

Understanding Poverty Rates and Gaps: Concepts, Trends, and Challenges

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Abstract

I survey key developments in applied and theoretical research on poverty rates and poverty gaps over the past two decades, and provide a detailed analysis of poverty trends across a variety of income measures and poverty indexes. Included is an extensive summary of how poverty thresholds and economic resources are measured and several proposed recommendations for revision. In addition I discuss axiomatically derived alternatives to the standard poverty rate that provide estimates not only of the incidence of poverty, but also the intensity and the inequality of poverty. The empirical analysis shows that while poverty rates fell in the late 1990s, deep poverty held steady and even rose for broad income measures that include the usual private and public income sources along with in-kind transfers such as food stamps and subsidized housing, and tax credits such as the EITC. I conclude with a discussion of a number of new challenges facing poverty measurement, especially issues of data quality in the Current Population Survey, and recommendations for future research and policy on poverty measurement.

1. Introduction

Measuring the economic status of low-income individuals and families is a central focus of poverty scholars, and is at the fore of much public policy debate. The stakes in the proper measurement of poverty are substantial as changes in poverty (and poverty thresholds) influence the scale and scope of redistributive tax and transfer programs at all levels of government. In the United States the programs directly affected by the location of the poverty line number at least 27, and include programs such as Temporary Assistance to Needy Families (TANF—formerly known as AFDC), the Food Stamp Program, Supplemental Security Income, Medicaid, Medicare (in the new prescription drug benefit), the National School Breakfast and Lunch Programs, the Supplemental Program for Women, Infants, and Children, and the Low Income Home Energy Assistance Program, among others (Citro and Michael 1995). In the most recent fiscal year the appropriations to these programs surpassed \$600 billion. While expenditures on other key programs in the U.S. social safety net such as Social Security, Disability Insurance, Workers Compensation, Unemployment Insurance, Section 8 and Public Housing, and the Earned Income Tax Credit do not hinge directly on the poverty line, they are affected by the distribution of income and thus by the depth of poverty. In this article I survey several developments in poverty measurement over the past two decades, including alternative measures of poverty thresholds, definitions of resources, and indexes of deprivation, and I also discuss old and new challenges in poverty measurement, especially those related to data quality.

Over the past two decades research on poverty measurement by economists has largely fallen into one of two camps—one which emphasizes methods of revising the easy-to-understand and commonly employed poverty rate (Ruggles 1990; Citro and Michael 1995) and one which emphasizes axiomatically derived alternatives to the poverty rate (Sen 1976; Foster et al. 1984;

Atkinson 1987; Zheng 1997; Jenkins and Lambert 1997). In the first camp, most of the controversy surrounds how and where to draw the poverty line and which income sources to attribute to the family or individual in determining the poverty rate (also known as the head count rate). For example, in the United States the official definition of poverty is based on an absolute scale, rather than a relative scale as in most OECD countries (Smeeding 2006), with the threshold updated annually only for changes in the cost of living. The implication is that the standard of living for purposes of poverty measurement in the U.S. in 2006 is the same in real terms as in 1966. Few would disagree that in the intervening four decades since the adoption of the poverty thresholds that there have been important changes in the consumption bundle of the typical family. At the same time the official definition of income for determining the poverty rate excludes the dollar value of in-kind transfers such as food stamps and housing subsidies, and also excludes tax liabilities and the refundable Earned Income Tax Credit. The EITC has grown ten-fold in real terms over the past two decades to over \$35 billion per year to exceed in dollar terms any of the means-tested cash transfers in the safety net, and has been credited with stimulating the labor force participation of single mothers and reducing poverty in the 1990s (Meyer and Rosenbaum 2000; Grogger 2003; Gundersen and Ziliak 2004). Official poverty statistics do not reflect important trends in programs like the EITC that affect the well being of the poor.¹

In the second camp, the focus is less on how to construct thresholds or count resources and instead is on constructing distribution sensitive measures of economic status to capture not just the level of poverty but also the depth. This literature argues that the benefit of the transparency afforded to the head count rate must be weighed against the cost of several

¹ To the extent that the EITC stimulates labor force participation among non-workers and possibly distorts labor supply decisions among workers, and to the extent that it affects the level of participation in cash transfer programs such as AFDC and SSI, then official poverty statistics are affected indirectly by behavioral responses to the EITC. The official estimates do not include the dollar value of the EITC.

undesirable properties. For example, the head count rate provides the same information regardless of whether all poor people are \$1 or \$5000 below the poverty line. In addition, transfers from a poor person to a less poor person that are not sufficient enough to lift the latter person over the line leaves the head count unchanged although most would argue such transfers worsen the depth of poverty. Sen (1976), who wrote the seminal paper on poverty indexes, argued that the ideal index should indicate the incidence of poverty, the average deprivation of the poor, and the relative deprivation among the poor. The poverty rate only answers the incidence question but is silent on the important issues of poverty intensity and inequality. The latter two outcomes, however, are critical to understanding the anti-poverty effectiveness of government tax and transfer programs because most such programs do not lift families above the line but presumably reduce financial hardship. Viewed simply, the poverty rate is an absolute benchmark to gauge whether or not persons are lifted out of poverty. However, many transfer programs are designed to alleviate poverty and not necessarily eliminate it. Since Sen's article several authors have refined and/or added to his list of axioms in a bid to make axiomatic measures more robust to alternative orderings of poverty status (see the surveys in Foster (1984) and Zheng (1997)).

In this article I survey some of the key issues from both research strands in the poverty measurement literature. Like most of the literature I focus on income poverty and do not address the issues of asset poverty (Haveman and Wolff 2001), consumption poverty (Slesnick 2001), or material hardship (Mayer and Jencks 1989). I also focus on issues salient to income poverty in the United States. Given the treatises on revising the poverty line by Ruggles (1990) and Citro and Michael (1995), and the technical surveys of axiomatic measures of poverty by Foster (1984) and Zheng (1997), what is the value added of this comparatively brief survey? The two

major recent books on revising the poverty line spend fewer than 10 pages on alternative poverty indexes across the more than 600 pages of text, while the major surveys on poverty indexes do not treat the substantive issues of implementing poverty lines raised in the former research. Hence one goal of this survey is to bring together the two agendas in the hopes of raising awareness to social scientists of key insights and challenges facing both.

A second goal is to discuss some recent developments in poverty indexes not covered in previous summaries. The leading example here is the powerful and intuitive ‘TIP’ curves proposed by Jenkins and Lambert (1997) that depicts in a single graph the incidence, intensity, and inequality dimensions of poverty.

The third goal of this survey is to update how the economic status of the poor in the United States has changed over the past two decades across a variety of income definitions, poverty indexes, family structures, and geographic regions. Burtless and Smeeding (2001), Iceland (2005), and Hoynes, et al. (2006) recently described U.S. poverty trends across alternative income definitions, but with a focus on poverty rates. Indeed, Hoynes, et al. (2006, p. 52) state that “Although poverty can be measured in ways other than the official definition, our work, and the work of others, shows that most of these different ways will alter the level of poverty but not the trend.” The claim by Hoynes et al. (2006) may be true for different definitions of poverty rates, but I show that deep poverty in the 1990s held steady and even rose when the poverty rate declined monotonically, which suggests that common trends do not apply to alternative poverty indexes and highlights the practical importance of robust poverty measures. The trend analysis also highlights a number of important developments in the anti-poverty effectiveness of the social safety net as well as challenges facing poverty measurement, especially with regard to data quality. The increasing proportion of sample participants in the

Current Population Survey with imputed incomes challenges the efficacy of our current estimates of the poverty rate (and gaps). Moreover, in light of the 1996 welfare reform the conversion of the primary cash assistance program into a block grant that largely provides in-kind transfers suggests that official statistics are likely understating the extent to which families are being assisted by the TANF program. I conclude by offering some recommendations for future research and reforms to poverty policy analysis.

2. The Incidence of Poverty

To fix ideas for the ensuing discussion consider the poverty index proposed by Foster, Greer, and Thorbecke (1984; hereafter referred to as FGT):

$$(1) \quad P_{\alpha} = \frac{1}{n} \sum_{q=1}^Q \left(\frac{z - y_q}{z} \right)^{\alpha},$$

where n is the size of the population, Q is the number of poor families, z is the family-size specific poverty threshold, and y is income. The parameter $\alpha, 0 \leq \alpha \leq \infty$, indicates the degree of aversion to poverty such that as α increases there is increasing weight given to the poorest households.

The FGT index is attractive because it nests many of the well-known poverty measures.

When $\alpha = 0$ the FGT index yields the commonly known poverty rate, $P_0 = \frac{Q}{n}$. The poverty rate represents the percentage of the population that is poor. Given a poverty line z , a person is poor if $y < z$ and not poor if $y \geq z$. In this case poverty is a discrete state reflecting the fraction of persons who have not yet attained a minimally adequate level of income to meet basic socially determined needs. While this definition is at once intuitive and transparent, and thus can be readily grasped by the policymaker, the voter, and the press, it is also vague because the notion

of poor depends on the resources being measured and where the cutoff separating the poor from the non-poor is drawn, each of which may be subjectively determined across time and space. There are also deeper concerns about the failure of the poverty rate to capture any notion of deprivation (Sen 1976). Indeed, four decades ago Harold Watts (1968 p. 324) complained that the poverty rate had “little but its simplicity to recommend it.” Before discussing the critiques of the poverty rate I first detail how resources are measured and how the line is drawn in the official definition, followed by a discussion of trends in the U.S. poverty rate over the past two decades.

2.1 Measuring Resources

In the United States economic resources for the purposes of poverty measurement entail highly liquid forms of money income. This includes earnings, Social Security (retirement, disability, and survivors benefits), Supplemental Security Income, Unemployment Insurance, workers’ compensation, TANF and other forms of public cash welfare, veterans’ payments, pension income, rent/interest/dividend income, royalties, income from estates, trusts, educational assistance, alimony, child support, assistance from outside the household, and other income sources. This information is collected on an annual basis as part of a supplement to the monthly Current Population Survey (CPS) called the Annual Social and Economic Study. The survey is fielded in March and the income information refers to the previous year. The family is the basic unit of analysis for poverty measurement, where family means two or more persons residing together and related by marriage, birth, or adoption. The income of all family members is summed to yield total family income for the year, and members of related subfamilies are assigned the family income of the primary family unit. All members of the same family share the same poverty status.

Although the official measure covers a broad range of income sources it falls far short of the gold standard espoused by public economists known as Haig-Simon income (Rosen 1985; Tresch 2002). Haig-Simon income, named after Robert Haig and Henry Simon, was originally proposed as an ideal for the income tax base and thus is intended to capture comprehensive changes in purchasing power during a year. This ideal measure of income “requires the inclusion of all sources of potential increases in consumption, regardless of whether the actual consumption takes place, and regardless of the form in which the consumption occurs.” (Rosen 1985, p. 336) Income in this case is the sum of consumption plus the increase in net worth; that is, it is the sum of consumption, saving, and capital gains. For the purposes of poverty measurement, however, one would like to focus on disposable Haig-Simon income; that is, income net of tax liabilities.

Many have argued for a consumption-based approach to measuring economic resources (Cutler and Katz 1992; Slesnick 1993, 2001; Meyer and Sullivan 2003), and thus emphasize one of the three components of Haig-Simon income. Two general arguments are made by proponents of consumption-based measures, one theoretical and one empirical. The basic theoretical argument is that current income is only a snapshot of real purchasing power and at any given point in time may be transitorily low. However, during periods of temporary income shortfalls the family may be able to maintain consumption by spending down assets and/or borrowing and thus current consumption better represents permanent income. Although this argument is compelling on the surface, Blundell and Preston (1992, 1998) urge caution about the use of consumption as a *carte blanche* measure of welfare. They show that consumption is most credible as a measure of well being when comparisons are made between households of a similar age and birth cohort. As most of our poverty comparisons are made across age and cohorts then

consumption may be only a weak proxy for lifetime welfare because households of different cohorts may face a very different pattern of real interest rates that can affect the ability to intertemporally smooth consumption, and households at different ages may have different tastes and needs for consumption that are driven by lifecycle changes in demographic structure such as childbearing and childrearing. It is worth noting that measures of well being based on current income are subject to a similar set of life-cycle criticisms.

A separate argument in favor of consumption poverty is based on measurement issues. There is some evidence that low-income families under-report income in order to qualify for transfer programs, and actually also under-report participation in transfer programs (Edin and Lein 1997; Bollinger and David 2001). Meyer and Sullivan (2003) argue that this underreporting is particularly acute among poor single mothers and that consumption data may be less prone to measurement error and hence provide a less noisy portrait of economic resources. In the United States, the only comprehensive dataset on consumption for poverty measurement is the Consumer Expenditure Survey (CE). However, some have criticized consumption measured in the CE because aggregate consumption in the CE does not align well with consumption reported in the National Income and Product Accounts (Attanasio, et al. 2006). As discussed later in the last section, more research is clearly needed on the relative merits of survey measures of income and consumption. Regardless, it is important to note that consumption-based poverty measures still fall short of the Haig-Simon ideal because of the omission of savings and capital gains. Although the poor tend to have few assets (Hurst and Ziliak 2006; Sullivan 2006), and thus low annual income from savings, this is likely an endogenous response to their poverty status. If the objective is to benchmark the well being of the poor to the economic status of the typical family, as was the intention with the original poverty measures designed by Mollie Orshansky, then for

the purposes of poverty measurement a case can be made for a comprehensive definition of disposable income capturing consumption, saving, and capital gains.

As currently implemented, however, the definition of income used in constructing the U.S. poverty rate excludes many income sources—both cash and in-kind—which are consistent with the Haig-Simon notion of purchasing power. Omitted income sources include capital gains and losses, the imputed rental value of owner-occupied housing, the dollar value of food stamps, subsidized and public housing, Medicaid, Medicare, tax payments, and tax credits. Some additional income sources, such as food stamps, school lunch and breakfast, tax payments, and tax credits, are readily measured and thus the reason for their omission from official statistics is not obvious. Possible explanations for their exclusion include the fact that some programs did not exist (the EITC) or were in their infancy when the modern poverty rate was established in the 1960s (Medicaid, Medicare, food stamps, public housing), other income sources were not collected in the CPS until a later date (capital gains and losses did not surface in the CPS until 1980), and still others such as in-kind transfers like Medicaid, Medicare, and the imputed rental value of owner-occupied housing are notoriously difficult to measure. Some argue that a key advantage of the U.S. poverty rate is the consistency of the definition over time. It is true that such stability in definitions affords more ready comparisons over time, but this convenience should not substitute for economic coherency. That said, if the additional cash and in-kind income sources are not also reflected in the construction of the poverty threshold, then the case for their inclusion as resources is less compelling.

2.1.1 Recommendations from Ruggles (1990)

Several commentators over the years have suggested revisions to the way we measure income for our poverty statistics. In an influential study Patricia Ruggles (1990) proposed basic

changes to the measurement of income, which still allow the use of the CPS for constructing poverty rates. Specifically, Ruggles argued that direct taxes extract resources from families and are not a choice and thus should be deducted from income, while tax credits in the form of the refundable EITC add resources to families and should be added to income. The primary direct taxes in the U.S. include Federal income tax payments, payroll (Social Security and Medicare) tax payments, and state income tax payments. Expanded deductions and exemptions as part of reforms to the Federal tax code have removed many poor families from the tax rolls over the past 20 years, but higher payroll tax rates and bases have consumed an increasing proportion of tax liability for low and middle-income taxpayers (Mitrusi and Poterba 2000), as have state taxes. Moreover, while the poor are less likely to be required to file the annual Federal tax return, the expanded generosity of the EITC over the same period creates strong incentives to file. In 1986 the maximum subsidy rate in the EITC was 11 percent, whereas in 2006 it is 40 percent, nearly a four-fold increase.

In addition to incorporating tax payments and credits, Ruggles proposed that a revised resource measure include near-money in-kind transfers, where near money implies that the transfers are fungible enough so that they free up cash to be used for other purposes. Included in this group are food stamps and housing subsidies, and although not stated explicitly, presumably school breakfasts and lunches, low-income energy assistance, and WIC. However, Ruggles argued against the inclusion of Medicaid and Medicare because she does not view health insurance as fungible enough to free up other cash resources, and unlike food stamps where most all recipients spend more on food than the stamps allow, she argues that Medicaid/Medicare health benefits “normally exceed the amounts recipients would have spent otherwise.” (p. 140) Health benefits are typically valued either at market values, that is, the amount that it costs to

obtain similar products in the private market, or at less than market rates, what the Census Bureau calls “fungible value” (Census P60-186RD 1992). In the CPS families are assigned fungible values if and only if their family income exceeds that which is needed for food and housing under the proviso that extra resources exist to purchase private health benefits. If family income falls short of food and housing needs then the fungible value is zero; otherwise, the fungible value equals the difference between family income and food and housing expenses up to the market value of medical benefits. Because of complications over how to properly value health benefits Ruggles did not support their inclusion as a resource to meet minimal consumption needs.

2.1.2 Recommendations from the National Research Council (1995)

Spurred by a Congressional directive, in 1992 the Census Bureau contracted to the National Academy of Sciences to convene an expert Panel on Poverty and Family Assistance. The National Research Council (NRC) published the panel’s report in 1995 with Constance Citro and Robert Michael as editors. The NRC panel was clearly influenced by Ruggles incisive analysis as their proposed resource measure overlapped with her measure, but with some additions. Like Ruggles, the NRC recommended that the income measure include the current components plus near-money in-kind transfers less taxes plus refundable credits. In addition, the NRC recommended that out-of-pocket medical expenses, insurance premiums, child care costs, child support payments, and a flat amount per week worked to cover transportation and other miscellaneous work expenses be deducted. The NRC believed strongly that the income definition be consistent with the poverty threshold definition, which it currently is not because as described below the thresholds were established relative to after-tax income whereas resources are measured on a before-tax basis. Following Ruggles, the NRC did not recommend inclusion of

the value of Medicaid and Medicare, nor private health insurance, because of the wide variation in health care needs across the population.

The NRC's recommended resource measure has two controversial deductions. The first is out-of-pocket medical expenses. Implicit in this deduction is the belief that out-of-pocket medical expenses are made out of necessity rather than choice, that is, they are part of health production rather than health consumption. This is a difficult position to take because many out-of-pocket medical expenses may be by choice for pure consumption purposes. For example, consider two individuals with incomes of \$10,000 where one decides to spend \$200 on corrective lenses to address a near-sightedness problem, and the other spends \$2,000 on Lasik surgery to correct the near-sightedness problem. According to the NRC definition the latter individual has \$1,800 less in disposable income than the former, even though some would argue that Lasik is a discretionary expense. The NRC did not wish to impose a cap on the amount of medical expenses one could deduct, though they acknowledged that such a cap could be needed in the future (Citro and Michael 1995, p. 236). Given the rapid growth in health care technology and cost, as well as the explosion of elective medical procedures, if one were to adopt the NRC recommendations it seems clear that a cap would be necessary.

The second controversial deduction in the NRC resource definition is the exclusion of child care costs. The NRC noted the explosion of families with dual career parents between the 1960s and 1990s, and thus they proposed allowing a deduction for child care expenses for families where both parents work or in families with one resident parent who works. The deduction, unlike out-of-pocket medical expenses, would be capped, in this case at the earnings level of the lower-earning parent or to the value of a pre-specified cap that is indexed to inflation. While this reform acknowledges the extra cost imposed on families with two working parents or

with a single working parent, it does cause some concern over horizontal equity in the case of two-parent families. Consider two, two-parent families each earning \$15,000 per year. In one family both parents work 20 hours per week at the same rate of pay on staggered shifts that allow them to provide care but they choose to place the child in care for 20 hours during one of the parents shifts at an hourly cost of \$10 to allow the other spouse to attend to household chores such as shopping and cleaning. Because the annual child-care cost exceeds the lower-earner's income of \$7,500 the family faces a cap on child-costs of \$7,500, making their disposable income \$7,500. The other family with one worker also chooses to place their child in the same child care facility for the same 20 hours in order for the non-working spouse to shop and clean, but they are unable to deduct the expense and thus their disposable income is \$15,000. This example raises the question whether the NRC resource definition violates the 'equal treatment of equals' principle, and thus basic principles of optimal tax and transfer theory.

2.2 Drawing the Line

The second component of the poverty rate is the poverty threshold z , which is typically established as either an absolute scale or as a relative scale. The absolute scale is based on the premise that poverty status should be judged against a fixed, objectively set minimum standard of living. The relative scale, on the other hand, treats the minimum standard of living as a function of the current socially accepted norms of consumption needs. In the latter case the most common approach is to tie the relative scale to the median income, for example, one-half the median income. There are advantages and disadvantages to both absolute and relative scales. On the plus side, absolute scales are readily amenable to comparisons over time to assess how a society is faring in its war on poverty. Because the relative scale is tied to current standard of living, which changes over time, it is less straightforward to benchmark progress against poverty.

On the down side, no matter how objective the expert panel charged with drawing the absolute threshold may be, there is an inherent element of subjectivity involved in determining minimally adequate needs and the thresholds may become dated if they are not revised periodically to better reflect minimum needs (Ruggles 1990). Because relative scales are tied to current living standards the issue of dated thresholds does not arise.

The United States adopted absolute scales in the 1960s using a method devised by an economist named Mollie Orshansky (1963), who worked in the Social Security Administration. Based on the Household Food Consumption Survey conducted by the U.S. Department of Agriculture in 1955, Orshansky deduced that the average family of three or more persons spent about one-third of their after-tax money income on food spending. This implies that after establishing the appropriate food budget one could use a multiplier of 3 to establish an income cutoff for minimally adequate needs. The food plan adopted was the least costly of four nutritionally adequate food diets specified by the U.S. Department of Agriculture known as the 'economy' food plan. Orshansky devised 62 separate food plans for nonfarm families and unrelated individuals depending on family size, age, gender, and number of related children and also had a separate category for farm families (Fisher 1992). The poverty thresholds were drawn by multiplying the food plans for families of three or more by 3, for 2-person families by 3.7, and for unrelated individuals the line is set at 80% of the 2-person line. Each year since 1963 the thresholds have been updated for changes in inflation as measured by the Consumer Price Index (specifically the CPI-U since 1980). In 1981 the farm/nonfarm distinction was dropped, as was the female householder distinction, which leaves 48 separate thresholds today. The thresholds apply uniformly across the entire country, making no distinctions for geographic variation in the cost of living.

Table 1 contains the poverty thresholds in the U.S. for 2005. In 2005 the poverty threshold for a 4-person family (weighted by the age and relationship composition of the family unit) was \$20,144. The weighted thresholds increase as family size increases, but within a given family size the thresholds first rise when moving from a unit with no related children under age 18 to a unit with one such child, and then they fall as more of the family is composed with related children under age 18. Thus, the thresholds roughly account for economies to scale in household production and consumption, implying that children eat less than adults and may share living space more intensively by pairing up in bedrooms.

Table 1. Poverty Thresholds for 2005 by Size of Family and Number of Related Children Under 18 Years

Size of family unit	Related children under 18 years								
	None	One	Two	Three	Four	Five	Six	Seven	Eight or more
One person (unrelated individual)....									
Under 65 years.....	10,160								
65 years and over.....	9,367								
Two persons.....									
Householder under 65 years.....	13,078	13,461							
Householder 65 years and over.....	11,805	13,410							
Three persons.....	15,277	15,720	15,735						
Four persons.....	20,144	20,474	19,806	19,874					
Five persons.....	24,293	24,646	23,891	23,307	22,951				
Six persons.....	27,941	28,052	27,474	26,920	26,096	25,608			
Seven persons.....	32,150	32,350	31,658	31,176	30,277	29,229	28,079		
Eight persons.....	35,957	36,274	35,621	35,049	34,237	33,207	32,135	31,862	
Nine persons or more.....	43,254	43,463	42,885	42,400	41,603	40,507	39,515	39,270	37,757

Source: U.S. Census Bureau.

A number of forceful criticisms have been levied against the poverty thresholds in the U.S. (Ruggles 1990; Citro and Michael 1995). As discussed in Ruggles (1990) some commentators in the 1960s like Rose Friedman (1965) thought that the thresholds were too high because the poor spent more than one-third of their budgets on food and thus the multiplier should have been set below 3. The problem with Friedman's argument is that the level of food spending of the poor was likely an endogenous response to their poverty status, and that Orshansky was attempting to establish a threshold against a benchmark reflecting the needs of the typical family. Others like Michael Harrington (1962) criticized the Orshansky threshold for being too low both because a BLS consumption survey in 1960 indicated that the multiplier should be larger than 3 and because the official thresholds are based on the economy food plan which was designed for emergency food need and not long-term food consumption needs.

In more recent years the critiques of the thresholds have tended to align more closely with Harrington than Friedman. Because the thresholds are only adjusted for changes in the CPI-U it is widely believed that the threshold is at best a weak approximation to minimally adequate needs. For example, median income for 4-person families in 2004 was \$66,111, which suggests that the 2004 threshold is only 29 percent of 2004 median income. In 1980 the same threshold was 34 percent of median income, which suggests that the relative-to-median-income position of the poor has fallen about 15 percent over the past 25 years (and by 40 percent since the original Orshansky threshold, which was set at about 50 percent of median income in 1963). Moreover, current estimates from the Consumer Expenditure Survey suggest that food expenditures only account for about one-sixth of the typical consumer's after-tax money income, suggesting that the multiplier should be roughly doubled from 3 to 6. In addition, the thresholds fail to account for regional differences in the cost-of-living. In the U.S. there are substantial differences in

housing costs, fuel and energy costs, transportation costs (of both money and time), and food costs, and yet the uniform thresholds do not account for such distinctions (Joliffe 2006). Another, more technical, criticism of the thresholds is their odd application of equivalence scales. This is seen, for example, in Table 1 where the threshold for a two-parent and two-child family (\$19,806) is lower than the threshold for a one-parent and three-child family (\$19,874).

2.2.1 Recommendations from Ruggles (1990)

Ruggles devoted the majority of her book to critiquing the current poverty thresholds, concluding that “Revision of our system of poverty thresholds is clearly the most pressing priority in poverty measurement.” (p.170) Ruggles espoused an absolute measure of poverty, but also recognizes that consumption patterns can change significantly enough over long periods of time to render the thresholds meaningless. Hence, she recommended that a panel of experts be assembled to establish a normative market basket of minimally adequate consumption goods and services, and then convene a new panel of experts each decade thereafter to revise the market basket to changing societal needs. Within each decade the thresholds would be revised by changes in the cost-of-living as is current practice with the CPI-U. This consumption-based approach to revising the line would make the poverty lines quasi-relative in that they would be fixed for upwards of a decade prior to substantial revision.

In her analysis Ruggles did not specify what the normative consumption basket should be (see the NRC recommendations below), and instead considered two relatively straightforward consumption-based fixes to the thresholds—one that updated the Orshansky multiplier and one based on a housing consumption standard. Using data on the budget share of food in the 1980s Ruggles proposed that the Orshansky multiplier be revised upward from 3 to 5. This revision would have increased the threshold for a 3-person family in 1987 from \$9,056 to \$15,195, and

increased the poverty rate to 25.9 percent from the official rate of 13.5 percent (Table 3.3 of Ruggles). The housing-based threshold uses the Fair Market Rent set by the U.S. Department of Housing and Urban Development (HUD) for the Section 8 Subsidized Housing Program times 3.33 because HUD stipulates that no more than 30 percent of recipient's gross monthly income should be spent on housing. In 1987 this raised the threshold for a 3-person family to \$13,977, and under this standard the poverty rate would have been 23.4 percent. Regardless of which of the two consumption-based thresholds were adopted poverty was significantly understated based on the current definition of income and revised thresholds.

The other major reform to the thresholds proposed by Ruggles was adjustment for differing family needs. One family need is spatial difference in purchasing the minimally adequate basket of goods. She recommended that the thresholds be adjusted by geographic price indexes rather than a uniform national price index. Official poverty statistics indicate that non-metro poverty exceeds metro poverty. However, Joliffe (2006) showed that metro poverty exceeded non-metro poverty in every year over the past 15 years after he adjusted for regional price variation with the Fair Market Rent index. While broad city-specific price indexes might be ideal, the data do not exist for such fine geographic regions and are deemed too costly to implement. However, one could follow Joliffe and use the Fair Market Rent index under the assumption that the bulk of regional price variation comes in the form of housing, or at a minimum one could use the Bureau of Labor Statistics' geographic price indexes to account for the fact that the cost-of-living in the South is lower than in the Northeast and West. A second revision proposed by Ruggles was to eliminate the "senior discount" in the thresholds. As seen in Table 1 the thresholds for 1-and 2-person households with heads over age 65 are lower than those with heads under age 65. This differential, Ruggles argued, is based on the (false)

conjecture that the needs of the elderly are less than those of the non-elderly. As there is not much evidence to support this claim the senior discount should be eliminated.

Third, Ruggles argued that household equivalence scales be revised. Equivalence scales are used to scale-up and/or scale down the thresholds based on the age composition of the family, that is, the number of adults versus the number of children. As discussed earlier, as one moves across family sizes in Table 1 there are a number of irregularities in the current thresholds. One easy fix-up proposed by Ruggles (Table 4.4) is to fix the threshold for a 4-person (2-child family) and then adjust for deviations from this amount by using a constant elasticity of family need with respect to family size of 0.5. That is, the Ruggles equivalence scale is

$$(2) \quad \text{Ruggles Scale} = (A + K)^{0.5},$$

where A is the number of adults and K is the number of children under age 18. This smoothes out the thresholds, but does have the effect of raising the current threshold for 2 and 3 person families and lowering it for families of 5 or more.

2.2.2 Recommendations from the National Research Council (1995)

The NRC Panel on Poverty and Family Assistance was just such a body of experts called for by Ruggles (1990) to establish a normative consumption basket for new poverty thresholds. Chaired by Robert Michael of the University of Chicago, the economists on the panel included Anthony Atkinson, David Betson, Rebecca Blank, Sheldon Danziger, Angus Deaton, John Cogan, David Ellwood, and Judith Gueron, all of whom are known for their expertise in consumer behavior and poverty policy. The NRC panel recommended that a new threshold be established for a reference family of four (two adults and two children) based on median expenditures on food, clothing, shelter, and utilities, plus a little extra for personal care, non-work transportation, and household supplies. In the benchmark year of 1992 they proposed that

the threshold be set at anywhere between 1.15 of the 30th percentile of spending on this market basket for the representative 4-person family, to 1.25 of the 35th percentile. The multipliers of 1.15 and 1.25 are designed to account for the “little bit extra” over the core goods of food, clothing, and shelter. This range would make the threshold between 14 and 33 percent higher than the official threshold in 1992. They recommended that this threshold be updated annually to reflect changing consumption patterns, and to smooth out statistical noise they suggested using a moving average of the three most recent years of CPI adjusted consumption spending. The benchmarking and annual updating was to be implemented with the Consumer Expenditure Survey.

Similar to Ruggles, the NRC panel recommended that the threshold be adjusted for geographic differences in the cost of living. However, they recommended that such indexing only be made with respect to the housing component of the threshold because of lack of reliable data for other consumption components. They suggested using data from the decennial Census along with HUD’s methodology for estimating rents for comparable apartments in different locales. Presumably with the rollout of the annual American Community Survey such adjustments could be made on an annualized basis rather than each decade (and with cost-of-living adjustments within a decade).

The NRC proposed a slightly different variation of the adult equivalence scale. Specifically they suggested the following scale

$$(3) \quad \text{NRC Scale} = (A + PK)^F,$$

where A and K are defined as before, and P and F are scale adjustment factors lying between 0 and 1. The NRC recommended that P be set at 0.70, which means that a child is 0.7 of an adult, and that F be set anywhere between 0.65 and 0.75. The higher power factor than proposed by

Ruggles underlies the NRC's belief that economies to scale are not as large as that implied by the Ruggles scale. However, like the Ruggles scale, the variant proposed by the NRC offers much smoother transitions so that the cost per adult equivalent falls as the number of adult equivalents rises. While the NRC scale lies somewhere between the Ruggles scale and the scale used by the OECD, this is an area in need of additional research.

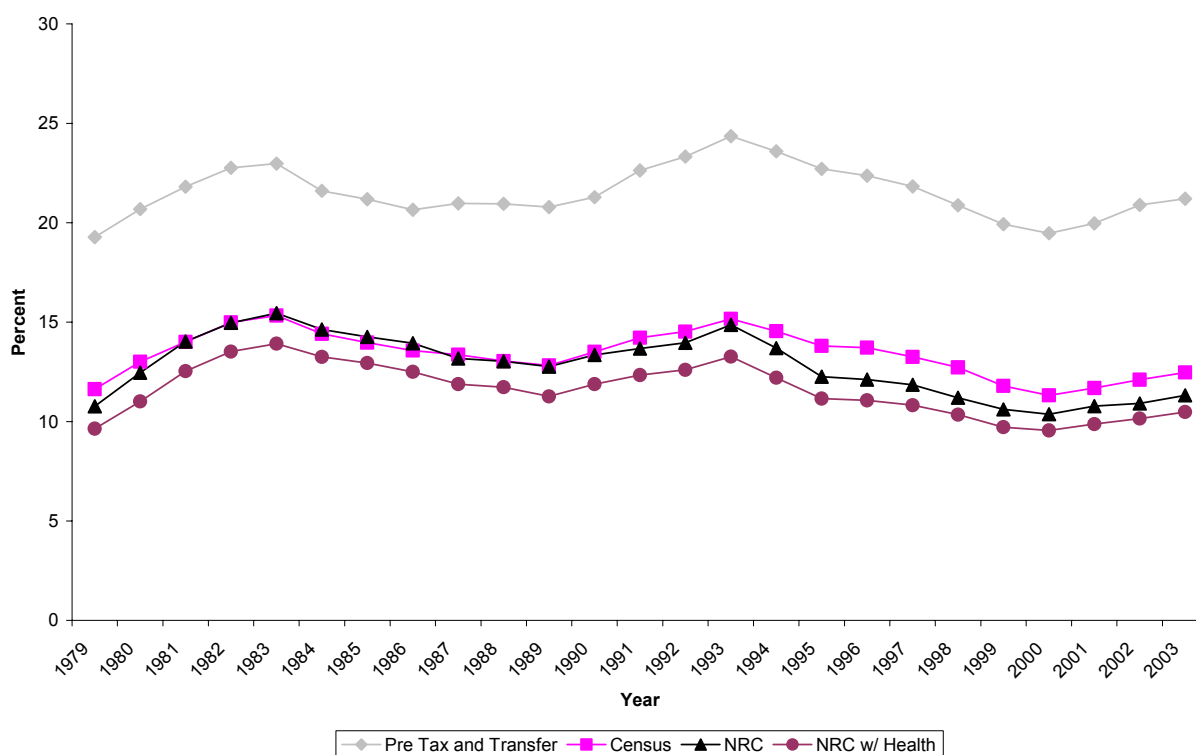
2.3 Trends in the U.S. Poverty Rate

Keeping in mind the caveats and concerns about the poverty rate, I now present trends in the U.S. poverty rate between 1979 and 2003. The data employed are from the Annual Social and Economic Study (formerly known as the March Demographic File) of the Current Population Survey. The March CPS is the data source used in constructing official poverty statistics in the U.S., and I follow the same method. Specifically the unit of analysis is families (including related subfamilies) and unrelated individuals. Income, as defined above, is summed up across all income-earning family members and the total is compared to the poverty threshold for that family's size. All individuals in the family are assigned the same poverty status, related subfamilies are assigned the poverty status of the prime family, and unrelated individuals are assigned the poverty status based on their own income and relevant threshold. There are several groups of individuals not accounted for in this definition including unrelated individuals under age 15 (such as foster children), and those individuals who are institutionalized, living in college dorms, military barracks, or the homeless living outside of shelters. All estimates are weighted using the individual weight supplied by the Census Bureau.

Figure 1 depicts the trends in poverty rates for all persons spanning the twenty-five years from 1979 to 2003. There are four lines depicted in the graph: (1) pre-tax and pre-transfer income, which only includes income from private sources; (2) the official Census definition of

income, which adds cash transfers to the pre-tax and transfer measure; (3) the NRC measure, which adds the dollar value of near-cash in-kind transfers like food stamps, school lunch, and housing subsidies, plus the EITC, less federal, state, and payroll tax payments (I do not net out imputed child care and out-of-pocket medical expenses, or add in net capital gains or employer-provided insurance contributions, so this measure might be viewed as a pseudo-NRC income definition); and (4) NRC w/ Health, which appends to the pseudo NRC measure the implied value of Medicaid and Medicare.²

Figure 1: Poverty Rates for all Persons Under Alternative Income Definitions



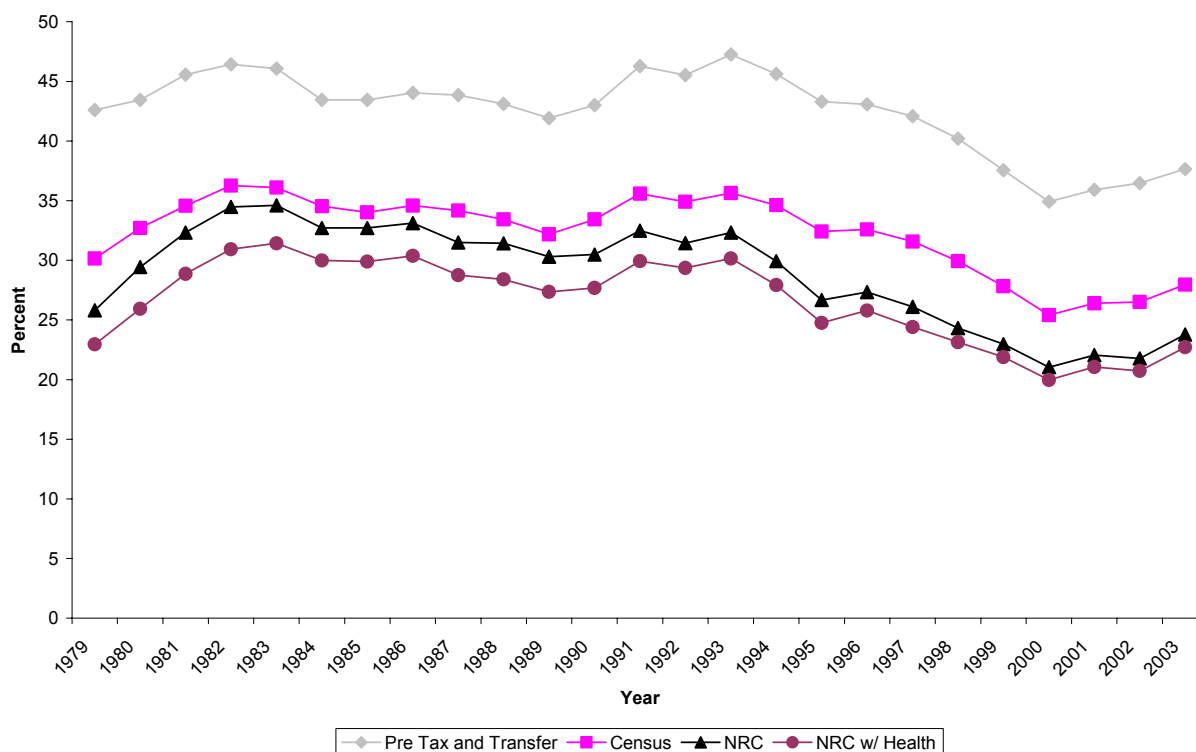
Over the past 25 years the average pre-tax/pre-transfer poverty rate was 21.5 percent, which is 60 percent greater than the average Census poverty rate of 13.4 percent. This highlights the strong anti-poverty effectiveness of such transfers as Social Security, Disability Insurance,

² As part of the release of the March supplement the Census Bureau uses a microsimulation model to impute the dollar value of taxes paid, EITC payments received, housing subsidies, Medicaid, and Medicare. A further discussion of these methods is contained in the last section.

SSI, and cash welfare. It is important to point out, however, that the wedge between the pre-tax/transfer poverty rate and the official rate is also likely due to the negative behavioral response of labor supply and saving induced by the fact that the transfers either explicitly tax wage and capital income (AFDC/TANF), or implicitly tax private income (Social Security/DI). Thus, the structure of transfer programs may artificially inflate the pre-tax/transfer poverty rate. The pseudo-NRC poverty rate is nearly coincident with the official rate until the early 1990s, suggesting that programs like food stamps, school lunch, and housing subsidies do not move many people above the line, but with the expanded generosity of the EITC after 1990 a greater wedge between the official rate and the NRC rate emerged. Including in-kind transfers health benefits (Medicaid and Medicare) lowers the poverty rate by an additional percentage point.

Regardless of income measure there is a clear counter-cyclical pattern to poverty rates, rising during the recessions of 1981/82, 1990/91, and 2001, and declining during the long expansions of the 1980s and 1990s. There has been considerable research on whether and to what extent the macroeconomy affects the head count rate, with all of it concluding that even after controlling for other confounding factors, poverty rates decline with both declines in the unemployment rate and increases in the employment growth rate (Anderson 1964; Gottschalk and Danziger 1985; Blank and Card 1993; Gundersen and Ziliak 2004). In addition the expanding generosity of the EITC beginning in the late 1980s increased the wedge between the official poverty rate and both NRC rates through the 1990s.

Figure 2: Poverty Rates Among Single Mother Families Under Alternative Income Definitions



Poverty in America differs widely across various family structures, races, and regions. I highlight some of those differences in Figures 2–4. In Figure 2 I present poverty trends for families headed by single women, which has been a growing demographic group over the past four decades and as a consequence a group that has received heightened policy focus. It is clear from the figure that single mother families are economically vulnerable compared to the typical person in the U.S., with poverty rates three times the national average. As this group entered the labor force in record numbers in the 1990s in response to strong economic growth and increased EITC generosity (Meyer and Rosenbaum 2000), there is a striking difference in the Census poverty rate definition and the base NRC income poverty rate. For example in 1995 the NRC rate was 18 percent lower (almost 6 percentage points) than the Census rate for single mother families. There is less difference between the NRC rate and NRC w/Health rate because the

Census only imputes Medicaid/Medicare income to those families whose private incomes are adequate enough to cover food and shelter. As many single mothers have low private incomes the Census Bureau assumes that their resources are too low to buy medical insurance in the private market, and thus little value from public health programs is imputed to single mothers.

Figure 3: Poverty Rates by Race of Head Under Alternative Income Definitions

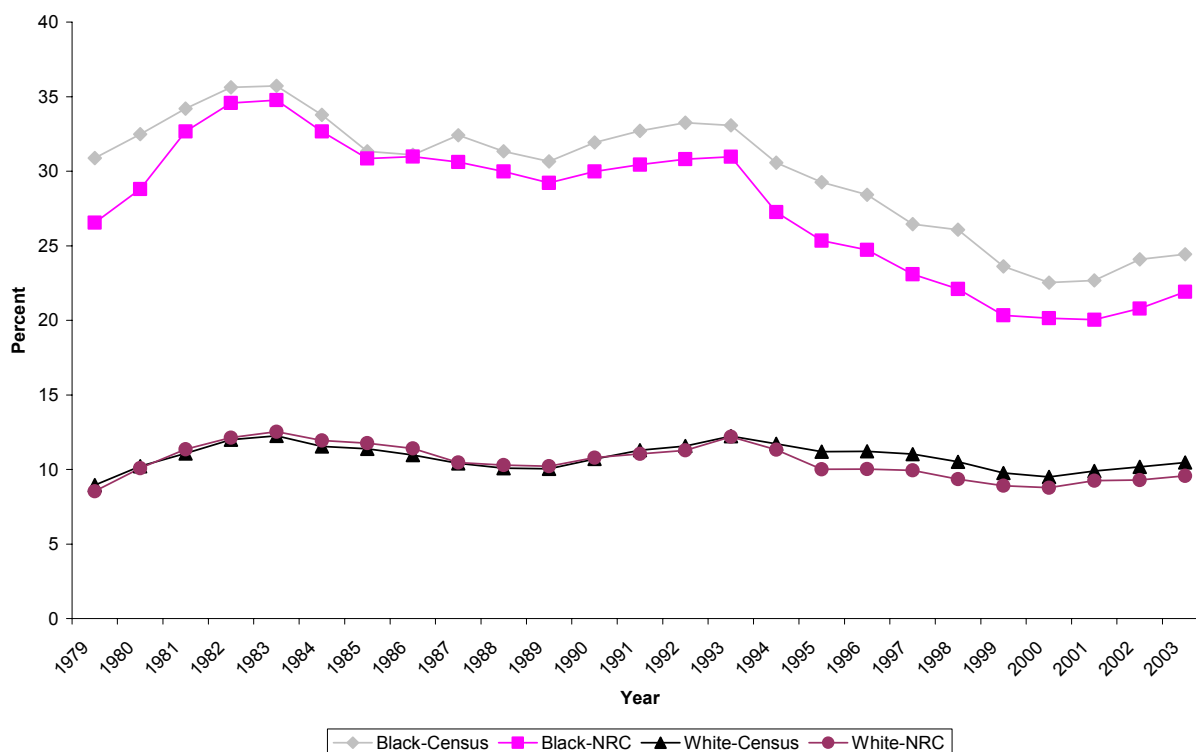
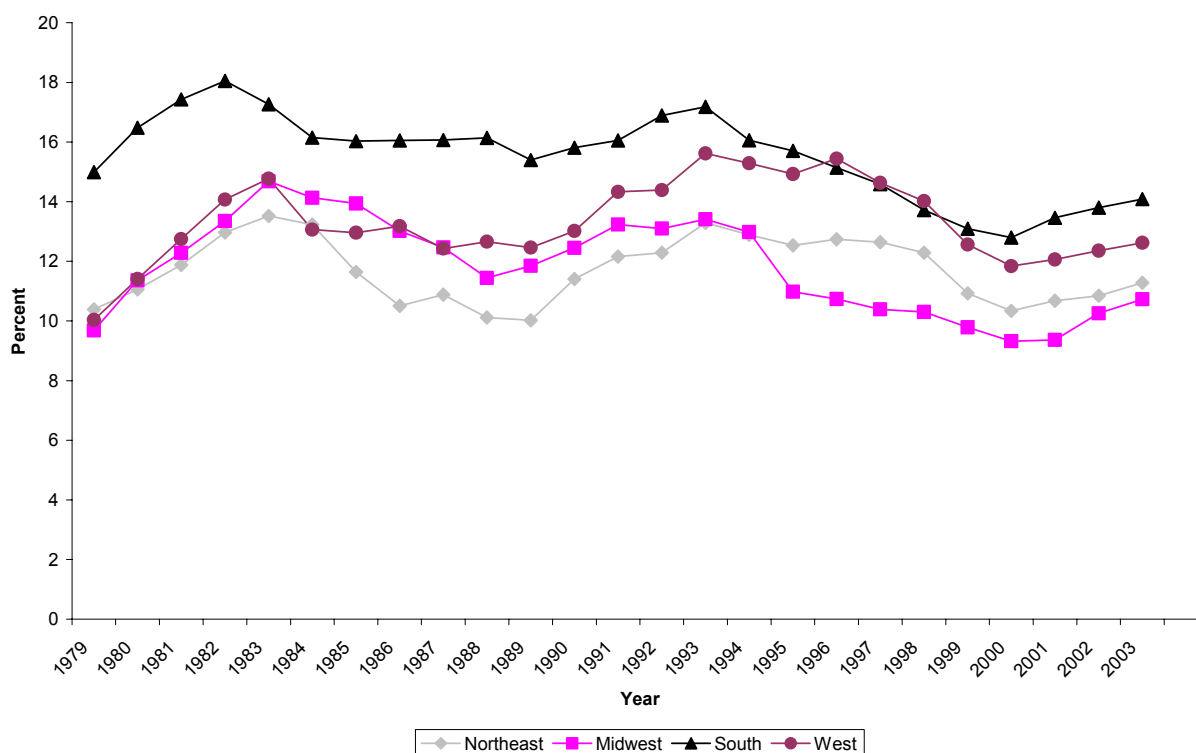


Figure 3 shows trends in poverty rates for persons in families headed by a white person or by a black person under the official income measure and the pseudo-NRC measure.³ Through the 1980s the black poverty rate was about 3 times the white rate, but in the 1990s black poverty declined more rapidly than white poverty such that the gap in rates fell to about 2.5 times. Like female-headed families, persons in black families benefited from the expanding EITC in the

³ Starting in 1993 it is possible to identify immigrants in the March CPS. Hoynes, et al. (2006) show that poverty among immigrants has been on the rise because of the shift in composition from high-skilled immigrants to low-skilled immigrants in recent decades. However, they conclude that this has little impact on overall poverty rates because the population of immigrants is too small to affect aggregate statistics.

1990s and thus there was a sizable wedge between the Census definition and the NRC definition. White persons also benefit from the expanded EITC, but proportionately so less than black families, and because of lower participation rates in food stamps and public housing relative to blacks, the difference between the official rate and the NRC rate is less pronounced among whites.

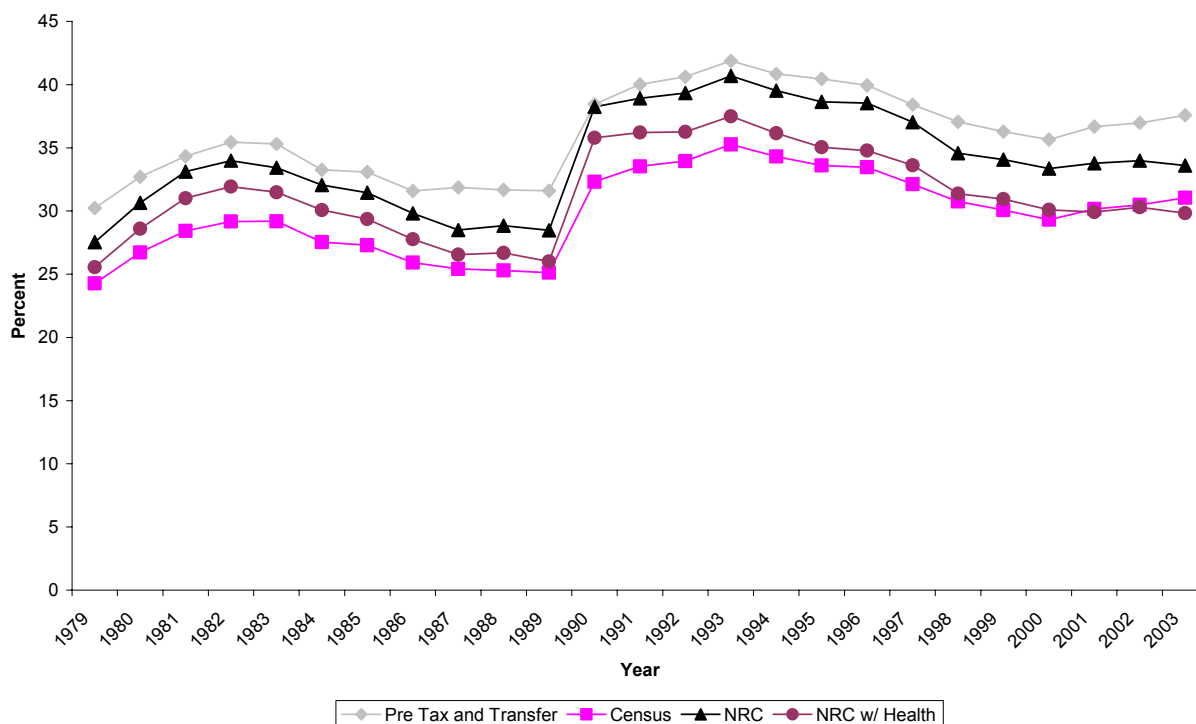
Figure 4: Poverty Rates by Region of Country for Census Income



Historically persons residing in the southern United States have been poorer than those in other regions. Figure 4 depicts regional distinctions for the official Census definition of income. Recall that the poverty threshold is set uniformly across the country and that geographic differences in cost-of-living can affect poverty rates holding income constant. It is generally recognized that the cost-of-living in the South is lowest in the nation, which suggests that poverty is potentially overstated in the South and understated in the Northeast and West.

However, it is also the case that incomes are lowest in the South, both wage income as well as transfer income such as AFDC/TANF and SSI, which of course is likely tied to the cost-of-living. Thus, it is not a priori clear which region has higher poverty once one adjusts the thresholds and expands the income definition to the NRC or NRC w/Health measure. In examining regional poverty trends Figure 4 reveals that the South converged briefly to the poverty rate in the West in the late 1990s, but has once again diverged post 2000. Not well known or understood is the fact that prior to the mid 1990s poverty in the Midwest exceeded that in the Northeast, but this long-term trend changed just as the economic expansion, higher EITC, and welfare reform were taking hold of the low-income population in the U.S. Further research is needed to decompose this important change in the geographical location of poverty in America.

Figure 5: Poverty Rate of All Persons with Updated Orshansky Thresholds Under Alternative Income Definitions



Perhaps one of the most straightforward fixes to the U.S. measure of poverty is to update the Orshansky thresholds to reflect current family budget patterns. Ruggles (1990), recognizing the practical, political, and economic costs associated with such updating (recall that eligibility for many transfer programs are tied to the poverty line), suggested that the thresholds be revised once a decade. The NRC panel recommended annual updating, complemented with less frequent comprehensive reviews of the poverty measure by expert panels. Following the suggestion of Ruggles, in Figure 5 I depict poverty rates for all persons with updated Orshansky thresholds. Based on food expenditure patterns the thresholds in the 1980s are multiplied by 1.667 because by the 1980s about 20 percent of expenditures were on food compared to the one-third adopted by Orshansky, and in the 1990s the thresholds are multiplied by 2 because estimates from the Consumer Expenditure Survey suggest that the typical family spends about one-sixth of their budget on food.

There are several items of note in Figure 5. First, by raising the threshold two-thirds in the eighties and doubling in the nineties, poverty rates more than double based on the Census, NRC, and NRC with Health income definitions (compare to Figure 1). This is not a surprising outcome given the skewed distribution of income in the U.S., which leaves many families and individuals above poverty but not by a large amount. Second, the poverty rate based on the pseudo-NRC measure is higher than that based on the Census income definition in every year even though the NRC measure includes food stamps, housing subsidies, and the EITC. The reason for this difference is that the NRC definition also nets out taxes paid and this deduction far outweighs the additions of food stamps, housing, and the EITC because most families above 130 percent of the poverty line do not receive in-kind food and housing benefits, or tax credits.

Third, the basic underlying time-series trends in poverty (aside from the jump with the updated threshold in the 1990s) are the same whether using the original or revised Orshansky thresholds.

3. The Intensity and Inequality of Poverty

Moving beyond the construction of thresholds and definition of resources, the most common complaint levied against the head count rate is its failure to account for the intensity of poverty. That is, individuals \$1 below the threshold are given the same weight as those \$5000 below the threshold, even though most would agree that the deprivation of the latter likely far outweighs the deprivation of the former. Although there is much learned about the economic health of a society from a simple summary statistic like the head count ratio, especially when discussion is focused on societies defined by extreme forms of absolute deprivation as in sub-Saharan Africa, in advanced economies like the U.S. with well developed tax and transfer systems, more nuanced measures of economic status are not only feasible but indeed are necessary to garner a deeper understanding of the anti-poverty effects of economic growth and of tax and transfer programs.

3.1 Sen's (1976) Core Axioms

Given that one is interested in measuring more than just the fraction of the population below the poverty line, Sen (1976) proposed that any 'good' index of poverty should satisfy at least the three basic axioms of *focus*, *monotonicity*, and *transfer*. Consider that for the income space $\Psi = \bigcup_{n=1}^{\infty} \Psi^n$, any poverty line z , $z \in \Psi$, and any income distribution y , $y \in \Psi$, we can construct a poverty measure $\Gamma(y; z)$. Then the three axioms are defined as follows:

A.1 The *Focus Axiom* states that the poverty measure should be independent of the income distribution of the nonpoor. That is, consider a distribution y that is obtained from another distribution y' by an increment to a nonpoor person. Then $\Gamma(y; z) = \Gamma(y'; z)$.

A.2 The *Monotonicity Axiom* states that the poverty measure should rise (fall) if there is a fall (rise) in the income of a poor person. The weak form of this axiom is written as $\Gamma(y; z) > \Gamma(y'; z)$ when y is derived from y' by a decrease in a poor person's income. The strong form is written as $\Gamma(y; z) < \Gamma(y'; z)$ when y is obtained via an increase in income to a poor person, even if y thereby crosses the poverty line.

A.3 The *Transfer Axiom* states that a pure transfer of income from a poor person to any less poor person should raise the poverty measure. In this case if y is obtained from y' by a regressive transfer then $\Gamma(y; z) > \Gamma(y'; z)$.⁴

The *focus axiom* basically implies that when measuring poverty the economic success of the nonpoor should not have a bearing on our statistical estimates of poverty. That is, a transfer from Warren Buffett to Bill Gates should have no impact on poverty in America. The head count rate satisfies this fundamental axiom. The head count rate, however, does not satisfy the monotonicity axiom. If the economic status of a poor person rises, but they still remain below the threshold, then the head count rate does not register this decline in poverty and thus remains constant. It follows then that the head count also fails the transfer axiom, which is a significant shortcoming of this measure because it implies that any regressive tax and transfer policy that alters the distribution of income within the poor population will not register as change in the economic status of the poor. Sen also proposed some additional axioms, but they are generally viewed as being peripheral to A.1–A.3.

3.1.1 Zheng's (1997) Core Axioms

Zheng (1997) provides a comprehensive technical survey of axiomatic measures of poverty, and on the basis of his review of the literature he proposes an updated set of core axioms in light of the two decades of research after the seminal article by Sen (1976). Many of the axioms are reasonable requirements for a good measure of poverty and it is worthwhile to

⁴ There are at least eight variants of the transfer axiom. The definition here is known as the *Weak Transfer Axiom* and was supported by Sen as being the most appealing. See Zheng (1997) for a discussion.

briefly review them. In addition to the *focus axiom* A.1, Zheng (1997) proposes a core consisting of

A.2' The *Symmetry Axiom* states that the names of the population members do not matter for our measures of poverty. Consider a distribution y that is obtained from another distribution y' by a permutation then $\Gamma(y; z) = \Gamma(y'; z)$.

A.3' The *Regressive Transfer Axiom*, which is a variant of the *transfer axiom* A.3, states that a good poverty index should register an increase in poverty with a regressive transfer from a poor donor to a less poor recipient (who may or may not be lifted above the line with the transfer). Given a distribution y that is obtained by a regressive transfer from y' then $\Gamma(y; z) > \Gamma(y'; z)$.

A.4 The *Replication Invariance Axiom* states that it is desirable to be able to apply the poverty index to populations of different sizes, for example, poverty in the southern U.S. versus the western U.S. The axiom actually says that $\Gamma(y; z) = \Gamma(y'; z)$ whenever y is obtained from y' via a replication.

A.5 The *Continuity Axiom* states that a good poverty measure should acknowledge that poverty is not a discrete condition, rather it is a continuum. That is, a family of four persons \$1 below the poverty line is hardly any better off in any material sense with a \$2 transfer that places them \$1 above the poverty line. Thus, $\Gamma(y; z)$ is a continuous function of y for any given threshold z .

A.6 The *Increasing Poverty Line Axiom* states that for any two identical income distributions poverty should be increasing in the threshold. Under the strong version of the axiom and given the same distribution y and any two thresholds, z and z' , where $z < z'$, then $\Gamma(y; z) < \Gamma(y; z')$.

A.7 The *Weak Transfer Sensitivity Transfer Axiom* states that the ideal poverty index should place more weight on transfers that take place lower in the income distribution. This implies that when each of the distributions y' and y'' is obtained from y by a progressive transfer then $\Gamma(y'; z) > \Gamma(y''; z)$ provided that the transfer that occurs in y' is lower in the distribution.

A.8 The *Subgroup Consistency Axiom* states that any reduction in poverty within a subgroup of the population will be accounted for in the aggregate measure of poverty. That is, $\Gamma(y; z) < \Gamma(y'; z)$ when the distribution $y = (y_0, y_1)$ is obtained from another distribution $y' = (y'_0, y'_1)$ and where the populations $n(y_0) = n(y_1), n(y'_0) = n(y'_1)$ such that $\Gamma(y_0; z) < \Gamma(y'_0; z), \Gamma(y_1; z) = \Gamma(y'_1; z)$.

These seven axioms, coupled with the three proposed by Sen (1976) provide a crucial benchmark against which to measure the efficacy of a poverty measure. The *symmetry axiom*

imposes anonymity in our poverty index. That is, we can change the names of the poor population and this has no impact on our poverty measure. This is a key axiom found also in the social choice literature for welfare measurement. The *replication invariance axiom* admits poverty comparisons across demographic groups (white female-headed families versus non-white female heads), regions (South versus non-South), countries, and time. The *continuity axiom* is not without controversy because many wish to define poverty as a discrete state, but this axiom contextualizes poverty as a continuum as one moves along the income distribution. The head count rate fails this axiom, but as a practical matter, many of the means-tested programs that rely on thresholds for program eligibility implicitly (or explicitly) recognize this limitation and thus frequently extend eligibility to 130 percent of the line (food stamps), 185 percent of the line (WIC and reduced-price school lunch), or sometimes upwards of 300 percent of the line in the case of Medicaid. The *regressive transfer* and *weak transfer sensitivity axioms* are refinements on Sen's axiom A.3 that allow for more nuanced features of poverty indexes to capture the effects of private and public redistributive actions on the economic status of the very poor. Finally, the *subgroup consistency axiom* extends Sen's *monotonicity axiom* to group settings such that an increase in poverty among, say African-American families, will register as an increase in overall poverty provided that the poverty of all other subgroups is unchanged. This is particularly powerful because if we target a particular anti-poverty program to a specific demographic group (for example, the 1996 Welfare Reform Act that targeted single mothers with young children) then we can track the effectiveness of the policy on poverty for both the subgroup and in the aggregate in commensurate terms. All subgroup consistent poverty measures, under certain conditions, are increasing transformations of decomposable poverty

measures. The FGT index, including the head count rate, is one such example. Sen's measures, along with several variants, fail to satisfy decomposability and subgroup consistency.

While the axiomatic approach to poverty measurement has strong ethical and theoretical foundations, it is not without its drawbacks. Chief among the drawbacks is that the axioms specify desirable properties for a poverty index, but conditional on satisfying the axioms, they are silent on which index(es) should be adopted. As a consequence there are a plethora of such measures available in the literature, as ably surveyed in Zheng (1997). This creates a challenge for advocates of distribution-sensitive poverty measures because in order for a measure to reach the mainstream—both in the academic and policy making worlds—it must be at once easy to calculate, easy to explain, and easy to comprehend. Many of the measures proposed in the literature fail one or more of these criteria, including (or especially) Sen's (1976) original alternative to the head count rate. The FGT measure, and its variants, does satisfy the three criteria of ease of calculation, explanation, and comprehension, and thus in the following subsections I focus discussion on poverty trends based on the FGT index.

3.2 The Poverty Gap

Returning to equation (1), when $\alpha = 1$ the FGT index measures the average normalized poverty gap, $P_1 = \frac{1}{n} \sum_{q=1}^Q \left(\frac{z - y_q}{z} \right)$, sometimes known as the income-gap ratio. The normalized poverty gap satisfies the axioms of *focus*, *replication invariant*, *restricted continuity*, *weak monotonicity*, and *subgroup consistency*. Restricted continuity is weaker than continuity in that the index is continuous below the poverty line, but not at the line itself, while weak monotonicity implies that monotonicity holds only when we extract resources from a poor person. Thus the income gap ratio possesses many desirable properties that can inform policy on the intensity of

poverty. However, because P_1 violates the transfer and transfer-sensitivity axioms the income gap ratio is not distributionally sensitive and thus sheds no light on the inequality of poverty.

Among many applied economists, including researchers at the U.S. Census Bureau, it is more common to represent P_1 in its non-normalized form, known as the poverty gap or average poverty gap (Weinberg 1985; Blank 1997; Scholz and Levine 2001; Ziliak 2003). That is, the aggregate poverty gap is measured as

$$(4) \quad g = \sum_{q=1}^Q \max \{z - y_q, 0\}, \text{ for } Q \leq n,$$

which reflects the aggregate income deficit among the poor population. The average poverty gap is then found either by dividing the aggregate by the total population if interest is in the average

gap among the whole society, i.e. $\frac{g}{n}$, or by dividing by the total poor population to yield the

poverty gap per poor person, i.e. $\frac{g}{Q}$. The attraction of the poverty gap and its average is because

they are expressed in currency units such as U.S. dollars. While this means that the measure is not scale invariant, i.e. the magnitudes change with currency denominations, it does mean that the intensity of poverty can be represented in units readily understood by the general population.

This is particularly attractive when attention is placed on understanding the extent to which the social safety net fills the gap for poor families.⁵

⁵ As an aside, in presentations to various community groups, I have found the general public to be quite receptive to pictures and tables of poverty gaps. They find them to be as intuitive as the poverty rate, and correctly, more informative of poverty status than the poverty rate.

**Table 2: Poverty Gaps for Primary Families and Unrelated Individuals
(in billions of 2004 dollars)**

Year	Pre-tax, Pre-transfer Earnings	Census Income	NRC Income	Poverty Gap (NRC Income)
1979	154.6	54.8	46.4	1,979
1980	174.9	64.5	55.0	1,961
1981	187.1	73.5	63.8	2,002
1982	195.0	80.4	69.4	2,019
1983	198.9	83.2	72.2	2,017
1984	189.1	78.1	67.8	1,983
1985	189.5	78.2	68.7	2,037
1986	189.8	78.6	69.5	2,091
1987	203.3	78.4	67.8	2,134
1988	206.2	77.9	68.6	2,164
1989	204.8	76.7	67.5	2,149
1990	212.1	81.7	70.9	2,137
1991	229.4	89.2	75.7	2,204
1992	242.8	94.3	80.6	2,273
1993	260.6	103.7	91.9	2,384
1994	255.7	99.2	85.9	2,397
1995	248.1	94.2	76.5	2,365
1996	249.9	95.6	77.2	2,393
1997	250.5	97.4	80.9	2,543
1998	240.1	95.5	80.5	2,651
1999	231.8	90.2	77.1	2,658
2000	238.1	91.2	79.2	2,740
2001	251.6	97.4	87.7	2,891
2002	268.2	103.2	91.1	2,926
2003	278.9	109.7	95.8	2,942

In Table 2 I present inflation-adjusted poverty gaps for primary families and unrelated individuals for three income definitions: pre-tax and transfer income, Census income, and NRC income, along with the average poverty gap per poor person based on NRC income. There are several trends worth noting. First, in real terms the before-tax aggregate poverty gap increased 80 percent between 1979 and 2003. The gaps indicate that \$154 billion was needed to lift all families and unrelated individuals out of poverty in 1979, but \$279 billion was needed by 2003. This is a sizable increase over the past two decades and suggests that in the aggregate the intensity of poverty is worsening. Strictly speaking this is likely an underestimate for the amount of money needed to eradicate poverty in the U.S. because the lump-sum transfers required

would induce a negative labor supply response, which would exacerbate the pre-tax and transfer gap and thus requiring an even larger transfer.

Second, underlying the secular trend in higher poverty gaps, however, is the fact that the aggregate gap is counter-cyclical as it expands during economic contractions and contracts during economic expansions. During the recessions of 1981, 1991, and 2001 the poverty gap was higher than in the expansionary years preceding the recession, though clearly some of the cyclical changes occur with a lag. Indeed, although the poverty gap was \$18 billion higher in 2003 than in 1993, this masks the fact that it fell \$30 billion between 1993 and 2000, before rapidly rising in the early 2000s.

Table 3: Percent Reduction in the Aggregate Poverty Gap from the Social Safety Net

Year	Percent Reduction to Census Income	Percent Reduction From Census to NRC Income	Total Percent Reduction From Pre-Tax/Transfer to NRC Income
1979	-64.55	-15.36	-69.99
1989	-62.56	-11.91	-68.55
1999	-61.09	-14.52	-65.91
2000	-61.71	-13.12	-64.44
2001	-61.30	-9.95	-63.68
2002	-61.53	-11.75	-64.13
2003	-60.67	-12.64	-63.75

The third aspect of Table 2 that is noteworthy is the fact that the social safety net fills a sizable fraction of the pre-tax and transfer poverty gap. This is summarized in Table 3 where I depict the percent reduction in the aggregate poverty gap in moving from pre-tax and transfer income to Census income, and then from Census income to NRC-based income that includes food stamps, housing subsidies, the EITC, and tax payments. Adding in cash transfers lowers the poverty gap by just over 60 percent, and adding in in-kind transfers, tax credits, and tax payments lowers the gap an additional 10–15 percent from the Census definition. Interestingly, the social safety net fills less of the poverty gap in 2003 (64%) compared to 1979 (70%). Ziliak

(2003) decomposes the changes in the poverty gap and attributes the decline to a reduction in AFDC/TANF cash payments in the 1990s.

Finally, recognizing that the size of the poverty gap is a function of the demographic structure of families, the last column of Table 2 presents the inflation-adjusted poverty gap per poor person for the NRC-based income measure. In 1979 a transfer of \$1,979 was still needed to fill the poverty gap even after accounting for most of the transfers in the safety net (ignoring a negative behavioral response). This suggests that while collectively the mean-tested and social insurance programs in America assist many families, they still leave many far from the line. The average gap rose 34 percent between 1979 and 1999, even though both years were business cycle peaks, and then it rose an additional \$284 per poor person by 2003.

The poverty gap satisfies subgroup consistency and thus is a useful measure to examine trends for important demographic groups. Researchers and policy makers frequently examine how poverty varies across racial groups, and across broad geographic regions of the country. In Tables 4 and 5 I present trends in poverty gaps and average poverty gaps per poor person for whites, blacks, and other racial groups (Table 4) and for the Northeast, Midwest, South, and West (Table 5). From Table 4 we see that the total poverty gap for pre-tax and transfer income in 2004 is \$278.9 billion, and of that amount \$209 billion is borne by white families and

Table 4: Poverty Gaps for Primary Families and Unrelated Individuals, by Race (Billions of 2004 dollars)

	Pre-tax, Pre-transfer Earnings			Census Income			NRC Income			Average Per Person Gap for NRC Income		
	White	Black	Other	White	Black	Other	White	Black	Other	White	Black	Other
	1979	114.7	36.8	3.1	37.2	15.9	1.7	33.3	11.5	1.6	2,075	1,712
1980	129.3	41.0	4.6	43.8	18.3	2.5	39.6	13.3	2.1	2,032	1,752	2,191
1981	137.7	44.6	4.8	50.2	21.0	2.3	45.8	15.9	2.0	2,075	1,814	2,034
1982	144.6	45.1	5.3	55.2	22.3	2.9	49.9	16.9	2.5	2,100	1,800	2,139
1983	146.4	46.5	6.0	57.2	22.7	3.3	52.2	17.2	2.8	2,109	1,787	1,983
1984	139.9	43.9	5.3	53.7	21.5	3.0	48.8	16.4	2.7	2,051	1,786	2,121
1985	141.3	43.2	5.0	54.5	20.9	2.8	50.0	16.2	2.5	2,114	1,844	1,927
1986	139.4	45.1	5.3	52.9	22.9	2.8	49.2	17.8	2.5	2,129	1,993	2,082
1987	146.8	48.9	7.7	51.5	23.3	3.6	46.8	17.9	3.1	2,195	1,987	2,157
1988	149.9	48.2	8.1	51.1	23.3	3.5	47.5	18.0	3.1	2,247	2,010	1,927
1989	148.5	47.8	8.4	49.9	23.2	3.6	46.6	17.8	3.2	2,204	2,009	2,208
1990	154.5	49.9	7.7	54.1	24.2	3.4	49.6	18.3	3.1	2,204	1,977	2,130
1991	166.5	53.7	9.2	58.4	26.4	4.4	52.1	19.7	3.9	2,242	2,066	2,472
1992	176.9	56.1	9.8	61.7	28.1	4.5	55.3	21.3	4.0	2,314	2,166	2,323
1993	190.1	58.1	12.5	67.7	29.9	6.1	63.3	23.1	5.5	2,415	2,268	2,561
1994	188.8	54.1	12.8	66.2	26.5	6.5	60.9	19.5	5.6	2,486	2,141	2,464
1995	185.3	51.3	11.5	63.4	25.2	5.6	53.2	18.6	4.7	2,435	2,179	2,386
1996	186.4	51.8	11.7	63.9	26.0	5.7	53.3	19.1	4.8	2,422	2,263	2,652
1997	189.0	50.8	10.7	67.3	24.2	5.9	57.5	18.3	5.1	2,617	2,297	2,710
1998	179.3	50.4	10.3	66.0	24.0	5.5	57.2	18.4	4.8	2,746	2,391	2,663
1999	175.4	45.8	10.7	62.1	22.4	5.7	54.7	17.4	5.0	2,739	2,416	2,736
2000	181.2	45.3	11.5	62.9	22.2	6.1	56.0	17.8	5.4	2,801	2,496	3,019
2001	190.4	48.0	13.1	66.8	23.8	6.7	62.1	19.4	6.2	2,923	2,700	3,255
2002	202.2	50.0	16.0	70.5	24.8	7.9	63.9	19.9	7.2	2,984	2,687	3,150
2003	209.0	52.4	17.5	74.6	26.1	9.0	66.6	21.2	8.0	3,003	2,688	3,201

individuals, \$52.4 billion by black families, and \$17.5 billion by other racial groups. Although whites have the largest aggregate poverty gap, it is also the case that this group has the largest proportional reduction in the poverty gap from the safety net (68% reduction moving from pre-tax and transfer income to NRC income), compared to a 60% reduction among black families and individuals, and a 54% reduction among other demographic groups. The racial differences are driven both by differences in take-up rates in social programs, as well as by differences in benefit generosity based on region of location. Blacks tend to be heavily concentrated in the South where welfare benefits such as TANF are lower than other regions. However, reflecting larger family sizes among black families, in 2003 the per person poverty gap is lowest among blacks, followed by whites and other racial groups. But the average poverty gap among blacks grew faster (41%) between the business-cycle peak years of 1979 and 1999, compared to a 32% growth among whites and 16% among other groups, and this differential growth in gaps continued through 2003.

In Table 5 we see that the size of the aggregate poverty gap varies significantly across geographic region of the country, with the gap in the South nearly twice as large as the other three regions. Regional distinctions remain even after including resources from the tax and transfer system in the NRC income definition. As noted earlier the aggregate pre-tax and transfer poverty gap grew 80 percent over the past 25 years; however, Table 5 shows that this upward trend was driven by the West (134 percent increase) and South (88 percent increase). Proportionally, the increase in the gap based on NRC income was even larger still in the West and South, suggesting that the support of the safety net fell faster in these two regions during this period. Again, adjusting for family size is important as the average poverty gaps in the South and West lie below the Northeast and Midwest, just the opposite of the aggregate gap. On a per poor person basis the NRC poverty gap rose the fastest in the Northeast, nearly 40 percent between business-cycle peak years 1979 and 1999 and over 60 percent by 2003. Since the peak of the 1990s expansion, the intensity of per-person poverty has grown most rapidly (20 percent) among residents of the Midwest. In results not tabulated, by looking at the simple head count rate one would not make a similar conclusion as the poverty rate based on NRC income grew faster in the South than the Midwest, underscoring the importance of examining measures of poverty intensity in order to gain a more complete understanding of the effectiveness of the safety net.

Table 5: Poverty Gaps for Primary Families and Unrelated Individuals, by Region (billions of 2004 dollars)

	Pre-tax, Pre-transfer Earnings				Census Income				NRC Income				Average Per Person Gap for NRC Income			
	Northeast	Midwest	South	West	Northeast	Midwest	South	West	Northeast	Midwest	South	West	Northeast	Midwest	South	West
1979	35.8	36.7	56.1	26.0	10.1	12.1	22.8	9.8	8.4	10.4	18.5	9.1	1,876	2,000	1,891	2,281
1980	38.8	42.5	63.4	30.2	11.5	14.7	27.1	11.2	9.7	12.6	22.2	10.5	1,869	1,964	1,920	2,152
1981	39.9	45.0	68.7	33.5	13.4	17.1	29.9	13.0	11.5	15.0	25.3	12.1	1,965	2,094	1,903	2,155
1982	42.6	48.1	69.8	34.6	14.4	19.4	31.9	14.7	12.1	16.7	26.9	13.7	1,928	2,129	1,932	2,166
1983	44.8	49.4	68.7	36.0	15.7	20.3	31.4	15.8	13.2	17.5	27.0	14.5	2,014	2,017	1,955	2,146
1984	42.1	48.2	66.2	32.7	14.6	20.2	28.6	14.6	12.2	17.4	24.6	13.7	1,908	2,062	1,869	2,195
1985	39.7	47.1	69.5	33.2	13.3	20.0	30.5	14.5	11.3	17.2	26.4	13.8	1,952	2,026	2,015	2,173
1986	37.7	45.5	72.4	34.2	12.5	18.7	32.6	14.8	10.9	16.3	28.1	14.1	2,072	2,086	2,086	2,119
1987	41.0	49.4	76.7	36.2	13.3	18.2	32.6	14.3	11.4	15.6	27.4	13.4	2,132	2,124	2,121	2,177
1988	40.9	47.6	79.2	38.5	13.2	16.8	32.8	15.1	11.4	14.7	28.1	14.4	2,260	2,141	2,111	2,219
1989	39.5	47.7	78.0	39.6	12.9	17.5	31.6	14.7	11.4	15.1	27.1	14.0	2,287	2,119	2,118	2,138
1990	42.9	50.7	76.4	42.0	14.5	18.7	32.3	16.2	12.6	16.0	26.9	15.5	2,186	2,154	2,052	2,242
1991	45.7	52.4	85.5	45.8	15.6	19.9	35.6	18.1	13.1	16.6	29.4	16.6	2,198	2,189	2,222	2,191
1992	48.8	55.1	88.9	49.9	16.5	20.6	37.6	19.6	13.9	17.7	31.1	18.0	2,314	2,288	2,195	2,372
1993	53.0	57.7	95.0	54.9	18.9	22.7	39.8	22.4	16.9	19.5	34.0	21.6	2,495	2,420	2,277	2,449
1994	52.2	55.8	92.4	55.2	18.2	20.8	37.5	22.7	16.5	17.7	31.0	20.7	2,598	2,366	2,270	2,479
1995	51.3	51.1	92.1	53.6	17.4	18.0	37.0	21.8	14.1	14.8	29.5	18.2	2,425	2,464	2,315	2,324
1996	50.9	51.6	92.3	55.2	18.2	17.0	37.3	23.1	14.7	13.8	29.6	19.2	2,476	2,336	2,372	2,407
1997	50.8	51.4	94.9	53.3	17.9	17.7	38.0	23.8	14.7	15.0	31.2	20.1	2,544	2,535	2,546	2,543
1998	48.3	48.5	90.2	53.2	18.1	17.4	36.5	23.5	15.1	14.8	30.6	20.0	2,696	2,522	2,680	2,675
1999	47.1	46.8	87.2	50.6	16.2	17.6	33.9	22.5	13.7	15.1	28.7	19.7	2,674	2,645	2,604	2,742
2000	48.0	47.9	90.9	51.2	16.4	17.8	35.5	21.6	14.2	15.7	30.2	19.0	2,871	2,837	2,600	2,802
2001	49.1	52.2	97.3	52.9	17.8	18.5	38.4	22.7	16.7	16.5	33.4	21.0	3,086	3,040	2,708	2,944
2002	51.3	56.2	103.1	57.5	18.5	21.1	40.2	23.4	16.5	19.0	34.6	21.0	3,168	3,085	2,757	2,907
2003	53.5	58.9	105.5	61.0	19.0	22.8	42.8	25.1	16.7	20.0	36.9	22.2	3,082	3,189	2,795	2,893

3.3 Distribution Sensitive Poverty Measures

The poverty gap and average poverty gap enhance our understanding of poverty over the head count rate, and are at once intuitive and easy to calculate. However, while the poverty gap is an improvement over the poverty rate, it still does not guide policy makers on whether additional transfers should be directed to those far below the line or those near the line. That is, so long as a poor person remains poor after any given transfer, the poverty gap is silent on the issue of whether anti-poverty policies are improving the economic status of the ‘poorest’ poor or the ‘richest’ poor. In other words, the poverty gap sheds no light on the inequality of poverty. Distribution sensitive poverty measures, however, are designed to address the inequality of poverty and as such are clear in that transfers should be directed toward the poorest poor, followed by the next poorest, and so on. To the extent that poverty is dynamic—where some people are climbing out, others are falling in, and still others are falling deeper (Stevens 1999)—then distribution sensitive measures help policy makers target anti-poverty policies that satisfy both vertical and horizontal equity.

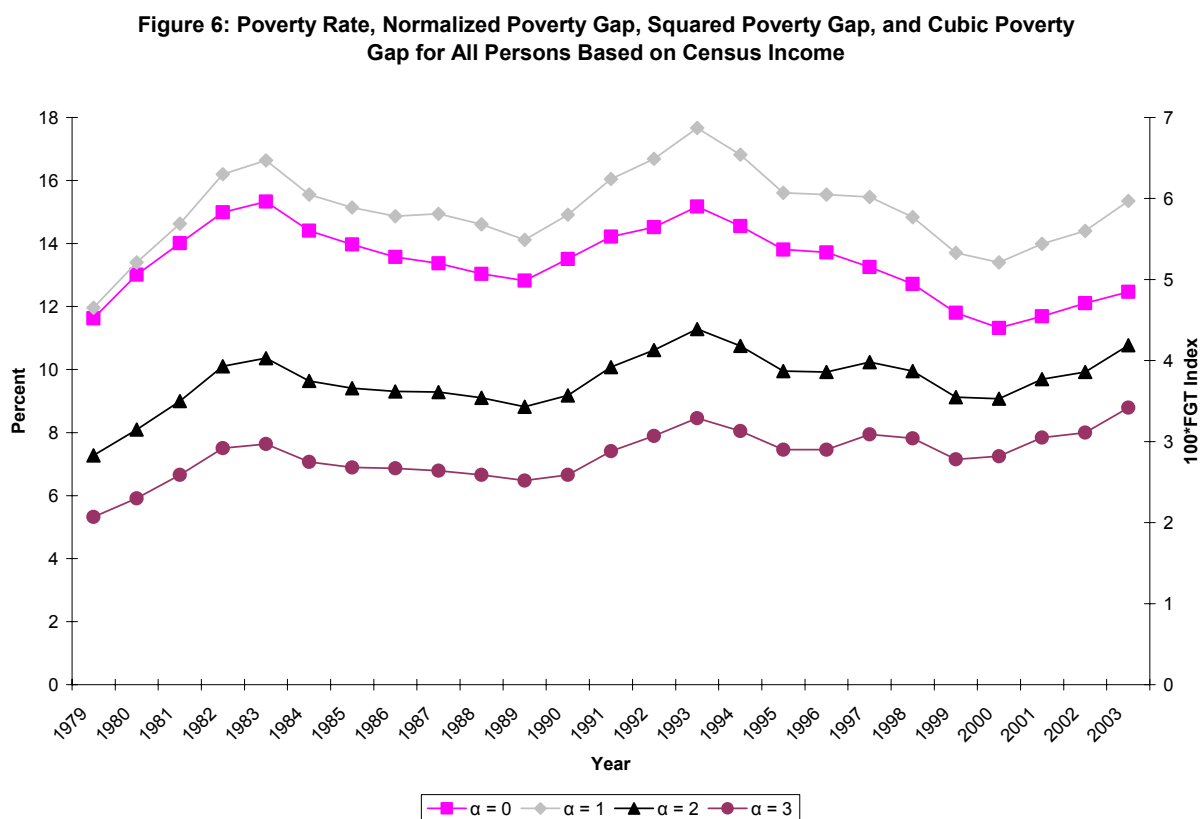
3.3.1 The Squared and Cubic Poverty Gaps

There are several distribution sensitive poverty measures that have been proposed over the years. Here I highlight a couple of promising options that are readily calculable and could be incorporated by the Census Bureau as part of its annual release of poverty statistics. The two indexes are the so-called squared poverty gap and cubic poverty gap that derive from setting

$\alpha = 2$ and $\alpha = 3$ in the FGT poverty aversion index, respectively; that is, $P_2 = \frac{1}{n} \sum_{q=1}^Q \left(\frac{z - y_q}{z} \right)^2$

and $P_3 = \frac{1}{n} \sum_{q=1}^Q \left(\frac{z - y_q}{z} \right)^3$. The squared poverty gap satisfies Sen’s core axioms, as well as all of

Zheng's axioms, with the exception of A.7—the *weak transfer sensitivity axiom*. That is, the squared poverty gap is focused, symmetric, continuous, replication invariant, monotonic, and subgroup consistent, and also satisfies increasing poverty line and the regressive transfer axiom. In addition to the latter axioms, the cubic poverty gap also satisfies the weak transfer sensitivity axiom and thus is more responsive to transfers that occur at the lower end of the income distribution.



In Figures 6 and 7 I depict the twenty-five year time series of the FGT index when $\alpha = 0, 1, 2, 3$ for all persons based on the official Census income definition (Figure 6) and the NRC income definition (Figure 7). The left-hand scale is for the poverty rate ($\alpha = 0$) and the right-hand scale is for the normalized, squared, and cubic poverty gaps. As seen in the figures there is little trend difference between the poverty rate and the poverty gaps in the 1980s and

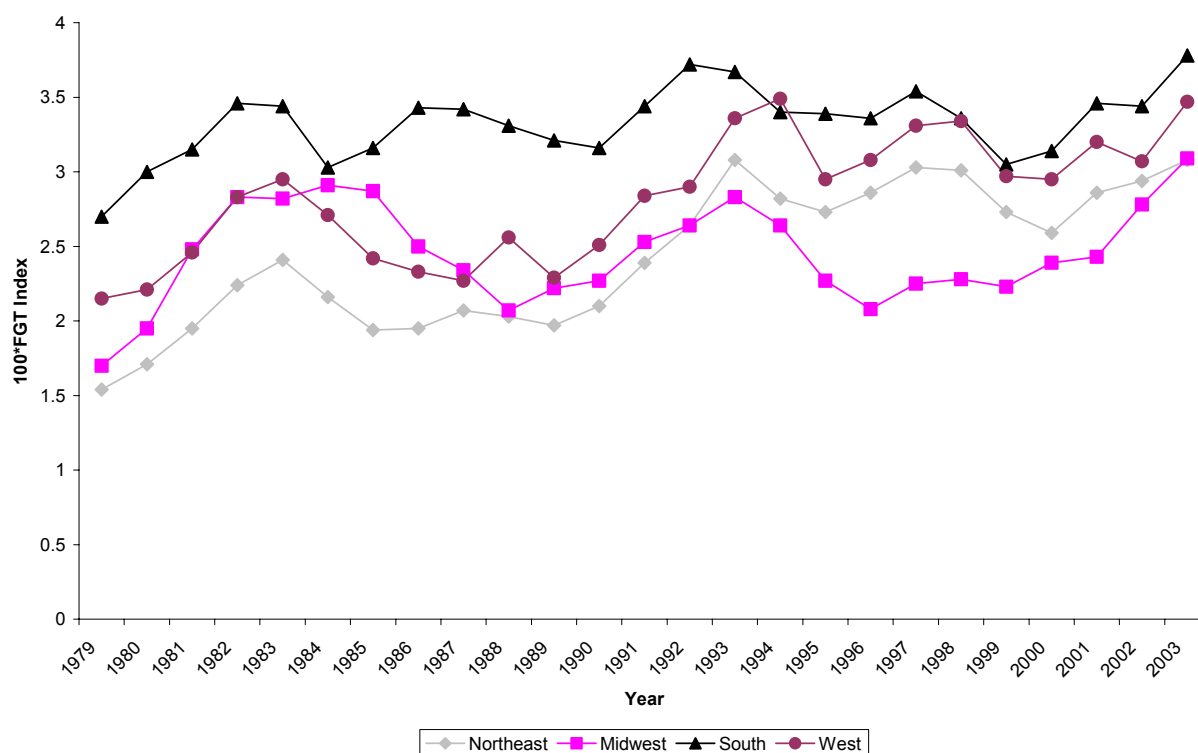
through the mid 1990s. However, after 1996 the record of the “roaring 1990s” becomes decidedly mixed based on the squared and cubic poverty gaps. While the poverty rate fell between 1996 and 2001, the squared and cubic poverty gaps actually rose in 1997 (for both Census and NRC income) and 1998 (for NRC income), and rather than falling like the poverty rate between 1999 and 2000, both the squared and cubic poverty gaps rose after 1999, and the rate of increase through 2003 has been higher for the two poverty gap measures relative to the poverty rate. The figures underscore that what happens to the economic status of the poor near the poverty line may not be the same as that far below the line, and that for a more complete picture of poverty one needs to move beyond the head count rate.⁶



⁶ Joliffe, et al. (2005) make a similar argument in their analysis of child poverty trends in the United States.

In Figures 8 and 9 I depict cubic poverty gaps by region of the country based on the Census income definition and NRC income. Figure 8 parallels Figure 4 that showed regional trends in the poverty rate using the official definition. Given that the squared and cubic poverty gaps provide similar information in this instance, I restrict attention to the cubic gap. As we saw with the aggregate cubic poverty gap, the decomposition of the gap by regions yields important

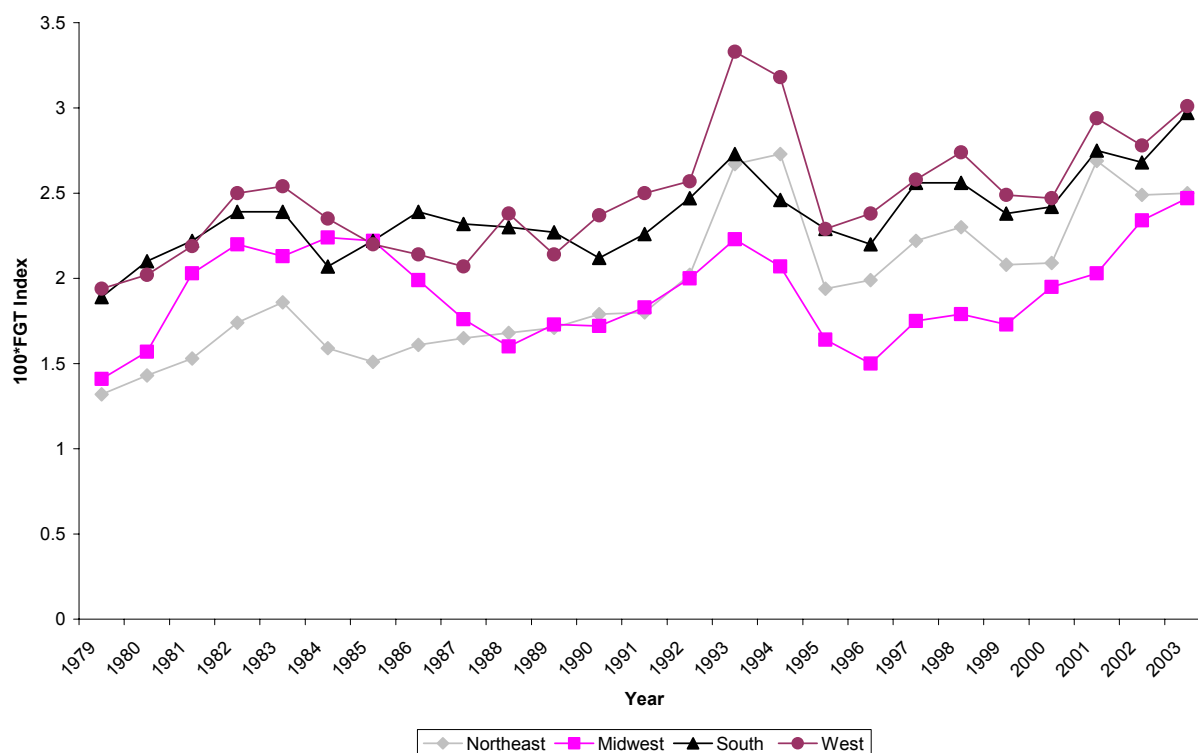
Figure 8: Cubic Poverty Gap by Region of Country for Census Income



insights for our understanding of poverty in the 1990s. Where poverty rates were largely declining across all regions from the mid 1990s till 2000 in Figure 4, in Figure 8 we see that the cubic poverty gaps were increasing in the West and Northeast from 1996–1998, and were relatively flat in the South during this period. Using the NRC income in Figure 9 shows that poverty was quite volatile in the late 1990s, and in a reversal from Figure 8, poverty in the West after 1992 is equal to or higher than poverty in the South. Moreover, across both Figures 8 and 9

the cubic gaps accelerated more quickly than the poverty rate after 1999, especially in the Midwest and South. Indeed, deep poverty rose nearly 65 percent in the Midwest between the low of 1.5 in 1996 to 2.47 in 2003. The two figures suggest that changes in the social safety in the 1990s differentially affected the extreme poor across regions of the country in important ways not accounted for by the simple poverty rate.

Figure 9: Cubic Poverty Gaps by Region of Country for NRC Income



3.4 A Portrait of Poverty

Recognizing the power of visual representations of poverty, Jenkins and Lambert (1997) recently proposed a graphical device called the ‘Three ‘I’s of Poverty’ curve, or TIP curve. Their approach is to represent the incidence, intensity, and inequality of poverty (the three ‘I’s) in a single diagram. The TIP curve is attractive theoretically because it satisfies both Sen’s and Zheng’s axioms, with the exception of the *weak transfer sensitivity axiom A.7*. This means that

the diagrams are generally useful for poverty comparisons across time, space, and demographic groups, but that in some situations they may not be as sensitive to transfers at the low end of the income distribution as was the case with FGT index P_2 .

The TIP curve is defined simply as the sum of poverty gaps or normalized poverty gaps.

That is, let the gap for family q be denoted as

$$(5) \quad g_q = \max\{z - y_q, 0\}$$

and the normalized gap as

$$(6) \quad \Gamma_y = \max\left\{\frac{z - y_q}{z}, 0\right\}$$

then for the cumulative population share p , $0 \leq p \leq 1$, the TIP curve $TIP(g; p)$ takes a value of 0 when $p = 0$, and takes a value of

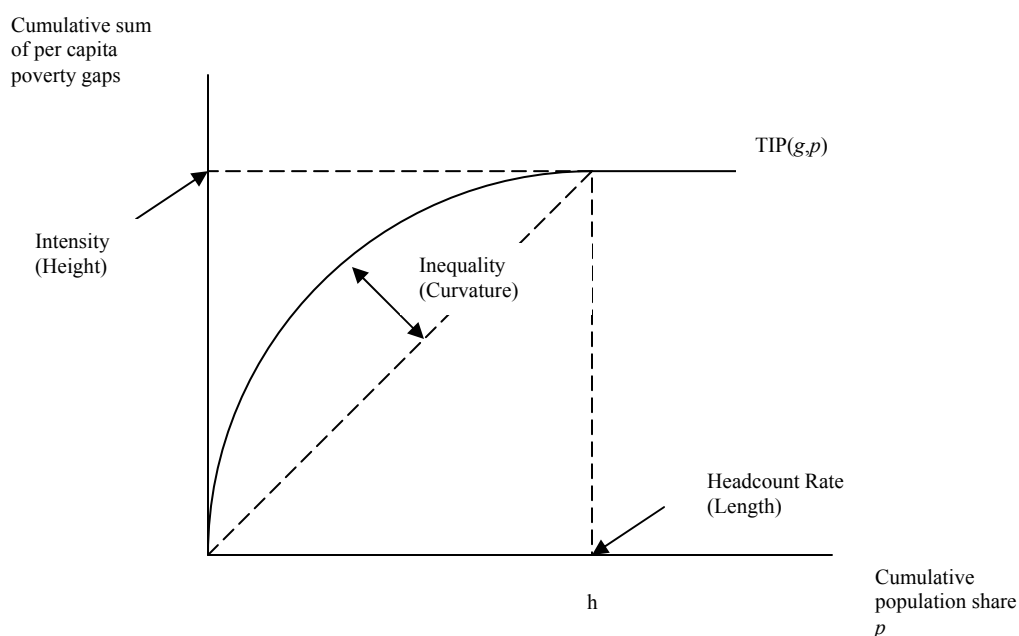
$$(7) \quad TIP(g; \frac{Q}{n}) = \frac{1}{n} \sum_{q=1}^Q g_q$$

for integer values of $Q \leq n$. When $Q = n$, $TIP(g; 1)$ is simply equal to the average poverty gap in the population as described in Section 3.2. For intermediate values of p , $TIP(g; p)$ is determined by linear interpolation. The TIP curve for normalized gaps, $TIP(\Gamma; p)$, is found in an identical fashion but with the normalized gaps in equation (6) replacing the non-normalized gaps in (5). Thus, for each p , $TIP(g; p)$ and $TIP(\Gamma; p)$ are indexes of poverty for the $100p\%$ poorest.

In Figure 10 I replicate Figure 1 from Jenkins and Lambert (1997), with some modifications. The horizontal axis measures the cumulative population share, p , while the vertical axis measures the cumulative sum of per capita poverty gaps (or per capita normalized gaps in the case of $TIP(\Gamma; p)$). Reflecting the three “I”s, the incidence of poverty (i.e. the poverty rate) is determined by the length of the non-horizontal section of the TIP curve. That is,

the headcount rate h is that p where the TIP curve becomes horizontal. The height of the TIP curve reflects the intensity of poverty, which in the case of $TIP(g; p)$ is the poverty gap per income-receiving family and/or individual, and the curvature of the TIP curve represents the inequality of poverty. A line from the origin to the point where the TIP curve becomes horizontal reflects equality of income among the poor. The TIP curve, then, is akin to an inverse Lorenz curve but where the unit of analysis is poverty gaps rather than income distributions.

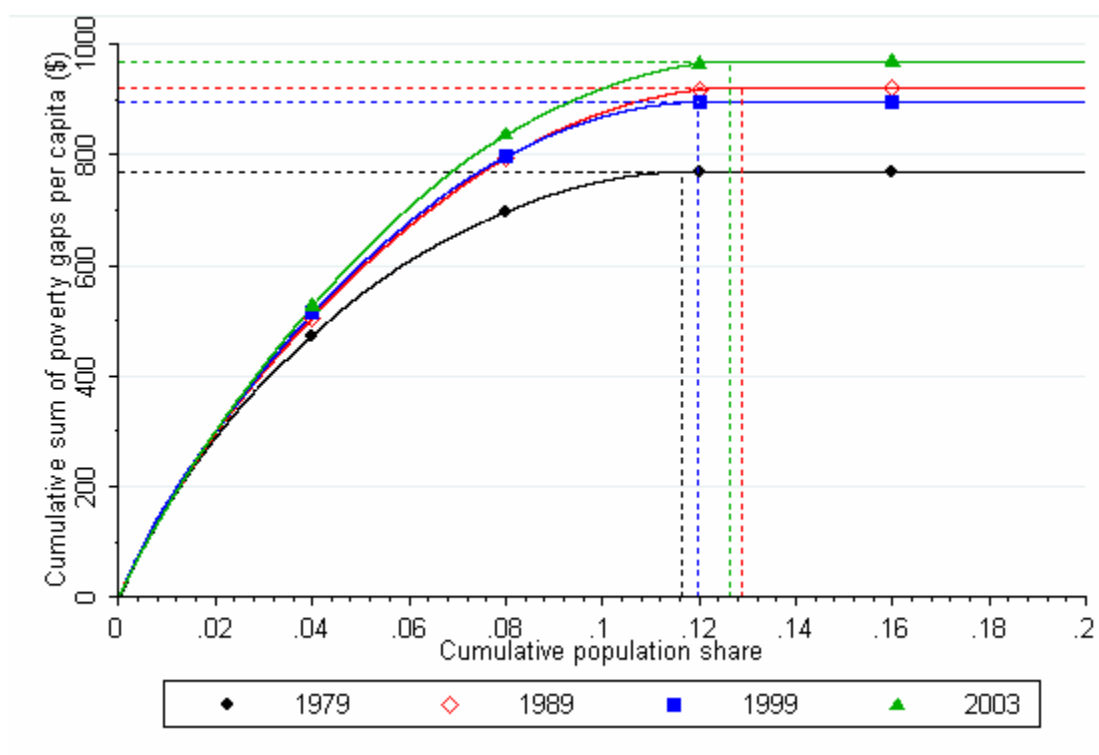
Figure 10: The TIP Curve



A common concern in the theoretical literature on poverty measurement is the issue of poverty dominance. In the case of TIP curves, if one curve lies completely above another, then we have a case of TIP (poverty) dominance. For example, if the TIP curve for 2000 in the United States lies wholly above the TIP curve for 1990 in the U.S., then we can say that poverty in 2000 dominates poverty in 1990. Alternatively, in cases where the TIP curves cross once then determining which situation has the greater poverty is only slightly more difficult. This can arise, for example, in making poverty comparisons over time. Specifically, if FGT index P_2 is higher in

the initially dominant TIP curve then poverty dominance can be established provided that aversion to income inequality among the poor is sufficiently strong. For example, suppose that the TIP curve for 2000 initially dominates the TIP curve for 1990, but they cross once at some point higher in the poverty gap distribution of the poor. If $P_2^{2000} > P_2^{1990}$ then we can claim poverty in 2000 is greater than in 1990 provided that our aversion to inequality among the poor is consistent with an FGT index where $\alpha \geq 2$. This discussion implies that while the TIP curves are a powerful device to at once examine the incidence, intensity, and inequality of poverty, in making comparisons across time, space, and groups it will be necessary to calculate other indexes such as P_2 in order to rank poverty states. This extra requirement is not a strong demand, and indeed, based on the discussion in the previous section it is desirable to examine this poverty aversion index independently of the TIP curve.

Figure 11: The U.S. TIP Curve for all Persons Based on Census Income

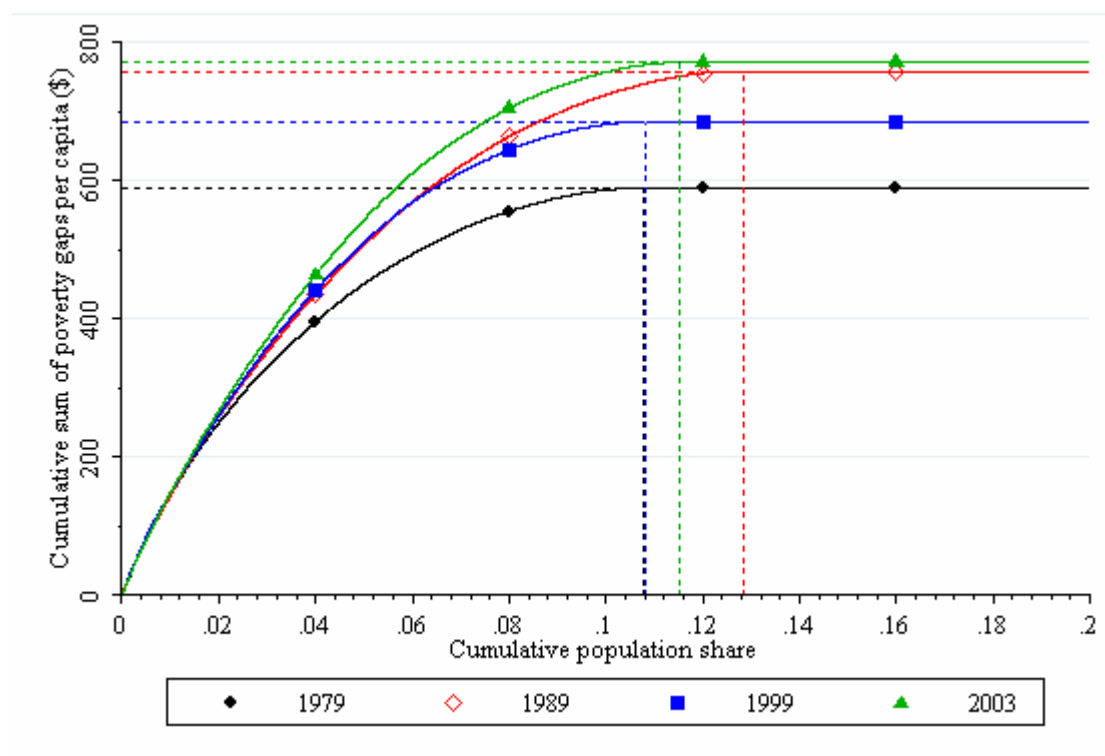


In Figure 11 I present the TIP curve for the United States in the peak years of the last three business cycles as well as in 2003. In this figure I use the official Census income definition for all persons. Thus, where the dashed vertical lines intersect the horizontal axis provides estimates of the official poverty rate for persons in the given year. A number of striking results emerge from Figure 11. First, it is transparent that the incidence, intensity, and inequality of poverty in 2003 are unambiguously higher than in 1979 or 1999. In 2003 the poverty rate was 12.5 percent, the poverty gap per capita was about \$1000, and inequality as measured by P_2 was 0.042. In comparison, the poverty rate was 11.6 and 11.8 percent in 1979 and 1999, respectively, the per capita poverty gaps were about \$790 and \$900, and P_2 was 0.028 and 0.036, respectively. Second, while the intensity and inequality of poverty were higher in 2003 than in 1989, the poverty rate was actually lower in 2003. This highlights, again, the importance of looking beyond the head count rate when making poverty comparisons across time. Third, while the poverty rate in 1999 was lower than in 1989, as was the per capita poverty gap, the inequality of poverty was higher in 1999 than in 1989. Notice that the 1999 line lies above the 1989 line until they cross at about 8 percent of the population. Thus, we have a case of a single crossing and so we must examine additional indexes to make conclusions about poverty dominance. Using FGT when $\alpha = 2$ reveals that $P_2^{1999} = 0.036 > P_2^{1989} = 0.034$ (the corresponding estimates when $\alpha = 3$ are 0.028 in 1999 and 0.025 in 1989), and so poverty in 1999 dominates poverty in 1989.

In Figure 12 I repeat the exercise but in this case I use the NRC income definition. The inclusion of food stamps, school lunch, housing subsidies, and the EITC less tax payments reduces the intensity of poverty in each year compared to Figure 11. Poverty in 2003 again dominates that in any of the past three business-cycle peak years (though the head count rate in 2003 continues to lie below that in 1989). With the broader income definition, however, it is

once again necessary to examine the FGT($\alpha = 2$) index to determine whether poverty in 1999 dominates that in 1989. As $P_2^{1999} = 0.028 > P_2^{1989} = 0.027$, poverty in 1999 continues to dominate poverty in 1989 even after the inclusion of in-kind transfers and the EITC. That poverty in the late 1990s is higher than at the end of the 1980s underscores the retrenchment in the social safety net during the welfare reform era of the 1990s that adversely affected those far below the poverty line. Thus, while the EITC expansions in the 1990s lifted many families above the line, the restrictions on TANF and food stamps in particular appear to have exacerbated economic hardship among the very poor.

Figure 12: The U.S. TIP Curve for all Persons Based on NRC Income



Because at each p , the index $TIP(p)$ is decomposable and subgroup consistent, the TIP curve is also a useful device to examine poverty trends among demographic groups. In Figures 13–15 I present TIP curves for white persons, black persons, and families headed by a single mother with dependent children under age 18, each based on the NRC income definition.

Figure 13: The U.S. TIP Curve for White Persons Based on NRC Income

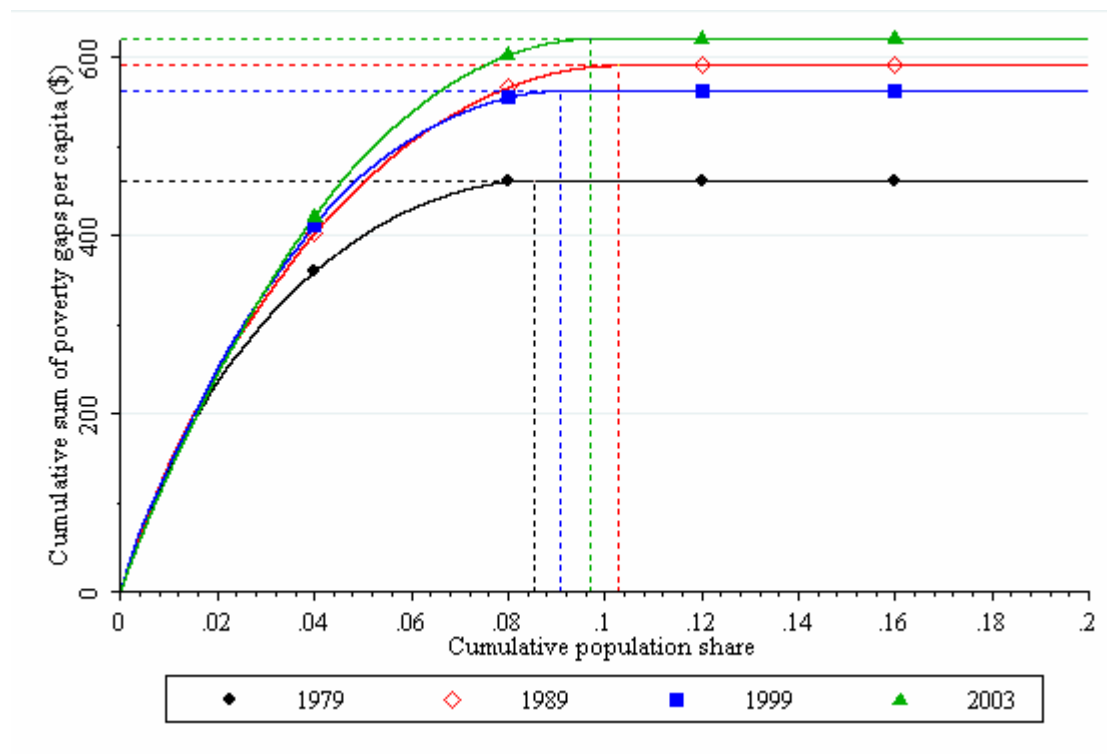


Figure 14: The U.S. TIP Curve for Black Persons Based on NRC Income

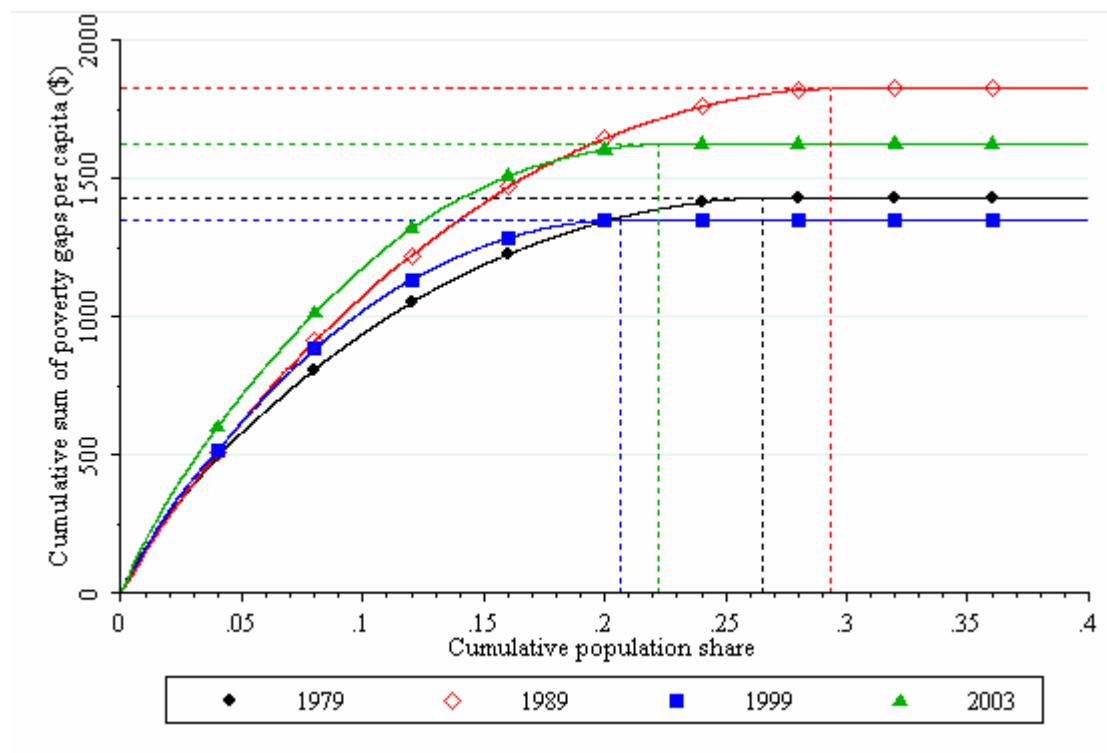
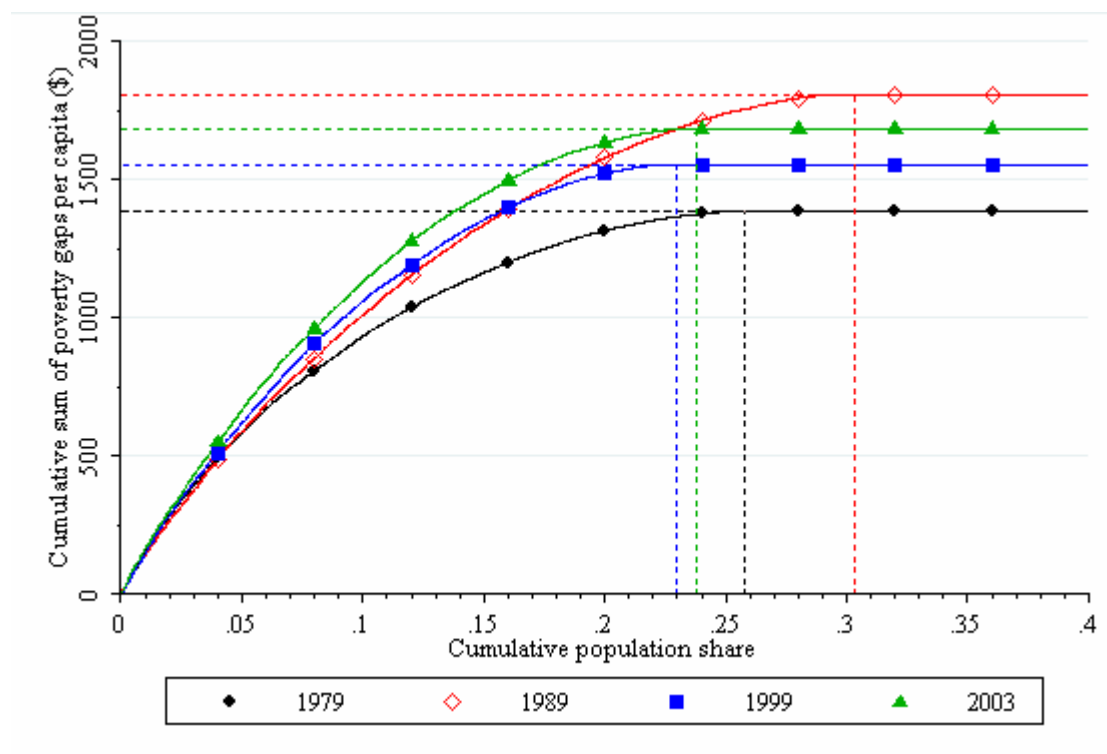


Figure 15: The U.S. TIP Curve for Female Headed Families Based on NRC Income



Poverty rankings among white persons as shown in Figure 13 are identical to those in the population as a whole as we saw in Figure 12. Among black persons in Figure 14, the 25-year portrait of poverty differs significantly from that of white persons. The expansion of the 1990s significantly improved the economic status of blacks in America relative to the 1980s expansion with lower incidence, intensity, and inequality of poverty, though they still fared worse relative to the 1970s business-cycle peak ($P_2^{1999} = 0.049 > P_2^{1979} = 0.043$). Although large gains were made in the 1990s, there has been significant retrenchment in the early 2000s with widening inequality. Indeed, inequality in 2003 dominates that in 1989 as $P_2^{2003} = 0.064 > P_2^{1989} = 0.056$, and only in 1992 and 1993 is the inequality of poverty among blacks higher than in 2003. A similar portrait to that for blacks emerges for female-headed families in Figure 15. Even though there is a single crossing between 2003 and 1989, the $FGT(\alpha = 2)$ index is larger in 2003 and

thus poverty is greater in 2003 compared to 1989 (and poverty in 2003 clearly dominates poverty in 1999 and 1979). As with black families, the inequality of poverty was greater in 1989 compared to 1999 for single mother families ($P_2^{1989} = 0.060 > P_2^{1999} = 0.057$), which underscores the strength of the late 1990s expansion for historically disadvantaged groups. These figures reveal that TIP curves are a powerful tool to succinctly portray poverty and could be readily adopted by the Census Bureau.

4. New Challenges in Poverty Measurement

As alluded to in the introduction the stakes surrounding the measurement of poverty are high, not only because of the direct effect on Federal, state, and local outlays on programs designed to help the poor, but also because of the indirect effect that poverty has on a society's real and perceived progress toward economic self-sufficiency for all citizens. I discussed the primary challenges in the measurement of poverty such as the choice of index (for example, poverty rate versus poverty gap), choice of threshold (absolute versus relative, updated Orshansky thresholds), and choice of resources (whether or not to include in-kind transfers and tax payments and credits as part of income, or whether to use consumption instead of income). These issues have rightly been the focus of research on poverty measurement over the past two decades, but there are some new challenges in the area that are in need of more research, mostly in the area of data quality. I discuss briefly each challenge in the following subsections.

4.1 The Rise of Imputations in the CPS

The Annual Social and Economic Study of the CPS is the primary data set used for income and poverty statistics in the U.S. Recent research by Hirsch and Schumacher (2004) and Bollinger and Hirsch (2006) on a related survey—the CPS Outgoing Rotation Group (ORG)—

highlights the increased reliance in the ORG file of earnings imputations and the attendant bias in regression parameters from this imputation bias. Specifically, for the ORG file the Census Bureau uses a so-called cell hot-deck procedure to assign to nonrespondents the reported responses of a matched donor who has an identical mix of measured attributes. Specifically, with the cell hot-deck procedure a respondent with missing outcomes (the recipient) is matched to a respondent with non-missing data (the donor) based on gender, age, race, education, occupation, hours worked, and receipt of tips and commissions. As of 2003 there were a possible 11,520 cells to match donors to recipients.

The idea behind imputation rather than simply dropping the observations with missing data is that imputation allows the researcher to retain the full sample, and with sampling weights, to produce relevant population statistics. As nonresponse rates are fairly low for most questions in the survey, this may be a reasonable approach to deal with missing data. However, nonresponse rates in the ORG are quite sizable for income, especially labor-market earnings. Indeed, Hirsch and Schumacher (2004) report that the proportion of imputed earners was approximately 15 percent from 1979–1993, but after revisions to the CPS survey design in 1994, the fraction of respondents with allocated earnings has risen to almost 30 percent. As Bollinger and Hirsch (2006) demonstrate the high rates of imputation in earnings results in severe attenuation of regression coefficients both on variables not used in the matching procedure as well as on match variables but where the match is imperfect.

The concern here is that if earnings and transfers are increasingly imputed in the Annual Social and Economic Study of the CPS then our estimates of poverty in America could be seriously distorted. Of course if the data are missing completely at random then we should expect no bias. However, if the data are missing nonrandomly either based on observables (that is,

selection on observables) or unobservables (that is, selection on unobservables) then the official estimates of poverty are biased. Suppose that the data are missing based on a single observable, schooling, and that persons with more education tend to refuse to answer earnings questions at higher rates than those with less education, and that the Census Bureau only matches on broad categories of less than high school, high school, and more than high school (which is indeed the method they employ). Given a positive correlation between education and income, this implies that people with higher, but missing earnings are likely to have their earnings “matched” to a donor with lower earnings, thus leading to an upward bias in the official poverty rate (given the use of an absolute poverty threshold). If low educated are less likely to report earnings then they are likely to be matched to a better off donor and thus leading to a downward bias in official poverty rates.

Determining the direction of bias is not so simple as the latter example because the method of imputation employed in the Annual Social and Economic Study uses multiple variables to match on and also differs from the ORG in that the Annual Study uses a sequential hot-deck procedure rather than a cell hot-deck procedure. As described in Bollinger and Hirsch (2006) nonrespondents are assigned to donors in the same March survey in sequential steps, where each step involves a less detailed match requirement. They explain the procedure as follows (footnote 6):

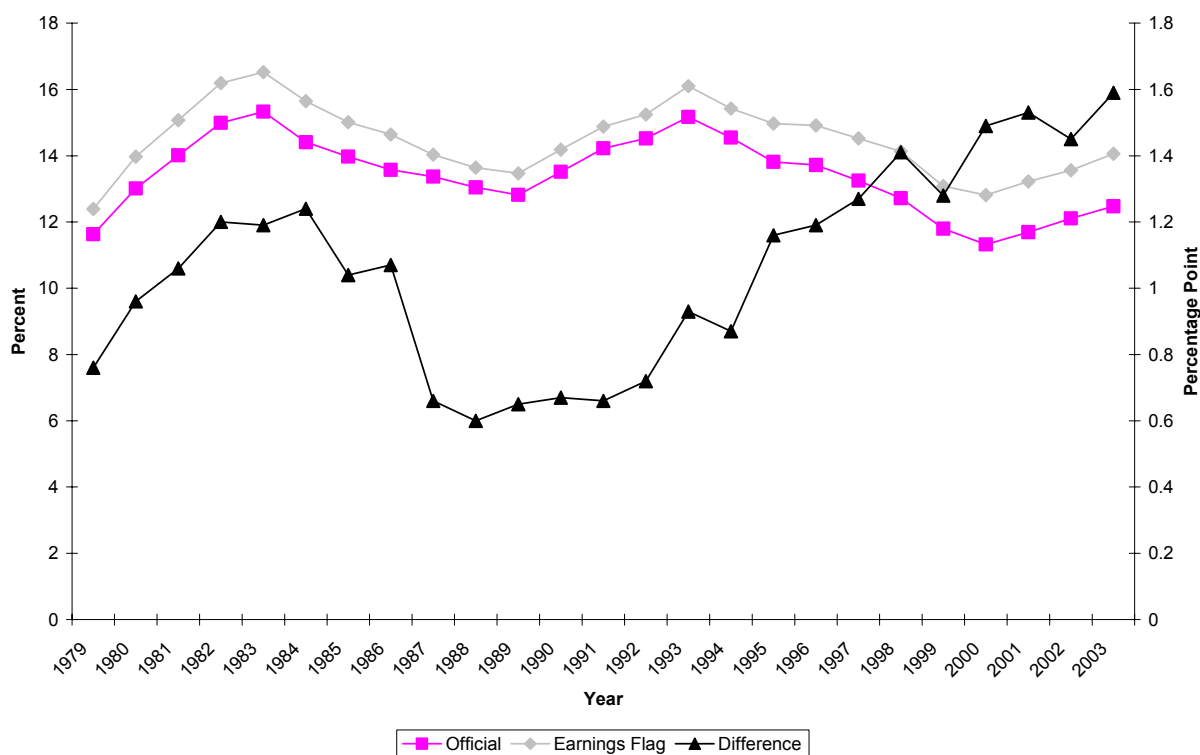
“For example, suppose there were just four matching variables: sex, age, education, and occupation. The matching program would first attempt to find a match on the exact combination of variables using a relatively detailed break-down. Absent a successful match at that level, matching proceeds to a next step with a less detailed breakdown, for example, broader occupation and age categories.”

While the procedure differs from that used in the ORG, it appears to be utilized less often as earnings imputation rates in the Annual Study are lower than the ORG; however, the trend over

the last decade has been toward higher rates of imputation on the order of 20 percent.

Based on the results of their analysis Bollinger and Hirsch (2006) recommend that users of the ORG either weight the data used in earnings models by the inverse probability of having earnings imputed, or at a minimum, drop observations with imputed earnings altogether. Either approach yields consistent estimates of regression coefficients provided that the data are missing only because of selection on observables. Similar research is needed on the Annual Study to determine whether or not the selection on observables is a valid assumption, but I take this assumption as given to provide a glimpse into the role of earnings imputations on official estimates of poverty in the U.S.

Figure 16: The Role of Earnings Imputations on Official Poverty Rates of All Persons



On the left axis of Figure 16 I depict the official poverty rate based on Census income and what the official rate would be if allocated earners were dropped from the analysis (Earnings

Flag), while on the right hand axis I depict the difference in the two series in terms of percentage points. Across all years the official poverty rate is understated by nearly 1.1 percentage points by the inclusion of imputed earnings, which is about 8 percent of the average poverty rate.

However, since the mid-1990s the trend in the difference has increased such that by 2003 the official rate was about 13 percent lower than it would be in the absence of imputed earners. If one also discards observations for whom transfers in the official definition are imputed then this bias gets reduced somewhat, but it is still 11 percent in 2003.

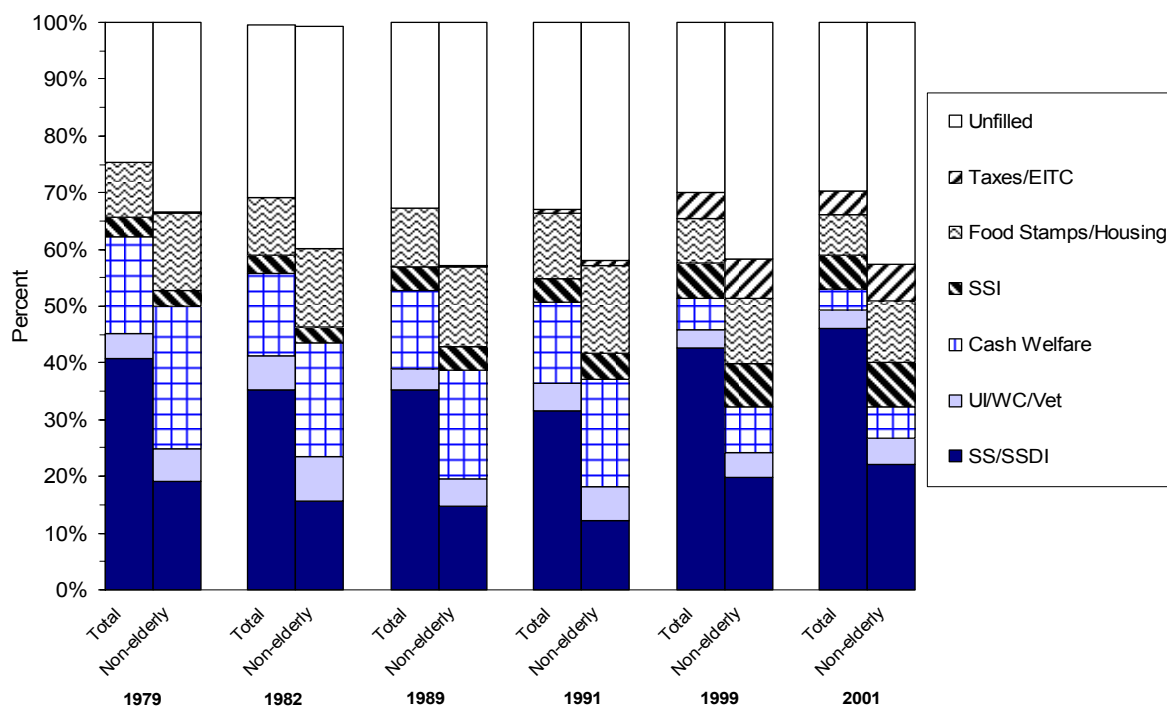
What is interesting about the time series in Figure 16 is the fact that in the 1980s the bias was countercyclical, i.e. it rose with increases in the unemployment rate and fell with declines in unemployment—suggesting some role for countercyclical composition bias in the imputations—but in the 1990s the difference between the official rate and the rate without imputed earnings bears no relation to the business cycle and simply seems to be a monotonic trend. One possibility is that the rate of refusal among the highly educated has increased in recent years such that by discarding individuals with a high education level we are shrinking the denominator of the poverty rate faster than the numerator, leading to an upward trend in the difference. Regardless, if the patterns continue then the long-run viability of the official poverty rate is of deep concern irrespective of other important matters such as where the poverty line is drawn. Additional research is clearly warranted on this issue, and simultaneously the Census Bureau needs to search for improved methods of data collection to reduce the disturbing pattern of earnings nonresponse in the both the ORG and the Annual Study.

4.2 The Rise of In-kind Transfers in the Safety Net

Devising methods of valuing in-kind transfers has been a significant challenge for poverty scholars (Smeeding 1982; Weinberg 1985; Leonesio 1988; Moffitt 1989; Scholz and

Levine 2001), and the importance of such transfers has only grown in proportion to total expenditures on relief over the past two decades making such valuation even more critical. At the time of Smeeding's (1982) report for the Census Bureau expenditures on in-kind transfers outnumbered cash transfers by 2 to 1; today, in-kind transfers exceed cash transfers by a factor closer to 10 to 1. Traditionally the primary in-kind transfer programs have been Medicaid, Medicare, food stamps, school breakfast and lunch, WIC, public housing and Section 8 vouchers, and Head Start. However, passage of the Personal Responsibility and Work Opportunity Reconciliation Act of 1996 eliminated AFDC and replaced it with the block grant program Temporary Assistance to Needy Families (TANF). AFDC was a cash-based means-tested transfer program, but its replacement TANF has been transformed into a program that largely provides in-kind benefits (Corbett 2002). How such benefits are valued by welfare recipients has yet to be explored in any systematic fashion.

FIGURE 17. PERCENT CONTRIBUTION OF VARIOUS TRANSFERS TO FILLING THE GAP FOR ALL AND NON-ELDERLY PRE-TAX AND PRE-TRANSFER POOR FAMILIES, 1979 TO 2001



To fix ideas consider Figure 17 that is adapted from Figure 1 of Ziliak (2003). Here I decompose the aggregate poverty gap in equation (4) into the relative contributions of means-tested transfers and social insurance programs to filling the gap in the peak and trough years of the last three business cycles for all families and for non-elderly families. Starting from the x-axis and moving up the programs are Social Security (SS) and Disability Insurance (SSDI), Unemployment Insurance (UI), Workers Compensation (WC), Veteran's Payments (Vet), AFDC/TANF (Cash Welfare), SSI, Food Stamps, public housing and Section 8 vouchers, and taxes plus the EITC. Medicaid and Medicare are not included in the figure.

Of particular interest in Figure 17 is substantial decline in the relative contribution of cash welfare to filling the gap. Among the non-elderly in 1979 AFDC filled about 25 percent of the gap, but by 1999 the equivalent contribution from TANF was only 8 percent of the gap. What accounts for this dramatic decline in the role of cash welfare? There are many possible reasons. First, the real value of the AFDC monthly benefit declined over this period. For example, the average AFDC maximum benefit guarantee for the 3-person family fell over one-third between 1979 and 1999. During the 1980s and 1990s most states kept the nominal welfare benefit constant, which allowed inflation to erode the real value of the transfer. Second, participation in AFDC among non-elderly families fell about 45 percent over this period (Ziliak 2003, Appendix Table 11). The reasons for this include the strong economy, expanded generosity of EITC benefits, and welfare reform (Ziliak et al. 2000; Blank 2001). Third, is evidence by Bavier (1999) that underreporting of welfare income expanded in the 1990s such that we are not measuring as much of the welfare check as in the past.

Although the latter three factors likely account for much of the decline of AFDC in filling the poverty gap, a fourth possible reason is the fact that today only about 30 percent of TANF

appropriations are delivered in the form of cash assistance. The remaining 70 percent includes expenditures on child care, workforce development, and various programs designed to improve family structure and family life such as reduced out-of-wedlock childbearing, early childhood investments, and substance abuse treatment, among others. These percentages are exactly reversed from the typical allocation of funds in the pre-welfare reform era. The problem for poverty measurement comes from the fact that the CPS only records cash welfare receipts and does not impute a dollar value for child care, transportation for work, education and training programs (unless drawn from other questions on educational assistance), substance abuse programs, etc... Moreover, if a welfare client does not receive cash but only in-kind transfers from the TANF office it is not obvious whether or not they would be recorded as a welfare recipient in the CPS. The question reads “*At any time during [19xx/20xx] (last year) even for one month did anyone in this household receive: Any public assistance or welfare payments from the State or local welfare office?*” The wording seems to preclude in-kind assistance from TANF. However, it may capture other forms of welfare assistance such as “diversion” payments, which are made in several states to potential welfare recipients in lieu of registering the client on the welfare caseload.

In sum, of the two-thirds decline in AFDC/TANF in filling the poverty gap for non-elderly families (a) we can be certain that the real value of the transfer benefit fell by about a third because the state-specific statutory benefit levels are posted amounts, (b) we can be reasonably confident that underreporting of income has increased (and we know that non-reporting has risen), and (c) based on administrative data we know that welfare participation fell. However, it is this last component that is difficult to assess accurately because of the rising role of in-kind benefits in the TANF program (as well as diversion payments) and the possibility that

in-kind benefits fall below the radar in both administrative files and in CPS data. We know that the Federal block grant to states has been fixed in nominal terms at \$16 billion since the 1997 fiscal year and that this money is being spent by the states. This appropriation is based on AFDC expenditures over the 1992-94 period and is at least as high as in 1991 when AFDC still filled 19 percent of the poverty gap for non-elderly families in Figure 17. If the same appropriation is being made eight years later in 1999 and yet the relative contribution to filling the gap has fallen by more than 50 percent, then this suggests that we are only capturing a small fraction of the benefits in our poverty measures. This not only distorts our estimates of the official poverty rate (they are too high if we're undercounting TANF benefits), but also our estimates of poverty gaps and TIP curves. Indeed, we cannot rule out the possibility that some of the rise in squared and cubic poverty gaps in the late 1990s is due to increased underreporting of income and benefits among the very poor, who receive disproportional weight in these poverty indexes.

4.3 The Future of the CPS in Poverty Measurement

The National Research Council proposed replacing the CPS with the Survey of Income and Program Dynamics (SIPP) coupled with the Consumer Expenditure Survey (CE) for the official poverty statistics in the United States (Citro and Michael 1995). The CE would be used to establish and update annual poverty thresholds, while the SIPP would be used to construct income and the attendant poverty rates and measures of income inequality. The Panel preferred the SIPP over the CPS because the CPS is primarily designed to be a monthly file on the nation's employment situation, and not its income situation with the exception of the March supplement. The SIPP, on the other hand, is designed to be a survey of income, and as such in addition to the usual income information it includes questions on taxes, medical care costs, child support, work expenses, and asset returns, each of which the NRC Panel proposed to include in the revised

measure of poverty. The Panel recommended that the SIPP be evaluated in terms of its design and questionnaire in order to handle the increased burden of providing official poverty statistics, but the belief at the time was that the SIPP was a viable alternative to the March CPS. At this writing, however, the future of the SIPP is in doubt. The Bush Administration proposed ending the SIPP as part of its fiscal 2007 budget plan, and if passed by Congress, the SIPP will terminate in September 2006.

In the intervening years since the NRC report the Census Bureau has rolled out a new survey—the American Community Survey (ACS)—that may replace the CPS over time for poverty statistics, at least for estimates at the state and substate level. The CPS is primarily intended for national and state analyses of labor force characteristics among the noninstitutionalized population ages 16 and older (CPS 2002). The survey consists of independent samples at the state level, and thus the Census claims that the survey is state-based. Even though there are claims of representativeness at the state level, the Census Bureau recommends that when making poverty comparisons within a state over time from the March CPS one should use 2-year moving averages, and when making cross-sectional comparisons across states one should use 3-year moving averages.⁷ It is not clear a priori why there are differential recommendations for within versus between state comparisons, but the general recommendation of 2-year moving averages is sensible given the smaller samples at the state level.

The ACS is designed to replace the long form of the decennial Census by 2010 and to provide the most accurate and complete subnational estimates on poverty and income. As of 2000 the ACS provided income and poverty estimates for all counties and metropolitan areas of at least 250,000 persons. As the sample size is expected to grow to 3 million addresses by 2006,

⁷ See the summary recommendations at <http://www.census.gov/hhes/www/poverty/newguidance.html#cpsasec>.

beginning this year the Census plans to release annual estimates for communities of 65,000 and more, and by 2008 the goal is to be able to provide 3-year averages for communities as small as 20,000. Going forward, in 2010 it should be possible to produce 5-year poverty averages at the census tract level.

Aside from sample size, there are four additional key distinctions between the CPS and the ACS. First, the Annual Study is a telephone-based interview using Computer-Assisted Telephone Interviewing (CATI) and Computer-Assisted Personal Interviewing (CAPI) techniques. The ACS, like the Census long-form, relies on self-response mail-back interviews, followed by CATI and CAPI. The ACS is potentially more time intensive to complete, but if made compulsory like the long form then response rates could be quite high and more accurate.

Second, the income questions in the CPS Annual Study refer to the previous calendar year, whereas income in the ACS is based on the 12 months prior to the survey. Thus, if you are interviewed in January 2006 for the ACS the look back period is January, 2005 to December 2005; however, if you are interviewed in September 2006, the look back period is September, 2005 to August 2006. This method is intended to reduce so-called recall bias, but given that most people align their earnings to the annually issued W-2 form for use in income-tax filing, the expected reduction in recall bias may be more transparent than real. It also raises questions as to which portion of the ACS sample should be used in annual poverty calculations. The March CPS questionnaire refers to the previous calendar year. Because ACS respondents are interviewed throughout the year and asked about their income for the last 12 months, poverty rates in the ACS refer to the previous 12 months and not calendar year. This requires modifying the official thresholds for changes in inflation within a year. Specifically the thresholds are determined by multiplying the base-year poverty thresholds (1982) by the average monthly inflation factors for

the 12 months preceding the interview. One option then is to base ACS poverty statistics solely on those families interviewed in January of each year in order to align income with the previous calendar year, and thus the CPS.

Third, the March CPS Annual Study includes people in noninstitutional group quarters such as group homes and college dorms, but the plan is for the ACS to include both institutional (such as jails and nursing homes) and noninstitutional group quarters. The fourth difference is the number of subcomponents summed to equal total income. In the March CPS there are 20 income components for each income recipient in the family that are summed to yield total family income, but in the ACS this has been collapsed into 8 income components. For example, rather than asking separate questions on Veteran's Payments, Unemployment Insurance, child support, and alimony, all sources are lumped into a single question. It would be useful to conduct a validation study on whether reporting improves or deteriorates with the more aggregated questions in the ACS.

In addition to aggregating income categories, the ACS also does not ask about receipt of many in-kind transfers such as housing subsidies, Medicaid, Medicare, School Lunch, WIC, or about receipt of the EITC. The survey does ask about food stamps over the past 12 months, but the omission of these other critical in-kind transfers limits the usefulness of the ACS even in comparison to the CPS for constructing alternative income definitions such as the NRC income definition found in many figures in this survey. At this time the Census has not implemented any simulation procedures to impute income tax payments or credits, or in-kind transfers such as housing and health. If the Census Bureau improves the income and expenditure coverage in the ACS to equal or better that found in the CPS Annual Study there is little compelling argument to continue the CPS Annual Study aside from the advantage of a long time series from a relatively

consistent data source. Recall that since the poverty rate is subgroup consistent and decomposable, there is little reason why the community focused ACS cannot form the basis of our national poverty statistics. However, given the important distinctions and concerns raised about the ACS the March CPS is likely to continue as the primary source of annual poverty statistics in the coming years, and likely the preferred source at both the national and possibly the state level given the long time series in the CPS.

5. Recommendations

The accurate measurement of poverty is a critical first step in a nation's effort to quantify the scale of economic disadvantage and for the attendant design of anti-poverty programs and policies. Research on poverty measurement continues to be an active line of research among economists, and much more needs to be done. The 1980s was dominated by an explosion of research on distribution-sensitive poverty indexes, while in the 1990s the focus leaned heavily toward revising how we measure the poverty line and economic resources. Each research vein is critical to our understanding of poverty, and yet there is not as much communication across the research strands as one would hope or as is needed to improve poverty measurement. As a contributor to applied poverty research, my own assessment is that applied economists and policymakers have ignored the theoretical literature for too long. My hope is that this brief survey will alert the applied community to some of the important issues of what constitutes a good poverty index and stimulate additional research into poverty measurement.

Toward this end, my own reading of the literature leads me to following recommendations for poverty measurement and future research. First, I believe that we should continue to focus on income as the primary metric of economic resources for poverty. However, income should be redefined along the lines of the pseudo-NRC income definition utilized here in

which the official Census definition is amended to include the dollar value of near-cash in-kind transfers such as food stamps, school lunch and breakfast, WIC, and subsidized housing, plus EITC payments and capital gains, and less Federal and state income taxes and capital losses. Income should be indexed to a regional cost-of-living price index already constructed by the Bureau of Labor Statistics. This brings the resource definition much closer to the Haig-Simon ideal, but admittedly it still falls short due to the omission of health benefits. Valuation of health benefits is perhaps the most difficult challenge in income measurement, and until a more satisfactory metric is devised it should be left out of the equation.

Second, compelling though the arguments of the NRC panel are to move toward a consumption-based relative poverty threshold, I find the simple elegance of the Orshansky thresholds superior to the NRC thresholds. However, to maintain relevance the Orshansky thresholds should be made quasi-relative, and as recommended by Ruggles (1990), they should be updated periodically such as each decade to reflect consumer spending patterns on food more accurately. As demonstrated in Figure 5, this reform is likely to have dramatic effects on estimated poverty rates, and thus the amount of political will needed to implement such a reform cannot be understated. Part of the negative reaction of policymakers to this reform is that they do not wish to be perceived as being responsible for increasing poverty. Part, too, comes from the fact that so many transfer programs are tied to the poverty line that they are concerned about the potential explosion of expenditures on social insurance and means-tested transfers.

Although I cannot dismiss the former concern given the ferocity of political campaigns, I do believe the latter concern is overblown. First, Congress regularly alters eligibility rules for safety net programs, and thus it is possible to rewrite gross-income eligibility limits for transfer programs. Many states already allow eligibility for Medicaid up to 200 percent of the poverty

line, and with new lines double the current ones then states could limit eligibility to those at the new line without altering the potential risk set of recipients. Likewise, the income limit for food stamps and free school lunch is 130 percent of poverty, and WIC is set at 185 percent of poverty. The realization was made long ago that the poverty lines were too low for many assistance programs. Perhaps now it is time to recognize that the lines are too low for poverty measurement. The second reason why I believe that revising the Orshansky thresholds will not result in a fiscal train wreck for Federal and state governments is the well-known fact that take-up rates for most programs are very low, and they decline with higher income. Whether it is the stigma of welfare, or the hassles of applying for and renewing benefit eligibility, nonparticipation among eligible families pervades all transfer programs. Estimates from the Food Stamp Program in the 1990s place take-up rates in the 50–60 percent range, for the former AFDC program at about 70 percent, and for the Medicaid program anywhere from 30–50 percent (Currie 2006). Thus, while raising the poverty line will likely lead to higher estimated poverty, the increase in social expenditures is likely to be much less than proportional.

My third recommendation for revising our measures of poverty is that along with the poverty rate, the Census Bureau produce an annual series of poverty gap estimates based on the Foster, Greer, and Thorbecke (1984) index with $\alpha = 1, 2$ to provide estimates of the (normalized) and squared poverty gaps. The Bureau already produces an annual Gini coefficient for income inequality, and thus the omission of a parallel index for poverty measurement is glaring. The squared poverty gap is an intuitive index that provides greater detail on the inequality of poverty, and I believe would greatly improve our understanding of the economic status of the poorest poor. Moreover, because pictures are often powerful tools to transparently represent complicated

statistics, the squared poverty gap could be complemented with TIP curves proposed by Jenkins and Lambert (1997).

My recommendations must be informed by additional research. Whereas the 1980s focused on theoretical indexes, and the 1990s on redrawing the line, the next item on the poverty research agenda for the early 2000s should be new research on data quality. This includes research on the importance of imputation and nonresponse in the CPS on our official poverty statistics. Based on the work of Hirsch and Schumacher (2004) and Bollinger and Hirsch (2006), the prognosis is not good, and thus the Census Bureau should redouble efforts at revising the survey instrument to improve item response rates on earnings and other income sources. New research is needed on several simulation modules within the CPS that are important for construction of disposable income. For example, research is needed on how well the CPS tax simulator compares to other tax modules such as the NBER's *TAXSIM* program or the tax simulator by the Brookings/Urban Institute Tax Policy Center. Research is needed on how to define a welfare case and how to value the variety of in-kind transfers that are part of the new TANF program. Given the debate surrounding the valuation of health insurance, additional research is needed on this topic in light of the explosive growth of health care expenditures. Scholz and Levine (2001) take an intuitive approach of valuing Medicaid at the same rate as a typical HMO policy, but such an approach has not been validated in the literature. With the emergence of the American Community Survey research is needed on how to benchmark our national and local area poverty statistics given the different survey designs of the CPS and ACS. Finally, although my preference is for income-based poverty measurement, the theoretical and empirical challenges to this approach by researchers favoring consumption-based poverty

measurement are serious and thus this area requires additional investigation. The issues raised here, along with other related questions, should keep poverty scholars busy for years to come.

References

- Anderson, L. 1964. "Trickling Down: The Relationship Between Economic Growth and the Extent of Poverty Among American Families." *The Quarterly Journal of Economics* 78(4): 511-524.
- Atkinson, A. 1987. "On the Measurement of Poverty." *Econometrica* 55(4): 749-764.
- Attanasio, O., E. Battistin, and A. Leicester. 2006. "From Micro to Macro, from Poor to Rich: Consumption and Income in the UK and the US," Mimeo.
- Bavier, R. 1999. "An Early Look at the Effects of Welfare Reform," mimeo.
- Blank, R. 1997. *It Takes a Nation: A New Agenda for Fighting Poverty*, Princeton, NJ: Princeton University Press.
- Blank, R. 2001. "What Causes Public Assistance Caseloads to Grow?" *Journal of Human Resources* 36(1): 85-118.
- Blank, R., and D. Card. 1993. "Poverty, Income Distribution, and Growth: Are They Still Connected?" *Brookings Papers on Economic Activity* 2: 285-339.
- Blundell, R., and I. Preston. 1992. "The Distinction Between Income and Consumption in Measuring the Distribution of Household Welfare." University College London Discussion Paper 92-01.
- Blundell, R., and I. Preston. 1998. "Consumption Inequality and Income Uncertainty." *Quarterly Journal of Economics* 113(2):603-640.
- Bollinger, C. and M. David. 2001. "Estimation with Response Error and Non-response: Food Stamp Participation in the SIPP." *Journal of Business and Economic Statistics* 19(2): 129-141.
- Bollinger, C., and B. Hirsch. 2006. "Match Bias from Earnings Imputations: The Case of Imperfect Matching." *Journal of Labor Economics*, Forthcoming.
- Burtless, G. and T. Smeeding. 2001. "The Level, Trend, and Composition of Poverty." In S. Danziger and R. Haveman, eds., *Understanding Poverty*, Cambridge, MA: Harvard University Press, 27-68.
- Citro, C., and R. Michael. 1995. *Measuring Poverty: A New Approach*, Washington, D.C.: National Academy Press.
- Corbett, T. 2002. "The new face of welfare: From income transfers to social assistance?" *Focus* 22(1): 3-10.

- Currie, J. 2006. *The Invisible Safety Net: Protecting Poor Children and Families*. Princeton, NJ: Princeton University Press.
- Cutler, D., and L. Katz. 1991. "Macroeconomic Performance and the Disadvantaged." *Brookings Papers on Economic Activity* 2: 1–74.
- Edin, K., and L. Lein. 1997. *Making Ends Meet: How Single Mothers Survive Welfare and Low-Wage Work*. New York: Russell Sage Foundation.
- Fisher, G. 1992. "The Development of the Orshansky Poverty Thresholds and Their Subsequent History as the Official U.S. Poverty Measure." <http://www.census.gov/hhes/poverty/povmeas/papers/orshansky.html> .
- Foster, J. 1984. "On Economic Poverty: A Survey of Aggregate Measures." In R.L. Basman and G.F. Rhodes, eds, *Advances in Econometrics*, 3, Connecticut: JAI Press.
- Foster, J., J. Greer, and E. Thorbecke. 1984. "A Class of Decomposable Poverty Measures." *Econometrica* 52(3): 761–766.
- Friedman, R. 1965. *Poverty: Definition and Perspective*. Washington, D.C.: American Enterprise Institute.
- Gottschalk, P. and S. Danziger. 1985. "A Framework for Evaluating the Effects of Economic Growth and Transfers on Poverty." *The American Economic Review* 75(1): 153–161.
- Grogger, J. 2003. "The Effects of Time Limits, the EITC, and Other Policy Changes on Welfare Use, Work, and Income Among Female-Headed Families." *Review of Economics and Statistics* 85(2): 394–408.
- Gundersen, C. and J. Ziliak. 2004. "Poverty and Macroeconomic Performance Across Space, Race, and Family Structure." *Demography* 41(1): 61–86.
- Harrington, M. 1962. *The Other America: Poverty in the United States*. New York: Macmillan.
- Haveman, R., and E. Wolff. 2001. "Who Are the Asset Poor? Levels, Trends, and Composition 1983–1998." Institute for Research on Poverty Discussion Paper 1227–01.
- Hirsch, B., and E. Schumacher. 2004. "Match Bias in Wage Gap Estimates Due to Earnings Imputation." *Journal of Labor Economics* 22(3): 689–722.
- Hoynes, H., M. Page, and A. Huff Stevens. 2006. "Poverty in America: Trends and Explanations." *Journal of Economic Perspectives* 20(1): 47–68.
- Hurst, E., and J. Ziliak. 2006. "Do Welfare Asset Limits Affect Household Saving? Evidence from Welfare Reform." *Journal of Human Resources*, 41(1): 46-71.

- Iceland, J. 2005. "Measuring Poverty: Theoretical and Empirical Considerations." *Measurement: Interdisciplinary Research and Perspectives* 3(4):207–43.
- Jenkins, S. and P. Lambert. 1997. "Three 'I's' of Poverty Curves, with an Analysis of UK Poverty Trends." *Oxford Economic Papers* 49: 317–327.
- Joliffe, D. 2006. "Poverty, Prices, and Place: How Sensitive is the Spatial Distribution of Poverty to Cost of Living Adjustments?" *Economic Inquiry* 44(2): 296–310.
- Joliffe, D., C. Gundersen, L. Tiehen, and J. Winicki. 2005. "Food Stamp Benefits and Child Poverty." *American Journal of Agricultural Economics* 87(3): 569–581.
- Mayer, S., and C. Jencks. 1989. "Poverty and the Distribution of Material Hardship." *Journal of Human Resources* 24(1): 88–114.
- Meyer, B. and D. Rosenbaum. 2000. "Making Single Mothers Work: Recent Tax and Welfare Policy and its Effects." *National Tax Journal* 53(4.2): 1027-1062.
- Meyer, B. and J. Sullivan. 2003. "Measuring the Well Being of the Poor Using Income and Consumption." *Journal of Human Resources* 38(Supplement): 1180–1220.
- Mitrusi, A. and J. Poterba. 2000. "The Distribution of Payroll and Income Tax Burdens, 1979–1999". *National Tax Journal*, 53, 765–794.
- Moffitt, R. 1989. "Estimating the Value of an In-Kind Transfer: The Case of Food Stamps." *Econometrica* 57(2): 385–409.
- Leonesio, M. 1988. "In-Kind transfer and Work Incentives." *Journal of Labor Economics* 6(4): 515–29.
- Orshansky, M. 1963. "Children of the Poor." *Social Security Bulletin* 26(7): 3–13.
- Rosen, H. 1985. *Public Finance*, 2nd Edition. New York: McGraw-Hill.
- Ruggles, P. 1990. *Drawing the Line: Alternative Poverty Measures and Their Implications for Public Policy*. Washington, D.C.: Urban Institute.
- Scholz, J.K., and K. Levine. 2001. "The Evolution of Income Support Policy in Recent Decades." In S. Danziger and R. Haveman, eds., *Understanding Poverty*, Cambridge, MA: Harvard University Press, 193–228.
- Sen, A. 1976. "Poverty: An Ordinal Approach to Measurement." *Econometrica* 44(2): 219–231.
- Slesnick, D. 1993. "Gaining Ground: Poverty in the Postwar United States." *Journal of Political Economy* 101(1): 1–38.

Slesnick, D. 2001. *Consumption and social welfare: Living standards and their distribution in the United States*. Cambridge, UK: Cambridge University Press.

Smeeding, T. 1982. "Alternative Methods for Valuing Selected In-Kind Transfer Benefits and Measuring Their Effect on Poverty." U.S. Department of Commerce, Bureau of Census, Technical Paper 50.

Smeeding, T. 2006. "Poor People in Rich Nations: The United States in Comparative Perspective." *Journal of Economic Perspectives* 20(1): 69–90.

Stevens, A.H. 1999. "Climbing Out of Poverty, Falling Back In: Measuring the Persistence of Poverty over Multiple Spells." *Journal of Human Resources* 34(3): 557–588.

Sullivan, J. 2006. "Welfare Reform, Saving, and Vehicle Ownership for the Poor: Do Asset Tests and Vehicle Exemptions Matter?," *Journal of Human Resources*, 41(1): 72–105.

Tresch, R. 2002. *Public Finance: A Normative Theory*, 2nd Edition. London: Academic Press.

U.S. Department of Commerce, Bureau of Census. 1992. "Measuring the Effect of Benefits and Taxes on Income and Poverty: 1992." Current Population Reports, Series P60-186RD.

U.S. Department of Commerce, Bureau of Census. 2002. "Current Population Survey: Design and Methodology." Technical Paper 63RV.

Watts, H. 1968. "An Economic Definition of Poverty." In D.P. Moynihan, ed., *On Understanding Poverty*, New York: Basic Books.

Weinberg, D. 1985. "Filling the 'Poverty Gap': Multiple Transfer Program Participation." *Journal of Human Resources*, 20:1, 64–89.

Zheng, B. 1997. "Aggregate Poverty Measures." *Journal of Economic Surveys* 11(2): 123–162.

Ziliak, J. 2003. "Filling the Poverty Gap, Then and Now." University of Kentucky Center for Poverty Center Discussion Paper 2003-06.

Ziliak, J., D. Figlio, E. Davis, and L. Connolly. 2000. "Accounting for the Decline in AFDC Caseloads: Welfare Reform or the Economy?" *Journal of Human Resources* 35(3): 570–586.