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THE IMPACT OF UNEMPLOYMENT ON ALTERNATIVE POVERTY MEASURES

Robert H. DeFina
Villanova University

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by

Robert H. DeFina
Economics Department
Villanova University
Villanova, PA 19085
610-519-4482
robert.defina@villanova.edu

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Abstract

The analysis uses data from the March Current Population Survey to estimate state-level cross-section/time-series models of the effects of unemployment on alternative poverty indexes. The indexes include the official headcount rate and alternatives based on improved identification and aggregation procedures. The estimated effects turn critically on the measurement approaches, both for the total sample population and for selected sub-groups. For some broader, distribution-sensitive indexes, the declines in unemployment of the last decade had no significant impact on poverty. The findings thus provide important lessons for researchers exploring the links between economic conditions and poverty and for policymakers developing strategies to reduce poverty.

*Key Words**: Poverty, Poverty Measurement, Distribution-Sensitive Poverty Indexes, Unemployment, Income Distribution, Business Cycles and Poverty.***

The Impact of Unemployment on Alternative Poverty Measures

I. Introduction

Poverty in the United States is currently indexed with an approach developed in the early 1960s [Orshansky (1965, 1966) and Fisher (1992).] The procedure identifies poor individuals by using a set of pre-tax family income thresholds, varying by family size and composition, intended to gauge the resources needed to purchase a minimally acceptable consumption level. Thresholds are indexed annually for consumer price inflation, and members of families that fail to receive their threshold income are deemed poor. Poor individuals are then aggregated into an overall index of poverty through a simple headcount, with the number reported both as a level and as a fraction of the total population (the headcount rate).

The official procedure has well-known shortcomings. Criticisms have been leveled both at the way in which individuals are officially *identified* as poor and at the way in which poor individuals are *aggregated* into an index of poverty (the headcount). Recommended improvements in poverty identification entail a higher baseline threshold, new equivalence scales, and different income definitions, among other procedural changes. These fundamental shifts result in collections of poor individuals of different sizes and compositions than the official one. Suggested changes in aggregation procedures are equally foundational and require using financial characteristics of the poverty population beyond a simple headcount, principally the depth of poverty and the distribution of income among the poor. Doing so can alter measured trends in poverty, especially for certain population sub-groups.

Despite a general awareness of these concerns, the official index continues to underpin most research into the nature of poverty and to inform popular discussions and policy debates. When alternatives to the official measure are employed, they typically provide descriptive evidence on levels and trends that see limited use. Key behavioral questions, such as the impact of child poverty on future earnings and the extent to which economic growth affects poverty, continue to be answered

using the official measure or something closely akin.[1] It would seem that a full and basic research agenda exists in exploring how reliance on more theoretically appealing identification and aggregation techniques affects perspectives on the causes and consequences of poverty.

This study addresses one such issue, namely, the impact of unemployment on poverty. The relationship has long had considerable practical and policy significance, both at the micro and macro levels. The link has been examined before using the official poverty rate, and extensive evidence has been brought to bear on it. Essentially, lower unemployment has been found to decrease the headcount, although the impact need not be immediate or, at times, quantitatively large. Various studies have demonstrated that changes in poverty were closely correlated with swings in unemployment during the 1960s and 1970s [see, e.g., Blank and Blinder (1986)]. By contrast, declines in unemployment through the 1980s were accompanied by growing wage dispersion that partly offset the lower poverty that otherwise would have occurred. Still, analyses of historical data generally conclude that variations in the unemployment rate significantly affect the fraction of the population that is poor, especially once distributional changes are accounted for [Blank and Blinder (1986), Cutler and Katz (1991), Blank and Card (1993), Tobin (1994), Danziger and Gottschalk (1995), Blank (1993, 1996, 2000), Romer (2000) and Haveman and Schwabish (2000).] Indeed, the marked decline in unemployment during the 1990s coincided with a drop in the official poverty rate, from a high of 15.1% in 1993 to 11.8% in 1999.

The present study departs from earlier research in two fundamental ways. First, it employs poverty measures that incorporate major improvements suggested during the past few decades, both with respect to identification and aggregation. Second, it estimates the relationship between aggregate unemployment and poverty, both for the entire population and for seven population sub-groups often encountered in poverty discussions and research. Diversity among the sub-groups in characteristics such as degree of labor force attachment and industry/occupation concentrations suggests that aggregate unemployment swings can have correspondingly disparate impacts.

The analysis uses data from the March Current Population Survey (CPS) for the 1990s to estimate state-level cross-section/time-series models of the alternative poverty measures. The analysis is restricted to the 1990s because of limited availability of consistent data on taxes and transfers that are vital to proper income measurements and, hence, poverty identification. Regressors include state unemployment rates and a variety of controls, including demographic and labor market variables, and state and year dummies.

The estimates reveal that measured effects of unemployment (magnitudes and significance) turn critically on the procedures for gauging poverty, both in the aggregate and for the population sub-groups. For certain measures and certain groups, the powerful economy of the last 10 years has had much less of an impact on poverty than is suggested by the official headcount rate. Indeed, the broadest and most theoretically appealing poverty index was uncorrelated with aggregate unemployment, both for the total sample and for all population sub-groups. These findings emerge despite considerable variation in both the unemployment rate and poverty indexes during the study period.

The next two sections of the paper examine issues surrounding the aggregation and identification of the poverty population. Each ends by offering concrete alternatives to the official measure that provide the basis for the empirical analysis. The data and methodology are then described, and the empirical estimates presented. The paper concludes with a discussion of the evidence and some final remarks.

II. Alternative Aggregation Procedures

The aggregation method used in the United States neglects characteristics of the poverty population other than the number of poor individuals. Following Sen's (1976, 1981) axiomatic framework, many authors claim that reasonable aggregation schemes should minimally include both the depth of poverty and income inequality among the poor (relative deprivation), in addition to the

headcount.[2] Various indexes satisfying these criteria exist, developed in response to Sen's important work, among them the family of measures introduced by Foster, Greer, and Thorbecke (1984) [henceforth, FGT].[3] The FGT indexes are notable for their intuitive structure, ease of calculation, and attractive theoretical properties. They are well known and have been used in a wide array of poverty measurements [see, for example, United Nations Development Programme (1999)]. Consequently, the analysis employs them both for exposition and computation.

The general class of indexes developed by FGT is written as:

1. $$P_\alpha = \frac{1}{nz^\alpha} \sum_{i=1}^{q} g_i^\alpha$$

where n is the total number of households rank-ordered in increasing income levels y_i, z is a predetermined poverty line, $g_i = z-y_i$ is the income shortfall of the i^{th} household, q is the number of poor households (i.e., for which g_i is greater than zero), and α is a parameter measuring "aversion to poverty," with a higher α indicating greater aversion.

Equation (1) allows a range of aggregation procedures that depends on α. For reasons to be discussed, attention is restricted to values of α equal to 0, 1, and 2. When α=0, equation (1) produces a simple poverty headcount; for α=1, equation (1) is the average proportionate poverty gap; and for α=2, equation (1) produces a weighted-average proportionate poverty gap, where the weights are the poverty gaps themselves, giving relatively more importance to relatively poorer individuals. The three indexes are referred to as $\mathbf{P_0}$, $\mathbf{P_1}$, and $\mathbf{P_2}$, respectively.

The indexes can be reformulated to reveal the characteristics of the poor population imbedded in their respective aggregations. Letting **H** signify the headcount ratio, q/n; **I** the average poverty-gap ratio, 1- (μ_z / z), where μ_z is the average income of poor households; and, $\mathbf{CV^2}$ the squared coefficient of variation of income among poor households, the three indexes can be expressed as [FGT (1984)]:

$$\mathbf{P_0}=\mathbf{H};$$

2. $\mathbf{P_1}=\mathbf{H}\cdot\mathbf{I}$; and,

$$\mathbf{P_2}=\mathbf{H}\cdot\left[\mathbf{I}^2+(1-\mathbf{I})^2\cdot\mathbf{CV}^2\right].$$

Thus, the aggregation procedures implicit in $\mathbf{P}_\alpha$ become increasingly complex as α increases. The index incorporates only the headcount for $\mathbf{P_0}$; it includes the headcount and average poverty-gap ratio for $\mathbf{P_1}$; and it includes the headcount, average poverty-gap ratio, and income inequality among the poor (i.e., relative deprivation) for $\mathbf{P_2}$. $\mathbf{P_2}$ thus satisfies the key axioms of Sen.[4]

In sum, three aspects of poverty are relevant: $\mathbf{P_0}$, **I**, and $\mathbf{CV^2}$. It is possible to imagine for present purposes realistic situations in which changes in unemployment could affect one, but not the other two elements of poverty, or perhaps affect two of the three in different directions. Lower unemployment might fail to decrease $\mathbf{P_0}$, for example, but cause **I** to decrease because some people classified as poor get jobs. Consequently, the analysis studies the impact of unemployment on each component ($\mathbf{P_0}$, **I** and $\mathbf{CV^2}$), to identify how broader conceptions of poverty behave. The study also examines the link between unemployment and $\mathbf{P_2}$, since $\mathbf{P_2}$ constitutes a theoretically coherent combination of the three basic elements.

III. Alternative Identification Procedures

Empirical values of $\mathbf{P_0}$, **I,** and $\mathbf{CV^2}$ depend on how poor individuals are identified, because the identification procedure affects both the size and financial characteristics of the poverty population during the study period. This holds true both for the full sample population and for population sub-groups. The critical issues addressed here concern where to set family poverty income thresholds and how to define family income.[5]

Setting income thresholds involves two choices. The first is the poverty level for a reference family. A single, non-elderly adult could, for example, represent the reference family and the poverty level constituting the minimum needs of such an individual. The second is an equivalence scale that translates the reference threshold into poverty levels for families of different sizes, compositions, and

other characteristics deemed relevant. These equivalences typically reflect economies of scale in family consumption. Once the thresholds are set, the amount of each family's available income must be measured and compared to its threshold.

Setting the reference threshold. Discussions of the official reference level generally surmise that it comprises at best the lower bound of a reasonable range. The conclusion partly stems from the Census Bureau's continued use of an outdated "food multiplier." Orshansky's (1965, 1966) original identification methodology established a baseline poverty threshold for a family of four by multiplying the Agriculture Department's "economy food budget" by three, since contemporary budget studies indicated that an average family of four spent one-third of its total budget on food.

The initial one-third food-outlay ratio continues to underpin official thresholds, even though current budget data show the ratio to be lower. Updating the ratio produces food multipliers and, hence, thresholds, 40 percent to 70 percent higher than official ones [Ruggles (1990), Schwartz and Volgy (1992), and Panel on Poverty and Family Assistance (1995).] Similarly, subjective surveys on people's attitudes concerning "get along" and poverty levels of income result in thresholds that are 20 percent to 70 percent higher.[6] Finally, "expert budgets," which cost out minimally acceptable consumption bundles, have produced thresholds about 50 percent higher than official lines [e.g., Schwartz and Volgy 1992)]. Based on the foregoing, the empirical analysis uses a lower mid-range value of 1.25 times the official reference threshold. A relatively conservative multiple is used to mitigate concerns that the empirical results are driven by unrealistic adjustments.

Determining the equivalence scale. Doubts have arisen about the official equivalence scale because it fails to consistently reflect household economies of scale [Panel on Poverty and Family Assistance (1995) and Triest (1998).] Alternative equivalence scale methods have been offered, essentially derived from analytical representations guaranteeing household economies of scale. One such approach, used in several studies, bases equivalence scales on the number of adults and children in a family [Buhmann et al. (1988), Cutler and Katz (1992), Panel on Poverty and Family Assistance

(1995), Johnson (1996) and Triest (1998).][7] Using the poverty threshold of a single adult as a baseline, a family comprised of N adults and K children is assumed to need $(N + pK)^f$ times the amount needed by a single adult. The parameters p and f must somehow be determined, for instance, by stochastic estimation or expert assignment.

The study relies on the foregoing approach to generate an alternative to the official equivalence scale. Specifically, the official poverty line of a single adult under age 65 is multiplied by $(N + pK)^f$, where both p and f are each set to 0.7 consistent with the recommendations of the Panel on Poverty and Family Assistance (1995).[8]

Defining income. A final identification issue regards the income concept that will be compared to chosen poverty thresholds. The preferred foundational concept is disposable income, that is, monies available to meet consumption needs. How the concept is implemented, however, depends on the purpose of the measurement. Is the object to gauge poverty before or after government intervention? Both questions have value.

If the concern is pre-policy poverty, disposable income will equal private money income, from market activity and private transfers, less money expended to obtain the income (e.g., transportation expenses). Neither taxes paid nor public transfers received figure in the calculation, as together they represent the net effect of policy intervention. If the concern is post-poverty policy, disposable income will equal pre-policy income less direct tax paid plus all public transfers, including money and in-kind payments. Official calculations use "Census Income" defined as all money income, including government cash, but not in-kind payments, before taxes. It thus falls short of the preferred concepts on several counts. For comparative purposes, the various poverty indexes and components are calculated using the alternative concepts of Census income, pre-policy income, and post-policy income. The impact of unemployment on each of these index values (e.g., $\mathbf{P_0}$ based on Census income, $\mathbf{P_0}$ based on pre-policy income, etc.) is then explored.

IV. Methodology and Data

Conceptual framework. Unemployment potentially affects poverty, however measured, through its impact on the distribution of income. Given an initial distribution, changes in aggregate unemployment affect total hours worked of individuals on both sides of pre-determined poverty lines, moving them to new positions in the distribution. Exactly how an unemployment shift affects a person's poverty status will depend on numerous factors. These include, among others: the individual's labor force attachment; the sensitivity of a person's job to shifts in the aggregate economy; the presence or absence of additional family workers; whether jobs available to the person pay above-poverty wages; and the person's access to social insurance and means-tested income transfers. Because these sorts of factors can vary systematically by population sub-group, the extent of poverty in different demographic cross-sections could respond uniquely to aggregate unemployment swings. Whatever the particulars, the net result could be a new number of individuals with incomes below the poverty lines, who have a different average poverty gap and degree of income dispersion than before. Consequently, any or all of the poverty measures – official and revised $\mathbf{P_0}$, $\mathbf{I}$, $\mathbf{CV^2}$ and $\mathbf{P_2}$ – could change.

In sum, empirically modeling the poverty indexes and components requires variables that capture movements in the distribution of each group's income. We rely here on three types of variables. The first is the aggregate (state) unemployment rate, given the focus of the study. The second set includes two variables, which account for other changes in a group's wages and hours that are not correlated with the aggregate unemployment rate. One is a group's median real per capita income, and the other, following Blank and Card (1993), is the standard deviation in a group's real per capita income. Together, these variables capture shifts in, and variations in the shape of, a group's income distribution.[9] The last set of variables measures changes in a group's demographic structure, given that the incidence of poverty historically has varied systematically by demographic characteristics. Demographic changes are likely to cause the income distribution to change form.

Several characteristics are used for the full population sample, including percent of the population aged 16 years to 19 years; the percent 65 years and older; the percent female; the percent black; the percent residing in metropolitan areas; the percent with at least a college degree; and the percent not in the labor force. Sub-group models use only the last three variables, as the sub-groups are defined by race/gender/age categories.[10]

Each poverty index and component is modeled using a pooled time-series/cross-section framework, similar to that of Blank and Card (1993).[11] The formulation is used both for the overall sample population and for population sub-groups. The empirical model for each group's sample is formally expressed as:

3. $$P_{\alpha,i,t} = \alpha_i + \delta_t + \sum_c \beta_c X_{c,i,t} + \eta_i U_{i,t} + \varepsilon_{i,t}$$

where: i and t index states and time, respectively; P_α is a state-level poverty index or component; U is total state unemployment rate; the X_c are the additional state-level control variables; ε is a random error term; and α and δ are state and time-period dummies to control for fixed effects. The models are estimated using weighted least squares to account for possible heteroskedasticity in the cross-section. Each state's weight equals the square root of the state's relevant group population. Poverty indexes, state unemployment rates, median real per capita incomes, and standard deviations of real per capita incomes are expressed as natural logs so that their coefficients are elasticities. Doing so aids cross-sample comparisons of the estimates and decreases the significance of outlying observations.

Data. The empirical analysis uses data from the March CPS covering the years 1991 to 1998. The annual March CPS data contain detailed income and demographic information for individuals, families, and households and are used to generate official U.S. poverty rate estimates. The period is

chosen because it is the longest period for which March CPS data on income, taxes and transfers are consistently measured and publicly available.

The data are used to construct a time series of state-level cross sections. These comprise four non-overlapping sets of two-year average values for all variables. The four, two-year pairs are: 1991/1992; 1993/1994; 1995/1996; and 1997/1998. Two-year averages are taken following Census Bureau suggestions for handling state-level income data.[12] The study analyzes the entire population sample and seven population sub-groups that have received attention in research and policy discussions. These are mature white males; mature white females; mature black males; mature black females; the elderly; the young; and female-headed households. "Mature" refers to ages 25 years to 65 years, "elderly" to ages above 65 years, and "young" to ages 16 years to 24 years. The categories "mature white female" and "mature black female" exclude "female-headed families," whereas both "elderly" and "young" include them.

Values for the $\mathbf{P_0}$, $\mathbf{I}$, $\mathbf{CV^2}$, and $\mathbf{P_2}$ are computed for different income concepts using equations 1 and 2. Pre-poverty policy income is calculated as total private cash income less work costs. The March CPS contains no information on private transfers, so these must be omitted. Work costs are estimated following suggestions of the Panel on Poverty and Family Assistance (1995, p. 243), whereby costs are set equal to $14.40 (1992 dollars) per week worked. Post-policy income equals pre-policy income plus money and in-kind transfers, less direct tax paid. The March CPS contains data on five different direct tax variables: federal income tax liability, state income tax liability, Social Security retirement payroll deduction, federal retirement payroll deduction, and the earned income tax credit. Data on government transfer payments include Social Security benefits, supplemental security benefits, unemployment compensation, public assistance or welfare, veterans benefits, workers' compensation payments, and the market values of food stamps, school lunches, and housing subsidies, and the fungible values of Medicare and Medicaid.[13]

To implement equations 1 and 2, each family's income is divided equally among family members. The resulting income for each member is then compared to its alternative poverty thresholds (i.e., the official and revised ones) divided by the number of family members. This approach results in the same number of people who are considered poor and the same average poverty gap that would arise if net family income were simply compared to the adjusted family poverty threshold. It has the added advantage of explicitly capturing the lack of income inequality among family members that is implied by the usual assumption that the family is the proper unit of analysis. Moreover, it allows the use of individual population weights, which Smeeding (1991) argues are preferred to family weights for poverty analysis.

All other variables are also calculated using March CPS data. Real values are computed by deflating nominal ones by a national Consumer Price Index (the CPIUX1).[14]

Summary statistics for poverty indexes. State unemployment rates generally fell during the sample period, although with quite uneven magnitudes across states.[15] The directional changes in the poverty indexes were much less uniform. For example, about 40 percent of the period-to-period changes in the official state headcount rates were positive, with the remaining 60 percent either zero or negative. Thus, there is considerable variation in the data for the panel estimation framework to exploit.

Tables 1 and 2 present summary information on the different poverty indexes for the sample period. Table 1 contains average index values for each group, and each index's full-period level change (i.e., between 1992 and 1999) relative to its mean. The estimates reveal familiar variations in mean levels of each measure across sample population groups. They also indicate that different identification methods can produce large level differences (only values for a given index or component, such as $\mathbf{P_0}$, are comparable.) When the headcount rate is gauged using revised $\mathbf{P_0}$, each group's rate increases relative to official $\mathbf{P_0}$ (mainly because of the higher baseline threshold). It increases further with pre-policy $\mathbf{P_0}$, because individuals' incomes are net of all cash transfers and a

greater fraction falls below the revised thresholds. Post-policy $\mathbf{P_0}$ could either be above or below the other headcount rates for a given group, because the related income concept adds in-kind transfers but also subtracts direct taxes. The outcome depends on the amount and distribution of the taxes and transfers. For all groups, the net effect of policy is to reduce both the average depth of poverty and relative deprivation of the poor. Finally, the estimates also evidence marked variation in percent changes across measures for a given group, suggesting diversity in the factors underlying the changes. This is not surprising in light of the historically different labor market experiences of each group.

Table 2 presents information on correlations between the various measures within and across sample groups. Panel A shows Pearson correlation coefficients between the official poverty rate in the total sample and the official rate for each sub-group. To make the correlations more meaningful and consistent with the subsequent empirical analysis, the aggregate and sub-group headcount rates are de-meaned by regressing each on 50 state-specific dummies and dummies for three of the four study periods.[16] The resulting correlations range from 0.784 (female-headed families) to 0.119 (mature black males). Five of the seven coefficients are below 0.65, and one is statistically insignificant. Thus, while sub-group headcount rates correlate with the aggregate rate, each series displays marked independent variation that reinforces the disaggregated approach taken here.

Panel B of Table 2 shows the Pearson correlations between each group's official poverty rate and the group's alternative poverty index components. Once again, each group's indexes and components have been de-meaned using dummy variable regressions. Correlations between the official $\mathbf{P_0}$ and the alternative $\mathbf{P_0}$ indexes are generally in the 0.7s and 0.8s and statistically significant. The correlations between the official headcount rate and the income gap ($\mathbf{I}$) and between the official headcount rate and the dispersion of income among individuals identified as poor ($\mathbf{CV^2}$) are substantially lower or statistically insignificant (including some negatives.) Overall, each alternative

index, even the different headcount rates, contains idiosyncratic elements that are not well proxied by the official rate.

Group income distributions. As mentioned earlier, unemployment affects poverty via changes in the income distribution. The eight sample population groups and three income concepts studied here result in 24 initial income distributions at each point in time. To illuminate the different circumstances of the groups, Figures 1 and 2 present graphs of the average cumulative real per capita family income distributions during the sample period for each of the groups studied.[17] Per capita incomes are computed by dividing total family income by its revised equivalence scale, to standardize for different family age compositions. Each graph contains three lines, one corresponding to each of the three income concepts. For reference, each graph also includes the official and revised poverty lines facing individuals. (Because real per capita incomes have been standardized for family size and composition, only the baseline values for the official and revised thresholds need be shown.)

The graphs indicate clear differences in the distributions across both dimensions (group and income concept). For some groups, such as mature workers and the young, differences in income concepts matter more in middle-income ranges, especially relative to post-policy income. For other groups, such as the elderly and female-headed families, differences arise mainly at lower-income levels. Here, policy substantially increases the incomes of less-well-off individuals. Differences across groups are also evident in the central tendencies of incomes. Incomes of mature white males and females, for example, tend to concentrate at higher levels than those of other groups. This point is made explicitly in Table 3, which contains sample-period averages and standard deviations of income for each group. Given differences such as these in initial income distributions, variations in estimated unemployment effects across groups and income concepts could reasonably be expected, even for a given poverty index.

V. Regression Estimates

The estimates of the unemployment elasticities for equation 3 are presented in Table 4. The first column in each table contains the poverty concept regressand, and the remaining columns contain the coefficient estimates for each group.[18] Standard errors are directly below the coefficients in italics.

Statistical significance of unemployment in the $\mathbf{P_0}$ equations is judged using a one-tailed test. Doing so acknowledges that the only reasonable alternative hypothesis to the null of no effect for aggregate unemployment on the poverty headcount is a positive effect (other things equal). As it turns out, virtually all the estimated unemployment coefficients in the $\mathbf{P_0}$ equations are positive, and the few negative ones lack significance at any standard level, using either a one- or two-tailed test. A two-tailed test is used for the income gap, $\mathbf{CV^2}$ and $\mathbf{P_2}$ equations because unemployment has a theoretically ambiguous effect on these variables.

Results for the $\mathbf{P_0}$ indexes. The discussion is usefully divided into two parts. The first is variation in the effects of unemployment on the official headcount rate across the different groups. Official headcounts of four groups respond positively and significantly to aggregate unemployment. Consistent with existing time-series and cross-section findings, the total sample population is one of the groups. The others are mature white males, the young, and female-headed families. The estimated impact of aggregate unemployment is relatively small, in the 0.1 to 0.2 range, with the point estimate for the total population being the smallest. The headcounts of the remaining four groups – mature white females, mature black males and females, and the elderly are all found to be unresponsive to unemployment changes during the study period, despite the relatively large changes in their actual official rates (see Table 1.)

A logical source of these inter-group differences is the varying degree to which each group's own unemployment rate correlates with the aggregate rate. That is, the aggregate unemployment rate might better proxy the specific labor market conditions facing certain groups than those of others. To

examine the possibility, a set of auxiliary equations is estimated in which the natural log of each group's unemployment rate is regressed on the natural log of the total unemployment rate, and the same set of year and period dummies is used in the main equations. The results are displayed in Table 5 and appear consistent with the interpretation. The three groups for which aggregate unemployment affects headcount poverty (mature white males, the young and female-headed families) also have group unemployment rates that significantly correlate with aggregate unemployment. Similarly, three of the groups for which aggregate unemployment has no effect on headcount poverty (mature black males, mature black females, and the elderly) have group unemployment rates that are not significantly linked to the aggregate rate.[19] The mature white female group seems an anomaly, although the estimated coefficient is the smallest of the significant ones (0.417). The relationship might not be sufficiently strong to allow aggregate unemployment to affect the group's headcount rate. Alternatively, or in addition, other mediating influences could be diminishing the importance of aggregate unemployment.

A second aspect of the results in Table 4 are deviations in estimated unemployment effects within each group from those based on the group's official headcount. As one goes down each column, the qualitative findings for the official headcount rates carry through for revised poverty headcounts (new baseline threshold and equivalence scales), and for headcounts based on pre-policy income (i.e., incomes before factoring in transfers and taxes.) Differences are evident in the sizes of some estimated elasticities. Pre-policy income coefficients for the total sample, mature white males and female-headed families are about half those based on Census income and are estimated a bit more precisely. The coefficient for young individuals is virtually identical, with a slightly smaller standard error. The results change more markedly when headcounts are calculated with post-policy income. Three of the four groups that before had shown a significant response to unemployment no longer do (mature white males, the young, and female-headed families.) The total sample continues to exhibit a significant coefficient, while the coefficient for the elderly becomes significant.

These patterns suggest a reasonable interpretation. As the headcount measure moves from the official $\mathbf{P_0}$ to the revised $\mathbf{P_0}$, the number of individuals counted as poor grows mainly because of the higher baseline threshold (see Table 1, and Figures 1 and 2.) As indicated by the data presented in Table 6, higher poverty thresholds increase the fractions of poor people who are in the labor force and who work. Thus, using the revised identification procedure causes the poverty status of more individuals to become independent of the unemployment rate, as they are poor with or without jobs. Econometrically, this shows up as a smaller coefficient on the unemployment rate.

Moving from the revised $\mathbf{P_0}$ to the pre-policy $\mathbf{P}_0$ results in offsetting effects. Pre-policy income subtracts from Census income all cash transfers. From one perspective, use of pre-policy income therefore pulls additional individuals, some of whom are workers, below the poverty line. As with the revised poverty threshold, a group's headcount rate thus can become less sensitive to unemployment, to the extent such transfers matter for the group. From another perspective, each group's income becomes more volatile because, on the margin, transfers act as income stabilizers that are sensitive to unemployment.[20] Consequently, a given change in unemployment is associated with wider swings in income and, hence, in poverty. The results indicate that, on net, the estimated coefficients for the total sample and for mature white males decline. Coefficients for the young and female-headed families are virtually unchanged.

Finally, moving from the revised $\mathbf{P_0}$ to post-policy $\mathbf{P_0}$ again produces offsetting effects. Post-policy income adds in-kind transfers and subtracts taxes, compared to Census income. First, these adjustments can either increase or decrease a group's poverty population, depending on the amount and distribution of the taxes and transfers. They can also alter the group's composition. The resulting net effect of these changes on the unemployment coefficient is ambiguous. Second, the inclusion of taxes and additional transfers that are sensitive to unemployment also will stabilize income and, as a result, diminish the impact of unemployment on poverty. The estimates reveal that the total sample headcount continues to respond significantly to unemployment, but headcounts for

mature white males, the young, and female-headed families no longer do. Alternatively, the coefficient for the elderly sample, which heretofore had been insignificant, becomes significant. Coincidentally, the elderly headcount experiences the largest change of any group as the income definition changes from Census income to post-policy income (Figure 1.)

Results for income gaps, relative deprivation and P_2. The use of broader notions of poverty (new aggregation procedures) diminishes the measured impact of unemployment. With one exception (the pre-policy income gap for female-headed families), unemployment has no significant effects on either the poverty gap or the relative deprivation of the poor. In the one instance where unemployment does matter, the estimated elasticity is small. Similarly, the estimated impact of unemployment on $\mathbf{P_2}$ is generally positive but always insignificant, regardless of which group or income concept is used. Given the insignificant impact of aggregate unemployment on poverty gaps and $\mathbf{CV^2}$, the absence of any significant unemployment effects on $\mathbf{P_2}$ is understandable.

Estimated coefficients on real median income. Table 7 contains the estimated (elasticity) coefficients for median real per capita income.[21] Real median income has a large and consistently negative effect on all the $\mathbf{P_0}$ indexes for all groups except mature black females.[22] The estimated elasticities are sizable. The coefficients exceed unity (in absolute value) for the total sample, mature white males, mature white females, the young, and the elderly. The coefficients for mature black males and female-headed families are somewhat smaller but highly significant. The coefficients remain highly significant as the headcount identification procedure changes, although their sizes tend to decrease. As with unemployment, real median income has few significant effects on the average poverty gap and relative deprivation of the poor population. Two exceptions are the pre-policy gap and $\mathbf{CV^2}$ of the elderly and the post-policy gap and $\mathbf{CV^2}$ of mature white males. In each of these cases, measured impact is negative.

Finally, real median income has negative, highly significant, and a generally large impact on the $\mathbf{P_2}$ index for all groups except mature black females, and for mature white males when post-policy

income is used. The results hold both for pre- and post-policy income. Given that real median income had almost no effects on poverty gaps and $\mathbf{CV^2}$, the significant impact on $\mathbf{P_2}$ is probably due to the large and significant effects in the $\mathbf{P_0}$ equations.

VI. Summary and Conclusions

The effect of aggregate unemployment on poverty has long been a focus of research and policy. This study has presented estimates of improved poverty measures and used these to conduct a state-level analysis of how aggregate unemployment affects the new measures, both for the total sample population and seven population sub-groups. The improvements include a more reasonable poverty baseline threshold; a more theoretically appealing equivalence scale; an adjustment for work costs; and more complete procedures for aggregating individuals identified as poor into an overall poverty index.

The main findings are as follows:

- Aggregate unemployment significantly affects the official poverty headcount rate of the total sample population and three of the seven sub-groups – mature white males, individuals aged 16 to 24 years, and female-headed families. The estimated elasticities are small.
- Re-calculating the headcount using a revised baseline threshold and equivalence scale or relying on pre-policy income leaves the qualitative findings based on the official headcount unaffected. The size of the coefficients for some groups changes substantially, however.
- Unemployment continues to have a significant effect for the total population sample when headcounts are calculated using post-policy income, but the results for sub-groups change markedly. Only the headcount of the elderly is significantly affected.

- Aggregate unemployment has virtually no impact on broader conceptions of poverty, including poverty gaps, relative deprivation of the poor, and the combined $\mathbf{P_2}$ index.
- Each group's median real per capita income has significant and large effects on all headcount indexes for all groups except mature black males, but generally not on poverty gaps or relative deprivation. Real median incomes significantly affect the $\mathbf{P_2}$ indexes for nearly all groups, perhaps on the strength of the headcount impact.

In sum, conclusions about whether and how aggregate unemployment affects poverty depend critically on the methods used to gauge poverty. The present study finds, as did earlier ones, that aggregate unemployment significantly affects the official headcount rate. Suggested improvements in identification and aggregation diminish the measured response, however, in some cases considerably. Indeed, indexes that encompass the most thorough revisions are unaffected by aggregate unemployment. Moreover, the impact of unemployment on any given poverty measure varies widely across different population groups.

Labor market conditions obviously matter importantly for the extent of poverty. It appears, though, that variations in hours and wages apart from those associated with changes in aggregate unemployment are most essential. The substantial effects of each group's median real per capita income on headcounts and $\mathbf{P_2}$ indexes confirm this. Still, improving general trends in hours and wages alone cannot ensure progress against poverty when broadly measured. Neither poverty gaps nor the relative deprivation of the poor responded to aggregate unemployment or to group real median income. To the extent that poverty rises because of increases in these components, microeconomic labor market interventions appear the more judicious approach to reducing poverty. The precise forms that these might take are unclear, but exploration of possibilities merits considerable attention. Research into the implications of using better poverty measures for analyzing basic behavioral issues, such as the effectiveness of anti-poverty policies, also commands priority.

Table 1: Period Averages and Full Period Percent Change, by group and poverty concept

Table 1 contains the means and full period changes of the poverty indexes and components relative to their means. **MWM** signifies mature white males; **MBM** mature black males; **MWF** mature white females; **MBF** mature black females; **Young** ages 16 years to 24 years; **Elderly** ages above 65 years; and **FHF** female-headed families. Both "elderly" and "young" include "female-headed families," while the other groups exclude them.

Index	Total		MWM		MBM		MWF		MBF		Young		Elderly		FHF	
Census	Mean	Change	Mean	Change	Mean	Change	Mean	Change	Mean	Change	Mean	Change	Mean	Change	Mean	Change
Official P_0	0.138	0.102	0.097	0.062	0.259	0.226	0.065	0.111	0.116	0.184	0.176	0.043	0.113	0.197	0.321	0.121
Revised P_0	0.228	0.091	0.177	0.081	0.371	0.166	0.144	0.100	0.230	0.162	0.267	0.040	0.275	0.147	0.441	0.075
Pre-Policy																
Revised P_0	0.296	0.072	0.241	0.066	0.430	0.127	0.206	0.078	0.290	0.103	0.295	0.045	0.613	0.028	0.533	0.054
Poverty Gap	0.594	0.003	0.551	-0.026	0.654	0.080	0.500	-0.034	0.663	0.052	0.544	0.002	0.698	-0.039	0.702	0.055
CV^2	0.694	-0.009	0.554	-0.125	1.006	0.314	0.416	-0.150	0.764	-0.066	0.526	-0.148	1.093	-0.164	0.671	-0.048
P_2	0.138	0.072	0.099	0.016	0.233	0.224	0.073	0.016	0.113	0.134	0.117	0.083	0.359	-0.032	0.308	0.134
Post-Policy																
Revised P_0	0.224	0.147	0.181	0.141	0.353	0.228	0.146	0.170	0.222	0.241	0.283	0.087	0.175	0.211	0.407	0.121
Poverty Gap	0.376	-0.014	0.352	-0.024	0.419	0.044	0.300	0.031	0.115	-0.327	0.404	0.005	0.364	-0.045	0.113	-0.131
CV^2	0.186	-0.161	0.172	-0.193	0.225	-0.095	0.119	-0.074	0.196	0.099	0.227	-0.048	0.161	-0.249	0.315	-0.073
P_2	0.048	0.087	0.036	0.061	0.089	0.243	0.022	0.180	0.039	0.273	0.071	0.012	0.034	0.093	0.106	0.080

Addendum:

Mean state unemployment rate: 0.059.

Change in unemployment rate relative to mean: -0.41

Table 2: Pearson Correlation Coefficients, poverty rates and components

Table 2, panel A contains the Pearson correlation coefficients between each sub-group's official poverty rate (**P_0**) and the total official poverty rate. Panel B contains the Pearson Correlation coefficients between each group's official poverty rate (**P_0**) and the group's other poverty index values. All index values are de-meaned by regressing the value on 50 state-specific dummies and 3 period-specific dummies. **MWM** signifies mature white males; **MBM** mature black males; **MWF** mature white females; **MBF** mature black females; **Young** ages 16 years to 24 years; **Elderly** ages above 65 years; and **FHF** female-headed families. Both "elderly" and "young" include "female-headed families," while the other groups exclude them. ** and * indicate statistical significance at the 1% and 5% levels, for two-tailed tests.

Panel A: Correlations With Total Official P_0

Group	Group Official P_0
MWM	0.718**
MBM	0.224**
MWF	0.534**
MBF	0.119
Young	0.602**
Elderly	0.394**
FHF	0.784**

Panel B: Correlations With Group Official P_0

Group	Revised P_0	Pre-policy P_0	Post-policy P_0	Pre-policy I	Post-policy I	Pre-policy CV^2	Post-policy CV^2
Total	0.868**	0.833**	0.838**	0.306**	0.407**	0.165**	0.209**
MWM	0.842**	0.812**	0.812**	0.217**	0.486**	0.064	0.267**
MBM	0.822**	0.702**	0.856**	0.162*	0.305**	0.223	-0.047
MWF	0.757**	0.708**	0.735**	0.060	0.412**	-0.094	0.193**
MBF	0.801**	0.665**	0.817**	0.149**	-0.076	-0.022	0.347**
Young	0.827**	0.803**	0.795**	0.176*	0.131	0.183**	0.172*
Elderly	0.658**	0.330**	0.772**	0.418**	0.460**	0.412**	0.235**
FHF	0.782**	0.690**	0.809**	0.352**	-0.189	0.014	0.146*

Table 3: Sample Period Means and Standard Deviations of Real Per Capita Income

(by group and income concept, constant 1999$)

Table 3 contains the means and standard deviations of per capita income for each group during the sample period. Calculations are in 1999 dollars, based on the CPIUX. **MWM** signifies mature white males; **MBM** mature black males; **MWF** mature white females; **MBF** mature black females; **Young** ages 16 years to 24 years; **Elderly** ages above 65 years; and **FHF** female-headed families. Both "elderly" and "young" include "female-headed families," while the other groups exclude them.

Income Concept	**Population Sample Group**							
Mean	**Total**	**MWM**	**MBM**	**MWF**	**MBF**	**Young**	**Elderly**	**FHF**
Census	21055.68	27998.29	19648.52	27141.41	20328.50	18158.63	20324.43	14875.21
Pre-policy	19137.63	27029.94	18312.57	26104.18	19205.55	17495.87	12276.92	12514.22
Post-policy	19838.84	22381.08	17055.65	25893.30	19470.38	17784.68	22266.61	14260.95
Standard Deviation								
Census	20789.17	25171.27	18426.03	22273.38	16284.76	16490.74	20381.48	16898.71
Pre-policy	21166.50	25513.14	18901.29	22568.20	16588.41	16668.46	20065.41	17183.78
Post-policy	17134.54	17994.82	13896.26	20697.99	14763.49	15502.62	16849.85	13071.29

Table 4: Estimated Unemployment Coefficients

The values in Table 4 are unemployment coefficients from weighted-least-squares estimates of equation 3 in the text. Coefficients are elasticities. All estimated models included a constant, state unemployment rate, group median real per capita income, group standard deviation of real per capita income, % of group with at least a college degree, % not in the labor force, % residing in a metropolitan area, 50 state-specific dummy variables, and 3 period-specific dummies. The model for the total sample also includes % female, % black, % teen, and % 65 years and older. Control variable coefficients are not shown. T-statistics for coefficients are in *italics* under the coefficients; * and ** indicate significance at the 5% and 1% levels, respectively. **MWM** signifies mature white males; **MBM** mature black males; **MWF** mature white females; **MBF** mature black females; **Young** ages 16 years to 24 years; **Elderly** ages above 65 years; and **FHF** female-headed families. Both "elderly" and "young" include "female-headed families," while the other groups exclude them. **P_0**, **I**, **CV^2**, and **P_2** are computed using equations 1 and 2 of the text. **Revised** refers to revised baseline threshold and equivalence scales. **Pre-policy** refers to cash income before taxes and transfers, less work expenses. **Post-policy** refers to cash income plus cash and in-kind government transfers, less direct taxes and work expenses. All pre-policy and post-policy values are calculated using the revised baseline threshold and equivalence scales described in the text.

Poverty Concept	**Sample Population Group**							
	Total	**MWM**	**MWF**	**MBM**	**MBF**	**Young**	**Elderly**	**FHF**
Census Income								
Official P_0	0.123*	0.189*	0.285	-0.237	-0.338	0.171*	0.211	0.153**
	0.06	*0.105*	*0.182*	*0.232*	*0.517*	*0.100*	*0.138*	*0.065*
Revised P_0	0.074*	0.153*	0.137	0.070	-0.180	0.167**	0.109	0.078*
	0.041	*0.071*	*0.103*	*0.152*	*0.320*	*0.070*	*0.069*	*0.039*
Pre-policy Income								
Revised P_0	0.062*	0.092*	0.053	0.064	-0.221	0.170**	-0.007	0.079**
	0.031	*0.045*	*0.073*	*0.153*	*0.291*	*0.062*	*0.031*	*0.028*
Poverty Gap (I)	0.010	-0.009	0.033	0.068	-0.160	-0.013	0.011	0.050*
	0.027	*0.041*	*0.055*	*0.095*	*0.097*	*0.048*	*0.028*	*0.021*
CV^2	0.062	-0.082	0.040	0.241	0.153	-0.178	0.072	0.123
	0.080	*0.118*	*0.155*	*0.341*	*0.144*	*0.122*	*0.106*	*0.072*
P_2	0.087	0.087	0.103	0.027	-0.159	0.092	0.012	0.065
	0.051	*0.079*	*0.113*	*0.207*	*0.570*	*0.114*	*0.045*	*0.045*
Post-policy Income								
Revised P_0	0.072*	0.109	0.141	-0.031	0.166	0.040	0.215*	0.052
	0.043	*0.072*	*0.098*	*0.165*	*0.354*	*0.064*	*0.103*	*0.050*
Poverty Gap (I)	0.050	0.083	0.152	-0.060	0.510	-0.007	0.008	0.070
	0.039	*0.062*	*0.088*	*0.118*	*0.428*	*0.044*	*0.082*	*0.093*
CV^2	0.040	0.096	0.329	-0.417	-0.185	0.000	-0.012	-0.028
	0.099	*0.155*	*0.241*	*0.332*	*0.681*	*0.120*	*0.236*	*0.078*
P_2	0.135	0.228	0.426*	-0.427	0.141	0.075	0.250	0.036
	0.076	*0.129*	*0.187*	*0.326*	*0.714*	*0.127*	*0.186*	*0.077*

Table 5: Regressions of Group Unemployment Rates on Total Unemployment Rate

The coefficient values in Table 5 are weighted-least-squares estimates of regressions of the natural log of state-level unemployment rates for the indicated groups on the natural log of total state unemployment rate, 50 state-specific dummy variables, and 3 period-specific dummies (not shown). Standard errors for the estimated coefficients are in *italics* under the coefficients; * and ** indicates significance at the 5% and 1% level, respectively

Group	Unemployment Coefficient	Adjusted R^2
Mature White Males	1.103** *0.136*	0.781
Mature Black Males	0.222 *0.337*	0.375
Mature White Females	0.417** *4.077*	0.621
Mature Black Females	0.750 *0.566*	0.495
Elderly	0.133 *0.489*	0.062
Young	0.593** *0.138*	0.647
Female-headed Families	0.839** *0.160*	0.462

Table 6: Labor Force Attachment of Poor Individuals, by alternative poverty lines

Panel A contains the average fraction of poor individuals that either work or are looking for work. Panel B contains the average fraction of poor individuals who work. Calculations are done for poverty populations using various multiples of the official poverty line. **MWM** signifies mature white males; **MBM** mature black males; **MWF** mature white females; **MBF** mature black females; **Young** ages 16 years to 24 years; **Elderly** ages above 65 years; and **FHF** female-headed families. Both "elderly" and "young" include "female-headed families," while the other groups exclude them.

Panel A: Fraction of Poor Individuals in Labor Force

Multiple of Official line	Sample Population Group							
	Total	**MWM**	**MBM**	**MWF**	**MBF**	**Young**	**Elderly**	**FHF**
1	0.353	0.625	0.473	0.426	0.336	0.471	0.030	0.311
1.25	0.367	0.653	0.508	0.439	0.355	0.493	0.034	0.323
1.5	0.383	0.682	0.545	0.490	0.380	0.513	0.034	0.337
1.75	0.400	0.711	0.575	0.506	0.409	0.530	0.037	0.354

Panel B: Fraction of Poor Individuals With a Job

Multiple of Official line	Sample Population Group							
	Total	**MWM**	**MBM**	**MWF**	**MBF**	**Young**	**Elderly**	**FHF**
1	0.282	0.525	0.348	0.329	0.290	0.352	0.028	0.239
1.25	0.302	0.562	0.387	0.351	0.313	0.376	0.030	0.256
1.5	0.322	0.594	0.427	0.403	0.341	0.401	0.030	0.274
1.75	0.343	0.629	0.457	0.429	0.371	0.422	0.035	0.294

Table 7: Estimated Real Median Per Capita Income Coefficients

The values in Table 7 are real median per capita income coefficients from weighted-least-squares estimates of equation 3 in the text. Coefficients are elasticities. All estimated models included a constant, state unemployment rate, group median real per capita income, group standard deviation of real per capita income, % of group with at least a college degree, % not in the labor force, % residing in a metropolitan area, 50 state-specific dummy variables, and 3 period-specific dummies. The model for the total sample also includes % female, % black, % teen, and % 65 years and older. Control variable coefficients are not shown. T-statistics for coefficients are in *italics* under the coefficients; * and ** indicate significance at the 5% and 1% levels, respectively. **MWM** signifies mature white males; **MBM** mature black males; **MWF** mature white females; **MBF** mature black females; **Young** ages 16 years to 24 years; **Elderly** ages above 65 years; and **FHF** female-headed families. Both "elderly" and "young" include "female-headed families," while the other groups exclude them. $\mathbf{P_0}$, **I**, $\mathbf{CV^2}$, and $\mathbf{P_2}$ are computed using equations 1 and 2 of the text. **Revised** refers to revised baseline threshold and equivalence scales. **Pre-policy** refers to cash income before taxes and transfers, less work expenses. **Post-policy** refers to cash income plus cash and in-kind government transfers, less direct taxes and work expenses. All pre-policy and post-policy values are calculated using the revised baseline threshold and equivalence scales described in the text.

Poverty Concept	**Sample Population Group**							
	Total	**MWM**	**MWF**	**MBM**	**MBF**	**Young**	**Elderly**	**FHF**
Census Income								
Official P_0	-1.368**	-1.860**	-1.039**	-0.432**	0.021	-1.072**	-1.135**	-0.752**
	0.159	*0.231*	*0.491*	*0.102*	*0.191*	*0.100*	*0.193*	*0.095*
Revised P_0	-1.270**	-1.546**	-1.087**	-0.358**	-0.064	-1.018**	-0.931**	-0.586**
	0.109	*0.156*	*0.279*	*0.065*	*0.119*	*0.082*	*0.097*	*0.057*
Pre-policy Income								
Revised P_0	-1.004**	-1.340**	-1.024**	-0.310**	-0.062	-0.955**	-0.472**	-0.408**
	0.080	*0.100*	*0.196*	*0.066*	*0.109*	*0.072*	*0.043*	*0.042*
Poverty Gap (I)	0.044	-0.138	0.183	-0.053	0.025	-0.071	-0.225**	0.043
	0.072	*0.090*	*0.148*	*0.042*	*0.036*	*0.057*	*0.039*	*0.031*
CV^2	0.329	-0.230	0.698*	-0.091	0.052	-0.061	-0.664**	-0.033
	0.210	*0.259*	*0.420*	*0.150*	*0.053*	*0.103*	*0.148*	*0.105*
P_2	-0.889**	-1.509**	-0.613*	-0.387**	-0.132	-0.999**	-0.788**	-0.546**
	0.134	*0.174*	*0.306*	*0.090*	*0.213*	*0.133*	*0.062*	*0.066*
Post-policy Income								
Revised P_0	-1.258**	-1.501**	-1.104**	-0.361**	-0.106	-1.062**	-0.979**	-0.650**
	0.114	*0.158*	*0.265*	*0.071*	*0.132*	*0.076*	*0.144*	*0.050*
Poverty Gap (I)	-0.046	-0.291*	0.233	-0.003	-0.041	-0.025	-0.039	0.161
	0.103	*0.137*	*0.238*	*0.053*	*0.149*	*0.052*	*0.114*	*0.138*
CV^2	-0.075	-0.747*	1.033	0.123	-0.129	-0.094	-0.140	-0.182
	0.262	*0.341*	*0.651*	*0.148*	*0.234*	*0.141*	*0.330*	*0.115*
P_2	-1.337**	-2.016**	-0.489	-0.441**	-0.147	-0.960**	-1.110**	-0.832**
	0.200	*0.129*	*0.504*	*0.141*	*0.714*	*0.149*	*0.260*	*0.113*

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Endnotes

1. For example, a researcher might use 125% of the official poverty lines, while continuing to use pre-tax income, official equivalence scales, etc.

2. Sen's (1976, 1981) work spawned a large literature on numerous aspects of poverty measurement. Useful surveys include Foster (1984), Hagenaars and van Praag (1988), Seidl (1988), Rodgers and Rodgers (1991), Ravallion (1994), and Zheng (1997).

3. Studies that employ indexes based on more complete aggregation procedures include Rodgers and Rodgers (1991), Bishop, Chow and Zheng (1995), Bishop, Formby, and Zheng (1997), Formby (1997), and Betson and Warlick (1998). Note also that the U.S. Census Bureau [e.g., U.S. Census Bureau (1998)] provides regular information on the aggregate depth of poverty and on overall income inequality, measured using the Gini index, although Sen (1976, 1981) stresses inequality among the poor.

4. Kakwani (1980) proposes that acceptable indexes satisfy another axiom, called Transfer Sensitivity, which requires greater weight being placed on transfers among the poorest poor, while Hagenaars (1986) maintains that indexes should be decomposable. Although not discussed here, $\mathbf{P}_\alpha$ meets Hagenaars' requirement for any choice of α. It also satisfies Kakwani's axiom for α equal to, or greater than, three. However, the theoretical and empirical literatures have concentrated on indexes that satisfy Sen's two criteria [see, e.g., Foster, Greer, and Thorbecke (1984) and, more recently, Rodgers and Rodgers (1991), Ravallion (1994), Shorrocks (1995), and Chakravarty (1997)]. Limiting the value of α to a value no greater than two permits a parameterization that satisfies the two Sen criteria and allows the main points to be made while keeping the analysis manageable.

5. Dissatisfaction has been expressed with the methodologies for setting basic family income thresholds and for adjusting the thresholds for differences in family size and composition; the use of income rather than consumption as an indicator of a family's attainment of the minimal living standard; the neglect of non-cash income factors, such as taxes, non-cash government transfers, work-related expenses, and wealth in judging a family's ability to acquire the minimal living standard; and how nominal values of income thresholds are adjusted for cost-of-living differences over time and across regions. Comprehensive reviews of these issues are found in Ruggles (1990), Panel on Poverty and Family Assistance (1995), and Triest (1998). Suggested improvements have resulted in numerous alternative poverty level estimates. These disparate estimates have informed debates about various poverty-related issues [see, e.g., Murray (1980), Cutler and Katz (1991), Hanratty and Blank (1992), Blank (1993, 1996, 2000), Blank and Card (1993), Slesnick (1993), Danziger and Gottschalk (1995), Mishel, Bernstein, and Schmitt (1996), Triest (1998), and Jorgensen (1998).] Studies generally have found that recommended changes produce broadly similar trends, although the consumption-based estimates of Jorgensen and Slesnick (1989) and Slesnick (1993) are exceptions.

6. A Gallup Poll has produced a time series of responses to the questions: "What is the smallest amount of money a family of four needs each week to get along in this community?" and "What amount of weekly income would you use as a poverty line for a family of four in this community?" [Panel on Poverty and Family Assistance (1995)].

7. Other studies have employed equivalence scales that vary over additional family characteristics. See, for example, van der Gaag and Smolensky (1982), Jorgensen and Slesnick (1989), and Slesnick (1993).

8. The Panel recommended a value of 0.7 for p and a value between 0.65 and 0.75 for f. Cutler and Katz (1992) present regression-based evidence that the official thresholds are approximated by a value of 0.61 for f and a value of 0.76 for p, although see Johnson (1996) for a critique. Buhmann et al. (1988) suggest a different method of implementing the above procedure. They assign a value of 1 to p and freely estimate a value for f. Resulting f values have ranged from about 0.25 to about 0.75 [Triest (1998).]

9. Auxiliary regressions of the natural log of each population group's median real per capita income on the natural log of total unemployment indicate that a large fraction of the variations in group per capita incomes are independent of variations in total unemployment. In each regression, the coefficient on unemployment is negative and highly significant, ranging from –0.052 (elderly) to -0.170 (mature black males and mature black females). However, the adjusted R^2s are all very small, ranging from 0.004 (elderly) to 0.071 (mature black males). Thus, group-specific median per capita incomes are not simply proxies for total unemployment.

10. Some previous studies have included the inflation rate as one possible macro economic determinant of poverty. A measure of inflation is excluded here both because it generally fails to have a significant impact [e.g., Romer (2000)], and because reliable state-level inflation estimates are lacking. Also, some researchers have added the ratio of the poverty line to mean or median income as a control variable to account for changes in the density of the income distribution in the tail below the poverty line [e.g., Tobin (1994) and Blank (2000)]. Given that real median income is included in the regression, and the poverty line is constant in real terms over time, the ratio variable is not necessary.

11. Blank and Card (1993) review the benefits and costs of using a pooled time-series/cross-section framework relative to relying on aggregate-level data. On the positive side, it increases the size of the available sample, allowing the analysis to identify the effects of an array of

variables, and it includes unrestricted year effects that will eliminate biases in estimated coefficients due to correlation between the regressors and unobserved factors that affect the poverty indexes in all states in a given year. On the negative side, the framework ignores the possible influence of other states' conditions on the poverty indexes of a particular state and excludes the impact of purely national variables that might affect state-level indexes.

12. The U.S. Bureau of the Census (1998) explains, "The CPS is designed to collect reliable data primarily at the national level…state estimates of income are, therefore considerably less reliable. Specifically, the sampling variability associated with state estimates are higher than for estimates based on the nation as a whole…. To reduce the chances of misinterpreting…state income estimates, the Census Bureau recommends using two-year averages…" (p.xiii). Non-overlapping years are used for averaging in order to avoid introducing serial correlation.

13. The study follows U.S. Census Bureau conventions and treats government pensions as market income, analogous to private pensions. Danziger and Weinberg (1994) treat government pensions as cash social insurance transfers, akin to Social Security benefits, as do Plotnick and Skidmore (1975). See Smeeding (1982) and U.S. Census Bureau (1992) for discussions of methods used to value in-kind transfers.

14. Two reporting issues associated with the CPS data are potentially relevant here. The first is the accuracy of households claiming zero income. While some or most of these households may have incorrectly reported their income, there are relatively few cases in the data. Thus, even though distribution-sensitive measures, such as $\mathbf{P_2}$, weight such cases more heavily than others, inaccurate reporting by these households will have little impact on the empirical results. The second issue is the possible underreporting of transfer income during the period of study. Because the extent, nature, and distribution of this underreporting is unknown, it is impossible to know how or if it will affect the results.

15. One might raise concerns about the use of a sample that contains few instances of unemployment increases. This is only a problem if poverty responds asymmetrically to increases and decreases in unemployment. This does not appear to be a significant issue here, in that the empirical results based on the official headcount rate are similar to those found in previous studies [e.g., Blank and Card (1993).]

16. The study employs 51 "states," comprised of the 50 actual states and the District of Columbia. Thus, 50 state dummies are used. The four, two-year periods require 3 period dummies.

17. The eight income categories shown in the graphs are: $0 to $5000; $5001 to $10,000; $10,001 to $20,000; $20,001 to $30,000; $30,001 to $40,000; $40,001 to $50,000; $50,001 to $60,000; and >$60,000. Incomes are in constant 1999 dollars, based on the CPIUX.

18. Summary statistics from the regressions (not shown) indicate that the models generally fit the data well. Adjusted R^2s for the $\mathbf{P_0}$ equations range from 0.8 to 0.95. Those for the poverty gap (**I**) and $\mathbf{CV^2}$ equations tend to be lower, on the order of 0.5 to 0.6. The $\mathbf{P_2}$ equations adjusted R^2s are around 0.7 to 0.8

19. The finding that black male and female unemployment is not significantly related to total unemployment merited further study. We ran an auxiliary set of annual regressions (not shown) of mature black male unemployment and mature black female unemployment on national unemployment for the years 1954 to 2000 and also found a statistically and quantitatively significant link for each group. This conforms to previous findings [e.g., Blank and Blinder (1986).] We then re-ran the state-level regressions, taking out the state and time-period dummies, and got results very similar to those based on national data. That is, the unemployment rate elasticity coefficients for black males and females were highly significant and sizable (0.781 for males; 0.743 for females). The data thus suggest that the relationship

between black unemployment and total unemployment arises mainly from changes in the mean values for all states over time and differences in mean values across states. Within-state relationships between black and total unemployment appear to be weak. We use the regressions that include state and time dummies in Table 5 because they are consistent with the main regressions in the paper, which also use the dummies.

20. Cohen and Follette (2000) present estimates of the quantitative importance of automatic stabilizers.

21. The standard deviation of real per capita income had no consistent or substantial impact on any of the group's poverty indexes. The related coefficient estimates are not presented to conserve space.

22. It is useful to reiterate that median per capita incomes of the population groups move largely independently of total unemployment (see footnote 9). Significance is judged using a one-tailed test for real median income in the $\mathbf{P_0}$ equation, and a two-tailed test in the other equations. As with unemployment, only one alternative hypothesis is reasonable (a negative impact.) The point is moot, however, because all the real median income coefficients in the $\mathbf{P_0}$ equations are also significant at the 1% level using a two-tailed test.