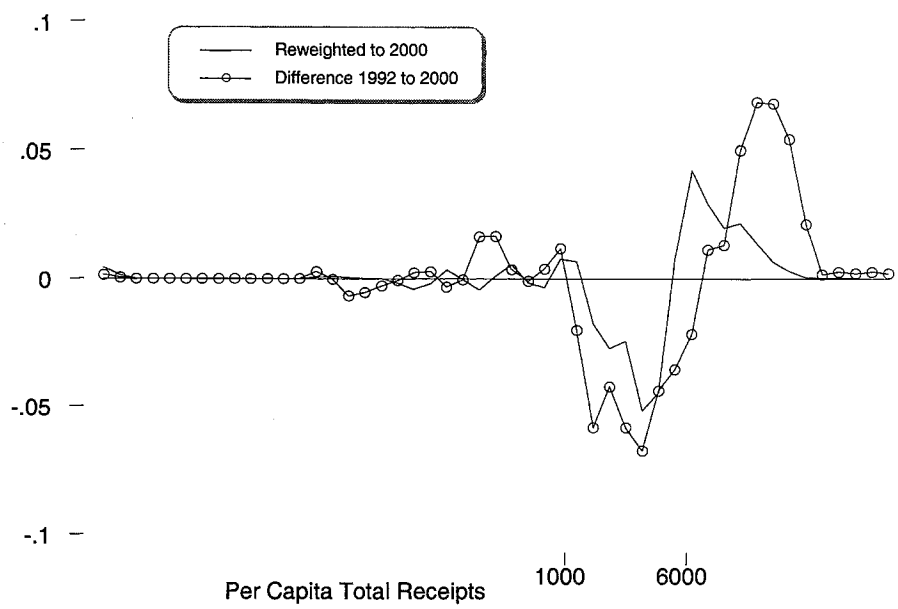
It is also worth noting that when the same experiment is run reweighting the distribution of economic well-being for single-mother families from the 1999 CPS and comparing it to the 1992 distribution, very little of the 1992 to 1998 shift in well-being is explained by the reweight. Thus, the impact of changes in propensities to work and to be on welfare appears to stem from the 1998–2000 period when workforce participation requirements became binding for many TANF recipients.

Changes in these propensities cannot be directly linked, however, to welfare reform measures. Recent studies have concluded workforce participation among single mothers has been significantly increased by EITCs (Meyer and Rosenbaum), confirming at least part of the shift in economic well-being associated with higher propensities to work stems from increases in EITC levels and increases in knowledge of the availability of EITCs which occurred concurrently with welfare reform measures. Nevertheless, the experiment does suggest that reforms and wage subsidies as a package of policies may have been effective in increasing the propensity to work and decreasing reliance on welfare. Changes in these propensities, in turn, resulted in increased economic well-being.

EXPERIMENT 3. 1992 Work / Welfare Propensities and 1992 Family and Area Economic Attributes

The third experiment asks the question, "What would be the 2000 distribution of economic well-being if both work/welfare propensities and family and area economic attributes were set to 1992 levels?" The attributes and area unemployment rates of nonmetropolitan





Notes: The reweighted density represents the 1999 nonmetropolitan distribution of per capita receipts that would have prevailed if the 1992 structural relationship between work/welfare states and area and individual attributes remained, but area and individual attributes were at 2000 levels; KDF = 0.80.

Figure 3. The 2000 nonmetropolitan per capita receipts density adjusted for 1992 propensities to work and to be on welfare

single mothers changed significantly between 1992 and 2000 (table 1). The reweighting experiment accounts for the contribution to shifts in economic well-being of changes in these characteristics and conditions, as well as changes in the propensities to work and to be on welfare addressed in the previous experiment.

The reweighted distribution is presented in the top portion of figure 4. The adjustment for 1992 workforce/welfare propensities and 1992 family head and area economic attributes produces a very strong leftward shift in the distribution of per capita total receipts. This shift is compared with the observed shift in density between 1992 and 2000 in the bottom portion of the figure. The KDF associated with this comparison is now greater than one (1.53) because the reweight substantially overpredicts 1992 to 2000 shifts in the distribution of economic well-being except at the upper tail of the distribution. In other words, the distribution of economic well-being of single mothers would have been far worse if families had the 1992 distribution of household and area attributes and 2000 return on those attributes, than with the observed 2000 distribution of attributes with 2000 returns. This result stems from well-being enhancing changes in characteristics of single mothers and their families, particularly increases in education and lower area unemployment rates.[8]

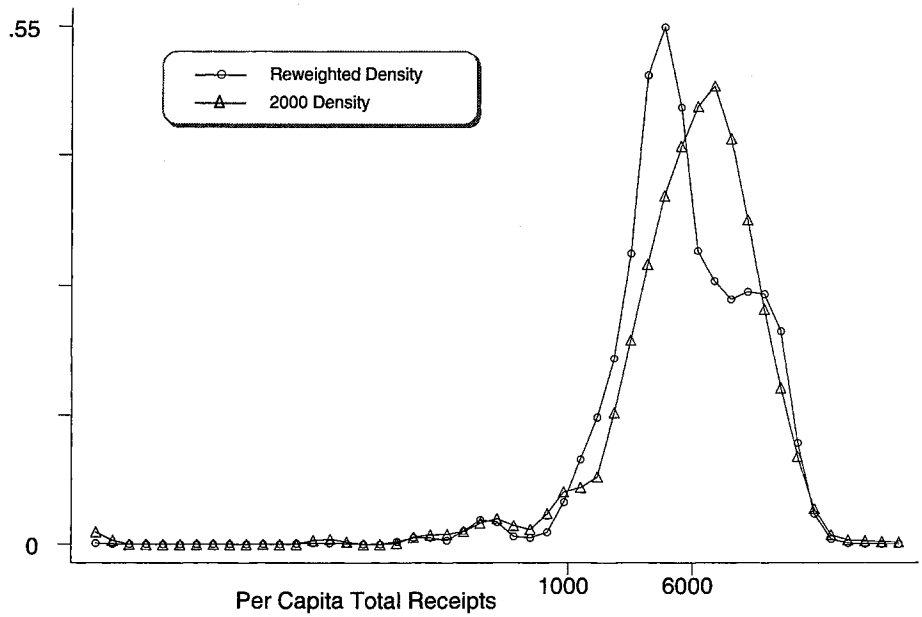
The overprediction of the reweighted density in the $1,000 to $15,000 per capita receipt range exposes a less positive trend. The distribution of economic well-being in this range would be worse with the 2000 relationship between family and area economic attributes and per capita receipts than the same relationship in 1992. In other words, economic well-being for a given set of attributes eroded between 1992 and 2000 across most of the distribution. But above $15,000, this erosion did not occur. This finding is consistent with long-term observed increases in returns to high-skill workers and erosion in returns to low-skill workers (Gottschalk).

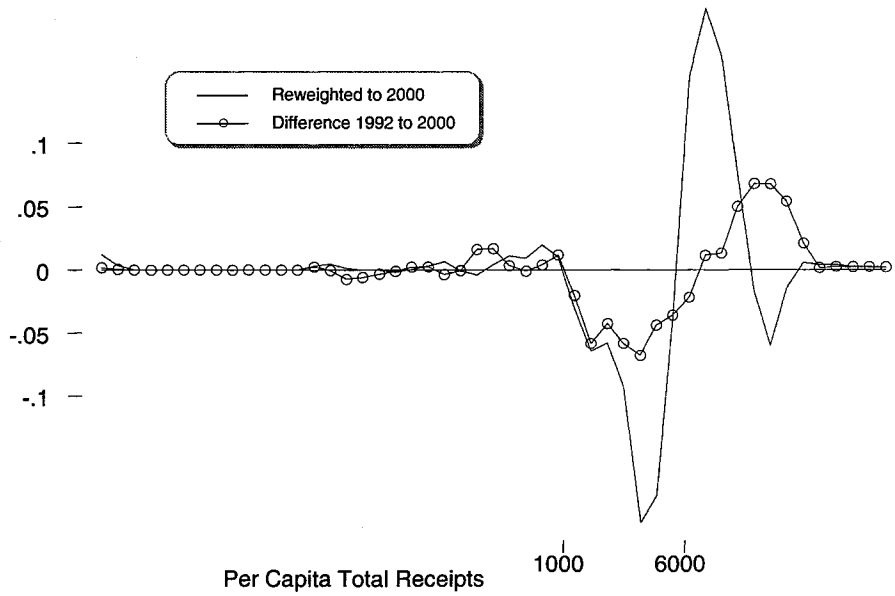
EXPERIMENT 4. The Influence of 1992 Area Unemployment Rate Changes on 2000 Work/Welfare States

The final experiment asks the question, "What would be the 2000 distribution of economic well-being with 2000 work/welfare propensities arising from 2000 family attributes and 1992 area unemployment rates?" This experiment isolates the contribution of widespread decreases in unemployment rates during the period, through changes in work and welfare levels, to observed shifts in economic well-being. The relationship between unemployment rates and welfare participation has previously been addressed by estimating parametric relationships between state caseload numbers and economic conditions (see, among others, Blank 1997; Ziliak et al.). The experiment has important policy implications because future economic conditions in nonmetropolitan areas will eventually deteriorate with macroeconomic downturns and reverse a portion of the documented gains in economic well-being.

The 2000 distribution of per capita receipts, adjusted for the influence of generally higher 1992 unemployment rates on work/welfare levels, is presented in figure 5. The changes in work/welfare levels associated with widespread declines in area unemployment

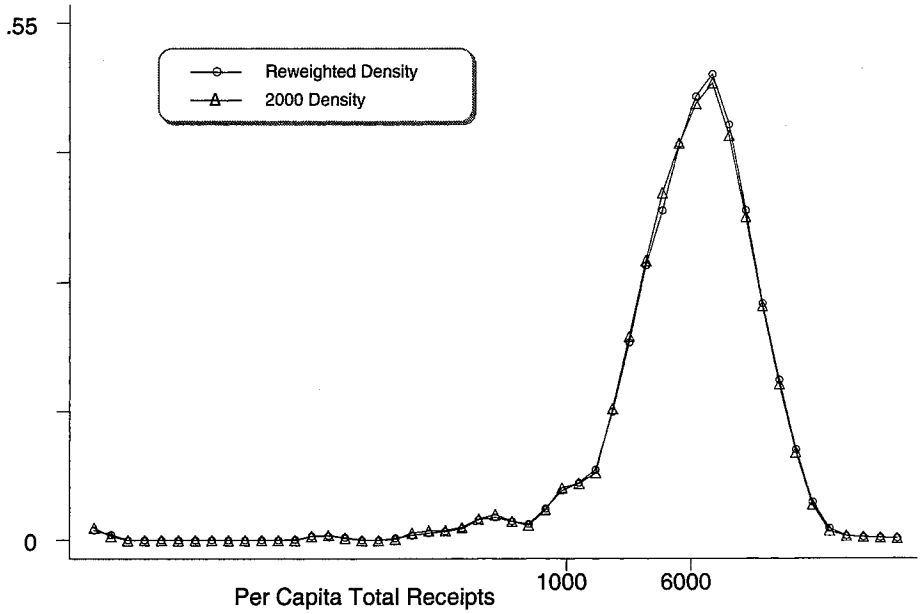
[8] The causes of increased education levels of single mothers are an area of debate. Well documented decreases in teenage pregnancy resulted in fewer high school dropouts. Welfare reform measures may have also created increased incentives for poor and near-poor single mothers, who tend to have lower levels of education, to marry. However, existing evidence suggests reform measures have had little impact on marital behavior (Murray).

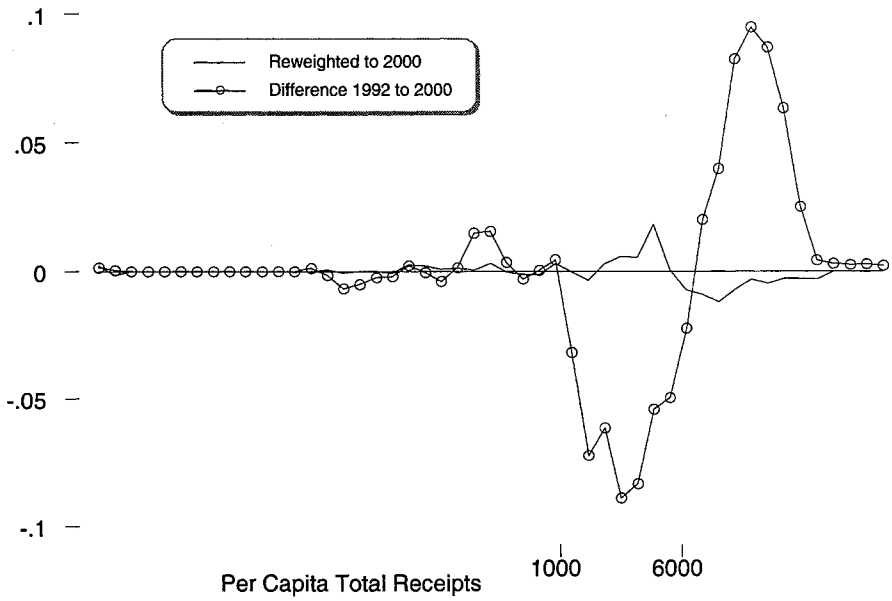




Notes: The reweighted density represents the 2000 nonmetropolitan distribution of per capita receipts that would have prevailed if both the structural relationship between work/welfare states and area and individual attributes were held at 1992 levels; KDF = 1.53.

Figure 4. The 2000 nonmetropolitan per capita receipts density adjusted for 1992 work/welfare propensities and 1992 family head and area economic characteristics





Notes: The reweighted density represents the 2000 nonmetropolitan distribution of per capita receipts that would have prevailed with 2000 work/welfare states arising from 1992 levels of area unemployment; KDF = 1.06.

Figure 5. Nonmetropolitan per capita receipts density adjusted for the influence of 1992 area unemployment rates on 2000 work/welfare states

rates between 1992 and 2000 appear to account for none of the observed shift in per capita receipts from 1992 to 2000. This result is not surprising. In the 2000 multinomial logit, the unemployment rate shows no statistically significant association with the three work/welfare states, relative to the base state of working/not on welfare.

In contrast, observed increases in the educational levels of single mothers and other attribute changes show consistently strong statistical associations. Based on these findings, if increased levels of education and other attribute changes are maintained, along with 2000 work and welfare propensities, future downturns in nonmetropolitan economic conditions toward 1992 levels will not completely erode observed welfare to workforce transitions and the associated economic gains of nonmetropolitan single-mother families.

The lack of association between area unemployment rates and 2000 work/welfare participation stands in contrast to the moderately strong association between unemployment rates and caseload declines found in national studies (for a discussion, see Blank 2000). Several differences in approaches and data may help reconcile the findings.

First, the impact of unemployment rates on welfare caseload declines may be smaller in nonmetropolitan areas than in metropolitan areas (Ziliak and Figlio). Second, the current analysis focuses on cross-sectional individual work and welfare behavior, while caseload studies focus on changes in aggregate county-level caseloads over time. The cross-sectional analysis does not capture the impact of changes in unemployment within an area. On the other hand, studies of county-level caseloads omit family head characteristics as explanatory variables. Because widespread declines in unemployment rates occurred at the same time as widespread increases in education levels, the impact of education levels of single mothers on welfare caseloads may be spuriously captured by the unemployment rate parameter. Third, area unemployment rates used in the current analysis represent aggregate rates across all nonmetropolitan counties in the state of residence. Area rates are a less precise indicator of local economic conditions than county unemployment rates, and therefore may show a weaker estimated association with work/welfare states.

Discussion and Conclusions

Historically, single-mother families have been the primary recipients of public cash assistance payments. As part of recent U.S. welfare reform measures, the Aid to Families with Dependent Children (AFDC) program was replaced with federal Temporary Assistance to Needy Families (TANF) block grants, giving states greater flexibility in setting eligibility requirements. Wage subsidies to single mothers also have been increased. These reforms have been judged a success based on a sharp decline in welfare caseloads and an increase in workforce participation among single mothers. Three findings in this study have significant implications for the long-term efficacy of welfare-reform initiatives in nonmetropolitan areas.

- First, welfare-to-work transitions have resulted in significant increases in the per capita receipts of nonmetropolitan single-mother families. Single mothers were less likely to be on welfare and more likely to be working in 2000 than in 1992. Most of the observed rightward shift in the per capita receipts distribution of single-mother families can be explained by the movement of family heads off welfare and into the workforce. However, additional childcare and transport costs associated with

working are not captured in this analysis. Therefore, the true gains in economic well-being from welfare-to-work transitions may be less than those indicated strictly by changes in per capita receipts.

- Second, changes in the propensity of single mothers to leave welfare and enter the workforce, controlling for their characteristics and area economic conditions, account for a moderate portion of the observed rightward shift in the distribution of per capita receipts from 1992 to 2000. Concurrent increases in education levels and decreases in area unemployment rates, as well as other changes in the characteristics of family heads from 1992 to 2000, are associated with an additional strong rightward shift in the distribution of per capita receipts. The increases in economic well-being associated with these changes in family and area attributes were, however, partially offset by deterioration from 1992 to 2000 in economic well-being for a given set of attributes.

- Third, many analysts of reform measures suggest future economic downturns may reverse observed shifts from welfare to work and associated gains in well-being. However, shifts in average annual unemployment rates between 1992 and 2000 explain none of the influence that workforce and welfare program participation changes have on per capita receipts. As mentioned, significant increases in general education levels and propensities to work of single mothers have also contributed to increased economic well-being. Thus, levels of economic well-being of nonmetropolitan single-mother families are unlikely to return to pre-reform levels if nonmetropolitan unemployment rates rise to 1992 levels.

Finally, the question of whether welfare-reform initiatives have been a success in nonmetropolitan areas remains. Evaluations of welfare-reform initiatives must recognize the important role that favorable changes in area economic conditions and individual attributes have played in the economic welfare gains of nonmetropolitan single-mother families. Despite these gains, single-mother families remain the family type most at risk of residing in poverty. At a minimum, efforts need to be made to monitor the well-being of these families as economic conditions continue to change and five-year lifetime limits on TANF benefit receipt take hold. Alternate uses of TANF funds should also be examined, given that unexpectedly rapid declines in caseloads have left program expenditures far below prior forecasts.

Both a high school degree and education beyond high school are strongly associated with movements off welfare and into the workforce in nonmetropolitan areas. Labor force development initiatives like Welfare-to-Work grants and the recent Workforce Investment Act can be used to channel welfare program surpluses to promote further education gains among single mothers, particularly those mothers who had their education interrupted by the birth of a child. Such human capital investments will further temper reliance on public cash assistance payments in economic downturns. Further, under new federal regulations for provision of cash public assistance, states can now target such labor force development initiatives to areas where human capital levels and area economic conditions pose the greatest constraints to welfare-to-work transitions.

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Appendix A: Procedures for Generating Reweighted Distributions

Let $f(w, z)$ be the joint distribution of total receipts, w, and the four workforce/welfare states, z, in domain Ω_z. The 2000 distribution of total receipts ($t_w = 00$) with 2000 work/welfare participation levels ($t_z = 00$) can be written:

$$f(w; t_w = 00, t_z = 00) = \int_{z \in \Omega_z} f(w|z, t_w = 00)\, dF(z|t_z = 00). \tag{A1}$$

Assume the conditional density for 2000 per capita total receipts $f(w\,|\,z, t_w = 00)$ does not change with the distributions of workforce/welfare states and family head and area economic conditions.

EXPERIMENT 1

The counterfactual density for the 2000 distribution of total receipts with the incidence of work/welfare states set to 1992 levels can be expressed as:

$$\begin{aligned} f(w; t_w = 00, t_z = 92) &= \int f(w|z, t_w = 00)\, dF(z|t_z = 92) \\ &= \int f(w|z, t_w = 00)\, dF(z|t_z = 00)\Psi_z, \end{aligned} \tag{A2}$$

where $\Psi_z(z) = dF(z|t_z = 92)/dF(z|t_z = 00)$. For each observation, Ψ_z is estimated as the ratio of the frequency of the observed state in 1992 to the frequency of the observed state in 2000. The estimated counterfactual kernel density is then denoted by:

$$\hat{f}(w; t_w = 00, t_z = 92) = \sum_{i \in S_{00}} \frac{1}{h} \hat{\Psi}_z(z_i) K\left(\frac{w - W_i}{h}\right). \tag{A3}$$

EXPERIMENT 2

The joint distribution of workforce/welfare participation (z) and family head characteristics and area economic conditions (x) is expressed as $f(z|x, t_{z|x} = t)f(x|t_x = t)$. The 2000 density that would have prevailed with 1992 propensities to be in specific workforce/welfare states, but with family head characteristics and area economic conditions at 2000 levels is given by:

$$\begin{aligned} &f(w; t_w = 00, t_{z|x} = 92, t_x = 00) \\ &\quad = \iint f(w|z, x, t_w = 00)\Psi_{z|x}\, dF(z|x, t_{z|x} = 00)\, dF(x|t_x = 00), \end{aligned} \tag{A4}$$

where $\Psi_{z|x}$ is the reweighting function $\Psi_{z|x} = dF(z|x, t_{z|x} = 92)/dF(z|x, t_{z|x} = 00)$, and $dF(z|x, t_{z|x} = t)$ represents the period t conditional probability of being in the observed work/welfare state with the family head characteristics and area economic conditions, x.

The 2000 conditional density function for $z\,|\,x = 00$ is estimated by regressing the four observed 2000 work/welfare states by multinomial logit on area unemployment rates and characteristics of the family head. A similar multinomial estimate is performed with the 1993 CPS data to recover the conditional density function for $z\,|\,x = 92$. Probabilities of workforce/welfare participation with the 1992 conditional density, but 2000 family characteristics and area economic conditions $dF(x\,|\,t_x = 00)$, are then simulated with the 2000 data. The multinomial logit model parameter estimates for 2000 and 1992 are presented in appendix B.

EXPERIMENT 3

The counterfactual 2000 per capita receipts density is:

$$\text{(A5)} \qquad f(w; t_w = 00, t_{z|x} = 92, x = 92) = \iint f(w|z, x, t_w = 00)\, dF(z|x, t_{z|x} = 00)\, dF(x|t_x = 00)\Psi_{z|x}\Psi_x,$$

where, by Bayes' rule,

$$\Psi_x = \frac{dF(x|t_x = 92)}{dF(x|t_x = 00)} = \left(\frac{\Pr(t_x = 92|x)}{\Pr(t_x = 00|x)}\right)\left(\frac{\Pr(t_x = 00)}{\Pr(t_x = 92)}\right).$$

The probability of being in sample period t given the set of family attributes and area unemployment rates, $\Pr(t_x = t\,|\,x)$, is estimated by a logit model using the 1992 and 2000 samples (see appendix C). (Note that the same covariates are employed in the logit as in the previously specified multinomial logit model.) $\Pr(t_x = t)$ is estimated as the number of observations in sample year t divided by the number of observations in both sample years.

EXPERIMENT 4

Let $z(x)$ now indicate the 2000 distribution of work/welfare levels associated with area economic conditions x. When area economic conditions are set to 1992 levels, the density function is denoted by:

$$\text{(A6)} \qquad f(w; t_w = 00, t_{z|x} = 92) = \int f(w|z(x), t_w = 00)\Psi_{z(x)}\, dF(z(x)|t_{z(x)} = 00),$$

where

$$\Psi_{z(x)} = \frac{dF(z(x)|t_{z(x)} = 92)}{dF(z(x)|t_{z(x)} = 00)}.$$

Probabilities associated with $dF(z(x)|t_{z(x)} = 00)$ are generated from the previously specified 2000 multinomial logit. For $dF(z(x)|t_{z(x)} = 92)$, probabilities are generated using the 2000 multinomial logit parameter estimates and the 2000 observations of work/welfare states and family head characteristics, but with 1992 nonmetropolitan area unemployment rates instead of 2000 rates.

Appendix B: Parameter Estimates for the Multinomial Logit Model of Workforce and TANF Program Participation Decisions

Table A1. Results for 1992 (Base is Alternative 1: In Workforce/Not on Welfare)

	ALTERNATIVE 2: Not in Workforce/ Not on Welfare		ALTERNATIVE 3: In Workforce/ On Welfare		ALTERNATIVE 4: Not in Workforce/ On Welfare	
Variable	Coefficient	ASE	Coefficient	ASE	Coefficient	ASE
Constant	-2.575***	0.72	-0.558	0.80	-1.115	0.70
Unemployment rate	10.793**	5.35	6.309	5.38	14.902***	5.13
South	0.013	0.25	-0.690**	0.30	-0.354	0.26
High school degree	-1.205***	0.25	-0.472*	0.29	-1.283***	0.23
Some college or higher	-1.632***	0.28	-0.855***	0.32	-2.273***	0.29
No. of children under 6	0.626***	0.16	0.763***	0.16	0.895***	0.14

(continued . . .)

Table A1. Results for 1992 (continued)

	ALTERNATIVE 2: Not in Workforce/ Not on Welfare		ALTERNATIVE 3: In Workforce/ On Welfare		ALTERNATIVE 4: Not in Workforce/ On Welfare	
Variable	Coefficient	ASE	Coefficient	ASE	Coefficient	ASE
No. of children 6 to 18	0.097	0.11	0.229**	0.12	0.298***	0.10
Black	-0.388	0.34	0.126	0.35	0.380	0.30
Other non-White	-0.066	0.46	-1.077*	0.64	0.923***	0.35
Hispanic	-0.242	0.47	-0.106	0.47	-0.088	0.42
Age	0.021	0.01	-0.055***	0.02	-0.040***	0.02
Never married	0.305	0.29	0.746***	0.27	0.645***	0.24
No. of observations	121		112		169	
Total No. of Observations:	1,022					
Log Likelihood:	-968.31					

Notes: Single, double, and triple asterisks (*) denote statistical significance in a Wald test at the $p = 0.10$, $p = 0.05$, and $p = 0.01$ levels, respectively. ASE denotes asymptotic standard error.

Table A2. Results for 2000 (Base is Alternative 1: In Workforce/Not on Welfare)

	ALTERNATIVE 2: Not in Workforce/ Not on Welfare		ALTERNATIVE 3: In Workforce/ On Welfare		ALTERNATIVE 4: Not in Workforce/ On Welfare	
Variable	Coefficient	ASE	Coefficient	ASE	Coefficient	ASE
Constant	-3.610***	0.84	-0.740	1.24	-2.769**	1.27
Unemployment rate	5.817	9.07	8.693	11.86	-20.389	15.29
South	0.598**	0.29	-0.886	0.49	-0.001	0.52
High school degree	-0.497*	0.30	-0.393	0.41	-1.388***	0.44
Some college or higher	-0.841***	0.32	-0.615	0.46	-1.797***	0.49
No. of children under 6	0.649***	0.17	0.608***	0.22	0.867***	0.24
No. of children 6 to 18	0.068***	0.13	0.431**	0.18	0.299*	0.18
Black	-0.237	0.36	-0.221	0.58	0.452	0.57
Other non-White	-0.064	0.52	0.527	0.52	0.708	0.59
Hispanic	-0.052	0.38	-1.317**	0.67	-0.540	0.62
Age	0.033**	0.02	-0.096***	0.03	0.020	0.03
Never married	0.686**	0.28	1.144***	0.40	0.884**	0.43
No. of observations	93		48		35	
Total No. of Observations:	747					
Log Likelihood:	-513.65					

Notes: Single, double, and triple asterisks (*) denote statistical significance in a Wald test at the $p = 0.10$, $p = 0.05$, and $p = 0.01$ levels, respectively. ASE denotes asymptotic standard error.

Appendix C: Logit Estimates of Probability of Being in 2000 Sample

Table A3. Logit Estimates (dependent variable = 1 if *t* is 2000, and 0 otherwise)

Variable	Coefficient	ASE
Constant	3.751***	0.48
Unemployment rate	-102.258***	4.73
South	1.471***	0.18
High school degree	0.239	0.18
Some college or higher	0.532***	0.19
No. of children under 6	0.105	0.10
No. of children 6 to 18	0.077	0.07
Black	-0.323	0.21
Other non-White	0.206	0.28
Hispanic	1.829***	0.27
Age	0.034***	0.01
Never married	0.921***	0.18
Total No. of Observations:	1,769	
Log Likelihood:	-705.60	

Notes: Single, double, and triple asterisks (*) denote statistical significance in a Wald test at the $p = 0.10$, $p = 0.05$, and $p = 0.01$ levels, respectively. ASE denotes asymptotic standard error.