

ORS Working Paper Series

Number 63

**NONCASH INCOME, EQUIVALENCE SCALES, AND THE MEASUREMENT
OF ECONOMIC WELL-BEING**

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October 1994

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ABSTRACT

The economic well-being of subgroups of the population usually is measured by comparing resources and needs. The measure of resources often includes noncash income. Equivalence scales are used to adjust for differential needs. Little attention, however, has been paid to the desirability of consistency between the specifications of the resources and the equivalence scales in these comparisons. This exploratory paper suggests that a lack of consistency between the definitions used on the income and the needs sides can be important for the assessment of the economic well-being of subgroups when some types of noncash income are included in the definition of income. The measured economic status of the aged in the United States when Medicare noncash income is included in the definition of income is used as an example of this consistency problem. Some previous estimates have used equivalence scales that probably understated the relative needs of the aged by omitting needs associated with Medicare. The measured economic well-being of the aged relative to other age groups could be overestimated substantially as a result of this consistency problem. The basic problem is not confined to the treatment of Medicare or to the United States, but is much broader in nature.

NONCASH INCOME, EQUIVALENCE SCALES, AND THE MEASUREMENT OF ECONOMIC WELL-BEING*

I. INTRODUCTION

The economic well-being of subgroups of the population usually is measured by comparing resources and needs. Much attention has been paid to the appropriate definition and valuation of resources such as income. There also has been a great deal of research done on the specification of appropriate adjustments for needs, especially differential needs of subgroups of the population as reflected in equivalence scales.

Those two sides of the comparison, however, often have been treated separately when specific issues are discussed. Little attention has been paid to the desirability of consistency between the specifications of the resources and needs sides of comparisons of economic well-being (Radner 1992). The potential importance of this consistency problem is large when the definition of income includes some types of noncash income that have needs associated with them that are unmeasured in the usual equivalence scales.¹ In recent years the use of comprehensive definitions of income that include noncash income has become more widespread, thus increasing the possible importance of the problem. Also, because some large noncash

* The author is greatly indebted to Sharon Johnson for her usual excellent job in preparing the estimates, and to Benjamin Bridges, Ann Harding, Dean Leimer, Michael Leonesio, Selig Lesnoy, and Denton Vaughan for many helpful discussions and comments. Any remaining errors are the sole responsibility of the author. The views expressed are the author's and do not necessarily represent the position of the Social Security Administration or the Department of Health and Human Services. An earlier version of this paper was presented at the Twenty-Third General Conference of the International Association for Research in Income and Wealth, St. Andrews, New Brunswick, Canada, August 21-27, 1994.

¹The consistency problem is not confined to the case of noncash income. For example, there could be inconsistency between needs specified for cash income before tax and income defined as cash income after tax. The noncash income case is the only one discussed in this paper.

income types (e.g., Medicare) are relatively concentrated in particular subgroups of the population (e.g., the aged), there is a potential for serious distortion of the measured status of those subgroups.

Almost all of the research in the United States that addresses this consistency issue in relation to noncash income has been in connection with the measurement of poverty. Appropriate poverty income thresholds for definitions of resources that include noncash income have been discussed extensively, although no consensus has been reached (Bureau of the Census 1986).

This consistency problem, however, is not confined to the measurement of poverty. It is also relevant for the specification of equivalence scales in the assessment of the economic well-being of subgroups in general.² The discussion of noncash income and poverty measurement, however, has not had a significant impact on the choice of equivalence scales in assessments of general economic well-being. The general consistency problem has received little attention, perhaps because of a perception that the effects of this inconsistency are insignificant.³

²The consistency problem discussed here is one aspect of the general problem of the misspecification of relative needs of subgroups of the population. Misspecification can occur whether or not an equivalence scale is used. If the economic well-being of subgroups is compared using income amounts and an equivalence scale is not used, the implicit assumption is that the units compared have equal needs. This assumption might produce misleading comparisons of economic well-being if relative needs differ.

³The discussion of noncash income and poverty measurement involved the official U.S. thresholds, which are adjusted over time only for inflation. The consistency problem also applies when the poverty threshold is specified as a fraction (e.g., one half) of median or mean income adjusted using an equivalence scale. The consistency problem has not been discussed in relation to that type of measure of poverty.

In this exploratory paper we suggest that the consistency problem can be important for the general assessment of the economic well-being of subgroups. The same equivalence scale usually is applied to different definitions of resources. This use is often inappropriate conceptually and is likely to be an important problem empirically in at least some cases. It should not be assumed that the relative needs of different subgroups remain unchanged when the definition of income changes. Most equivalence scales have been formulated or estimated for use with cash income. We argue that, at least in some important cases, such scales are not appropriate for a definition of income that includes noncash income because needs associated with the noncash income are not taken into account.

As an example of the effects of the consistency problem, this paper focuses on the economic well-being of the aged compared with other age groups. Medicare is used as the type of noncash income in the example.⁴ The emphasis is on consistency in the context of practical measurement problems. Several hypothetical cases are discussed. Illustrations of the effects on the relative economic well-being of the aged produced by two crude modifications to an equivalence scale are presented. Those modifications account for the presence of unmeasured medical needs associated with Medicare noncash income. Household survey income data from the Current Population Survey (CPS) conducted by the Bureau of the Census are used in those illustrations.⁵ The estimates presented should not be considered as satisfactory estimates of the

⁴Medicare is a government health plan that provides medical care for the aged and the disabled. See Social Security Administration (1993) for a description of the Medicare program.

⁵The comparisons made here are for a specific year, 1992. The consistency problem can also affect estimates of changes over time if the relative importance of the relevant type of noncash income changes over time.

economic well-being of the aged, but only as examples. The conclusion is that there is substantial uncertainty about the true relative status of the aged. The usual measures that include both cash and noncash income but take only cash needs into account tend to overestimate the economic status of the aged, but the amount of overstatement, although it is likely to be substantial, is not known.

The detailed analysis in this paper is limited to the frequent case in which the definition of income has already been selected and an equivalence scale (or more than one) has to be chosen for use in the analysis. It usually is not feasible for researchers to estimate their own equivalence scales. The case in which the equivalence scale is estimated in a consistent manner as part of the analysis (e.g., Danziger et al. 1984) is not discussed here.

Some types of noncash income, such as food stamps, are not important sources of potential bias because they generally do not have unmeasured needs associated with them. Food stamps generally are considered to be used in place of cash income to meet food needs reflected in existing equivalence scales. This paper focuses on noncash income types that have unmeasured needs associated with them.

An example can help clarify the nature of the consistency problem discussed here. The treatment of Medicare in assessments of economic well-being is the most important example of the consistency problem for the aged in the United States.⁶ Except in connection with poverty measurement, discussions of Medicare generally have focused solely on the income side (with the emphasis on valuation issues). Compared with the nonaged, the aged have a greater need

⁶The importance of several types of noncash income relative to cash income is shown in the appendix.

for medical care, but this difference is rarely, if ever, taken into account adequately when medical noncash income is included in the definition of income. The appropriate specification of needs associated with Medicare has received little attention.

If the value of Medicare is included in income and medical needs are underestimated, then groups, such as the aged, that have greater medical needs (i.e., are "sicker") and receive Medicare could be estimated to be better off (i.e., "richer") than other groups. If the value of Medicare is included in income, then the needs side (i.e., the equivalence scale) should include the medical needs paid for by Medicare. If Medicare is included in income, but only those needs not paid for by Medicare are included on the needs side, then the measured economic status of the aged will tend to be biased upward. This result would be obtained because unmeasured needs are omitted.

In recent years comprehensive definitions of income that include noncash income frequently have been used in the assessment of the economic status of the aged. Influential papers on this topic (e.g., Hurd 1990, Smeeding 1989) have used several equivalence scales that do not explicitly take needs associated with noncash income into account in conjunction with comprehensive definitions of income (including Medicare) and have concluded that the elderly were much better off when noncash income was included in the definition of income.⁷ Estimates of this type have been cited in the policy debate regarding possible modifications to the U.S. Social Security system (Steuerle and Bakija 1994).⁸

⁷Hurd primarily used Smeeding's estimates in the relevant part of his analysis. For a discussion of these and several other estimates, see Radner (1993).

⁸Some estimates show that the aged are relatively well off using cash income adjusted using an equivalence scale as the measure. The use of equivalence scales that show relatively small

Estimates of this type, however, contain the potential for bias because of a possible lack of consistency between the comprehensive definitions of income and the equivalence scales used. The ratio of the needs of the aged to the needs of the nonaged is not likely to be the same for needs associated with cash income and needs associated with cash plus Medicare and other noncash income types. This inconsistency could produce a substantial upward bias in the measured relative economic well-being of the aged. Of course, broad definitions of income usually include several types of noncash income other than Medicare; this comprehensiveness makes the analysis of any bias much more complex because biases produced by specific income types could be offsetting.

In section II of this paper, noncash income and equivalence scales and the relationship between the definition of income and those scales are discussed. In section III, the alternative crude adjustments for needs used in this paper are described and relative medians and aged-nonaged ratios of medians estimated using those adjustments are presented as illustrations for age groups. A summary and conclusions appear in section IV. The appendix discusses the relative importance of several types of noncash income.

II. NONCASH INCOME AND EQUIVALENCE SCALES

In this section, noncash income, equivalence scales, and the relationship between the U.S. poverty thresholds and noncash income are discussed.

needs for the aged (e.g., van der Gaag and Smolensky 1982) frequently produces this result. Some analysts have concluded that the relevant aged-nonaged differentials in the van der Gaag-Smolensky scale are implausibly large and that further examination of the appropriate interpretation of those differentials is needed (Radner 1992).

A. NONCASH INCOME

The treatment of noncash income in the measurement of economic well-being in the United States has been a controversial topic for some time. The discussion generally has consisted of three related parts: (1) the choice of which types of noncash income to include in resources; (2) the appropriate valuation of the types included; and (3) for the measurement of poverty, the appropriate adjustments (if any) to the official poverty thresholds to reflect the inclusion of noncash income. No consensus on any of these three issues has been reached.⁹

The first issue is not discussed here, and the second is discussed briefly below. This paper focuses on the desirability of consistency between the income and needs sides in general assessments of economic well-being, a topic that is related to the third issue.

There has been much discussion of the appropriate valuation of noncash income (e.g., Wolfe and Moffitt 1991, Haber 1990, Bureau of the Census 1982). The principal choice has been between the market value and the cash equivalent value.^{10 11} The market value is used most often. The cash equivalent value is usually considered to be the most appropriate in terms of economic theory, but is difficult to estimate. For some types of noncash income (e.g., food stamps), the market and cash equivalent values have been estimated to be very similar (e.g.,

⁹The appropriate choices for these three issues can depend on the purpose of the specific analysis. For the assessment of the economic status of the aged, there is little agreement on any of the three issues.

¹⁰The cash equivalent value is the amount of cash that would make the recipient of noncash income just as well off as receiving the noncash income.

¹¹The Bureau of the Census uses what is called the "fungible value" of Medicare and Medicaid in its published estimates of noncash income. According to the Bureau of the Census (1993b, page B-2), "Medicare and Medicaid benefits are counted as income to the extent that they free up resources that could have been spent on medical care." For a description of this method, see Bureau of the Census (1993b).

Bureau of the Census 1982). For some income types, such as Medicare, the market value usually is calculated on an insurance basis, rather than according to the amount of benefits actually received.

The appropriate valuation can differ according to the purpose for which the estimates are made. For example, cash equivalent values have been criticized by some as inappropriate for comparison with poverty thresholds. Market values calculated on an insurance basis are used in this paper. What is most important here is not the valuation chosen, but the equivalence scale chosen given that valuation.

B. EQUIVALENCE SCALES

In addition to a lack of consensus regarding the best definition and valuation of resources, there also is a great deal of disagreement about the proper specification of equivalence scales (Nelson 1993). An equivalence scale is a scale that shows amounts of income (or consumption), relative to the amount for a base unit, that units with different characteristics (e.g., size and/or composition) require to be at the same standard of living. If the amount for the base unit is standardized at 1.0, then a different unit might require twice as much (scale value of 2.0) to be at the same standard of living.

Equivalence scale values often depend on several classification variables.¹² Scale values almost always differ by the number of persons in the unit; economies of scale are usually assumed to be appropriate for multi-person units. Age differences are the next most frequently

¹²Equivalence scale values represent approximations of average relative needs for the classification groups chosen. In some cases (e.g., medical care), units can be thought of as facing a distribution of needs, rather than average needs (Radner 1992). This aspect of the measurement of needs is not discussed in this paper.

used classification. Differences between adults and children are included quite often, and differences among children of different ages are also used. Differences between adults of different ages (e.g., aged and nonaged) are sometimes present; those differences in needs often are related to the lack of work-related expenses for many of the aged. Other important classifications that have been used (or discussed) include those based on sex, level of income, labor force status (working, not working), home ownership status (owner, renter), region of residence, and type of area of residence (e.g., farm, nonfarm; urban, rural).¹³ In one instance, because different equivalence scales were used for cash and noncash income, implied scale values for total income also differed according to the split of total income between those two types (Smeeding et al. 1993). This example is discussed in section III.

Conceptual problems discussed in the literature include: whether equivalence scales vary by level of economic well-being; whether size of unit should be viewed, at least in part, as a matter of choice; whether total well-being or only economic well-being is considered; and whose standard of living is being equalized in the units compared (e.g., is it only the standard of living of adults, or is the welfare of children also considered). These problems are not discussed in this paper. In general, it seems to be assumed that equivalence scales are applied to cash income, although ordinarily that is not discussed or specified. The importance of the relationship between the definition of income and the specification of the equivalence scale is the focus of this paper.

¹³Equivalence scale values ordinarily do not differ by health status. An equivalence scale that included such differences would be related to the crude equivalence scales adjusted for needs associated with Medicare that are used in the estimates presented in this paper.

The official poverty thresholds used in the United States can be viewed as consisting of an equivalence scale and a specified dollar amount of needs for the base unit (i.e., for the base scale value). In the current version of the thresholds, the equivalence scale values differ by size of family unit,¹⁴ number of related children under 18 years of age in the family unit, and, for family units of 1 or 2 persons, by the age of the reference person (under age 65 or age 65 and older)(Bureau of the Census 1993a).¹⁵ Those aged units are assumed to require 8-10 percent less than corresponding nonaged units. As an example of the level, in 1992 a 1-person unit 65 years of age or older had a threshold of \$6,729.

As noted earlier, most equivalence scales appear to have been intended for use with cash income (either before or after tax).¹⁶ The poverty threshold equivalence scale is one such scale. It seems reasonable, however, that equivalence scale values could depend on the definition of income used. With the increased popularity of the inclusion of noncash income in comprehensive definitions of income, the issue of the appropriate specification of the equivalence scale has become increasingly important.

We can illustrate the consistency problem and its relationship to equivalence scales by considering a hypothetical example. Let us consider two simple hypothetical cases; in both cases

¹⁴A family unit is either a family (two or more related persons living together) or an unrelated individual (a person who lives with no relatives).

¹⁵The original version of the thresholds also differed by farm-nonfarm residence and sex of the family head or unrelated individual. Also, fewer family size categories were used; the largest category was 7 persons or more, rather than the current 9 persons or more (Fisher 1992).

¹⁶An important point related to the consistency problem is that relative needs for cash income can differ as a result of differences in the extent to which noncash income meets needs. Phipps and Garner (1994) discussed this point in connection with government medical insurance coverage and possible differences between equivalence scales in the U.S. and Canada.

there are two 1-person units, one aged and one nonaged. Assume that the nonaged unit is the base unit for the equivalence scale. Consider case I, in which the government pays a substantial part of the medical expenses of an aged person (e.g., \$3,000) directly. Let us assume that, with those expenses paid for by the government, the aged and nonaged persons require the same amount of cash income to put them at the same standard of living (e.g., \$10,000 cash income). That is, both the nonaged and aged persons have equivalence scale values of 1.0 for cash income.

In case II, the government does not pay for those medical expenses of the aged person. In this case the aged person has a greater need for cash income (\$13,000) than the nonaged person does (\$10,000)(or than the aged person did in case I) because the aged person has those medical needs to pay for in addition to her other needs. In case II, the aged person has a scale value for cash income of 1.3, while the nonaged person has a scale value of 1.0.

We now return to case I and change the definition of income to include the noncash medical expenses (\$3,000) the government pays for the aged person. The aged person then has a greater need for cash plus noncash income (\$13,000) than the nonaged person does even though both the aged and nonaged persons have equal need for cash income (\$10,000); this difference is due to the medical needs added in.¹⁷ Using cash plus noncash income, the aged person has a scale value of 1.3, while the nonaged person again has a value of 1.0. If the case I cash income equivalence scale values (1.0 for both persons) were used in this case, then the relative needs of the aged person for cash plus noncash income would be underestimated. Thus,

¹⁷Although this example is discussed in terms of individuals, the same argument applies to groups and the market value of noncash income calculated on an insurance basis, the case discussed in most of this paper.

comparing cash plus noncash income with an underestimated measure of needs would overestimate the economic well-being of the aged person relative to the nonaged person.

The problem can also be discussed in a similar manner in terms of consumption rather than income. The case of consumption is important because equivalence scales estimated using consumer expenditure data generally use out-of-pocket expenditures and therefore may omit some needs associated with noncash income. Assume that the aged and nonaged require the same amount of consumption excluding the aged's consumption of medical services paid for by the government. Thus, the aged require more consumption than the nonaged to reach the same standard of living and the difference is the amount of the aged's consumption of medical services paid for by the government. If only the consumption associated with cash income (i.e., paid for "directly" by the person) is considered, then the aged and nonaged have equal needs. However, if total consumption (i.e., including the medical consumption of the aged paid for directly by the government) is considered, then the aged need more than the nonaged do. If the government pays directly for the medical expenses of the aged and that payment is considered noncash income, then the medical consumption associated with that noncash amount should be included in the consumption needs of the aged. If that is done, then in this example the aged require more consumption than the nonaged do to reach the same standard of living.

It is assumed in most of this paper that, at least at the poverty level, medical needs paid for by Medicare are not included in the needs reflected in the equivalence scales that are generally used.¹⁸ This is likely to be a reasonable assumption for several reasons. As discussed

¹⁸Medicare does not pay for all medical expenses of the aged. Even with the existence of Medicare, the aged pay more than the nonaged in out-of-pocket medical expenses. In one estimate, average out-of-pocket health costs are projected to be \$2,800 for all aged and \$1,900

above, an equivalence scale formulated for cash income probably would not be appropriate for cash income plus Medicare. Also, where equivalence scales are estimated from expenditure data, those data ordinarily exclude expenses paid for by Medicare since those items are not paid for directly by the consumer. Finally, at low levels of cash income, the value of Medicare (the market value calculated on an insurance basis) is sufficiently high that it is unlikely that the associated needs are included in the usual equivalence scales because the inclusion of those needs would imply that cash needs are unreasonably small.^{19 20}

A discussion of relative needs at poverty levels of cash income can illustrate this last point. One implication of an equivalence scale applied at low income levels is that some types of units are assumed to require very little cash income. This problem is magnified when noncash income is included in the income definition. This problem applies to other scales as well as to the poverty threshold scale; some other scales produce comparisons that are more extreme than the poverty threshold scale. A discussion of several examples follows.

In the official 1992 poverty thresholds, a nonaged 1-person unit requires \$7,299 to be at the threshold, while an aged 1-person unit, either male or female, requires \$6,729. If the latter amount includes about \$3,000 in Medicare noncash income, then an aged person with

for the poor aged in 1994. For all nonaged, the corresponding figure is \$700 (American Association of Retired Persons 1994).

¹⁹Specification of needs at low levels of income is very important for the aged; in 1992, almost half of aged family units had cash income that was less than twice their poverty threshold (Bureau of the Census 1993a).

²⁰Haber (1990) made a similar point in connection with poverty measurement.

about \$3,700 cash income is measured to be about as well off as a nonaged person with about \$7,300 cash income.^{21 22}

Using the frequently applied van der Gaag-Smolensky scale,²³ relative to a 1-person unit consisting of a male aged 35-54 receiving \$7,299 annual income (the official poverty threshold), an aged female in a 1-person unit requires only \$2,654 to be as well off as that nonaged male.²⁴ This is a very low amount, even when noncash income is excluded. If Medicare is included in income, then an aged female with zero cash income but receiving \$3,000 of Medicare is measured to be better off than the nonaged male.

Using the scale from Danziger et al. (1984), which is roughly similar to the van der Gaag-Smolensky scale, an aged female requires \$4,287.²⁵ If \$3,000 of Medicare is included in income, she would require only about \$1,300 cash income to be as well off as the nonaged male receiving about \$7,300.

²¹Of course, this simple example only considers one type of noncash income. The nonaged person could be receiving noncash income also. The base unit type used later in this paper, however, is a unit without noncash income.

²²The Medicare values used in this paper varied by state; the median state had a value of \$3,253 for the aged (Bureau of the Census 1993b). As an approximation, \$3,000 is used in this and other examples.

²³This scale was estimated using a set of consumer demand equations and data on expenditures from the 1972-73 Consumer Expenditure Survey (van der Gaag and Smolensky 1982).

²⁴That scale shows a male aged 35-54 with a scale value of 66 and an aged female with a scale value of 24. (The base unit was a 4-person family consisting of a husband age 35-54, his wife, and children ages 12-17 and 6-11; that family had a scale value of 100.) As noted earlier, the aged-nonaged differentials in this scale are considered by some to be unreasonably large. When \$7,299 is multiplied by 24/66, the amount \$2,654 is obtained.

²⁵In that scale, the relevant ratio of needs is 37/63.

Similar comparisons can be made for couples. Couples consisting of two aged persons generally would receive about \$6,000 in Medicare noncash income. The poverty threshold in 1992 for an aged couple was only \$8,487, while the threshold for a nonaged couple was \$9,443. Thus, an aged couple in which both received Medicare would require only about \$2,500 cash income to be as well off as a nonaged couple receiving about \$9,400. These examples suggest that the inclusion of at least some noncash income types can produce inappropriate results if adjustments are not made on the needs side.

C. U.S. POVERTY THRESHOLDS AND NONCASH INCOME

As mentioned earlier, almost all of the relevant research on noncash income and needs has been in connection with the measurement of poverty. Thus, it is useful to discuss more fully the U.S. poverty thresholds and their relationship to noncash income. The original formulation of the U.S. poverty thresholds was in terms of cash income, and that specification has not been changed. That original formulation was specified in terms of income after tax, but in practice the official U.S. poverty statistics have been calculated by comparing cash income before tax with the official thresholds.

The official thresholds formerly differed by farm-nonfarm residence, but that distinction was eliminated in 1981 (Fisher 1992). The original farm-nonfarm distinction specified that farm units required only 70 percent of the cash income of comparable nonfarm units. It is relevant to the issues discussed in this paper that that difference was primarily based on the assumption that farm units needed less cash income because of the food and housing in-kind income they received.

The ongoing debate in the U.S. about the appropriate poverty thresholds for use with an income definition that includes several types of noncash income is relevant and instructive. Both the level of the thresholds and the equivalence scale (i.e., relative needs) embodied in those thresholds have been questioned, at least implicitly. When the official thresholds are used and noncash income is included, poverty rates are lower than when only cash income is used. Early reports by the Bureau of the Census (e.g., Bureau of the Census 1982) used several valuation methods, including the market value (calculated on an insurance basis) of Medicare and Medicaid, other noncash types, and the official thresholds. The combination that included the market value of Medicare and Medicaid produced very low poverty rates for the aged, rates that were generally not considered plausible. In response to this and other problems, the Bureau of the Census began using a revised procedure for taking noncash income into account (Bureau of the Census 1988). They left the thresholds unchanged, but, among other changes, included what was called the "fungible value" of Medicare and Medicaid.²⁶ That change limited the included value of Medicare and Medicaid for low-income family units. That method of valuation, however, is not considered fully satisfactory either (e.g., Weinberg and Lamas 1993b). For example, family units receiving Medicare and/or Medicaid but for whom the

²⁶According to the Bureau of the Census (1993b, page B-2), "Medicare and Medicaid benefits are counted as income to the extent that they free up resources that could have been spent on medical care." In those estimates, Medicare and Medicaid benefits were not counted in income if the unit was unable to meet (or was just able to meet) basic food and housing requirements. For higher income units, Medicare and Medicaid were valued at the mean government outlay for units in a given risk class. Partial value was used for units that were not in either of those two groups. For a description of the estimation method used to obtain fungible values, see Bureau of the Census (1993b).

fungible value is zero are measured to be no better off, *ceteris paribus*, than units that do not receive those types of noncash income.

The relationship between noncash income and poverty measurement was the focus of a 1985 conference organized by the Bureau of the Census (1986). Many different views were presented at that conference. Ward (1986) and Ellwood and Summers (1986) presented views about medical noncash income and medical needs that are of particular relevance to this paper. Ward concluded that health care effectively was not included in the needs reflected in the official poverty thresholds and that it was necessary to use a consistent treatment of medical noncash income and needs.²⁷ Ellwood and Summers concluded that, if medical noncash income were included in the definition of income, it would be essential to change the poverty thresholds to adjust for differences in medical needs since the aged and disabled had higher needs. This adjustment would be needed even if the cash equivalent value was used for the medical noncash income.

Alternative formulations of poverty measures including noncash income have been presented recently by Weinberg and Lamas (1993a). Adjustments to both the resource and needs sides of the comparison were shown. In one formulation, an estimate of out-of-pocket expenditures for medical care was subtracted from the income side and the poverty thresholds

²⁷Ward also discussed another relevant problem--the inconsistency between the measure of needs, which is essentially a long-term average measure, and the short-term measure of income, annual cash income, that is used in the official poverty measure. This problem is not discussed here.

were reduced by average out-of-pocket expenses on medical services to provide consistency between the two sides of the comparison.²⁸

The examples discussed above illustrate problems related to the lack of consistency between the resource and needs sides of the comparison, primarily at low income levels. Illustrations of the possible importance of these problems in general assessments of the economic well-being of age groups using actual income data are presented next.

III. ILLUSTRATIVE ESTIMATES OF THE RELATIVE ECONOMIC STATUS OF THE AGED

The discussions of noncash income, equivalence scales, and the relationship between the U.S. poverty thresholds and noncash income presented above can have important implications for the form of appropriate equivalence scales. The effects on the measured economic well-being of the aged of several different assumptions about the needs associated with the noncash income included in the income definition (Medicare noncash income in this case) are examined in this section.

Several crude alternative adjustments for needs are described . Two of those adjustments take into account unmeasured needs associated with Medicare. Then the adjustments are applied to data on cash income and Medicare noncash income from the CPS to obtain illustrative estimates of the relative economic status of the aged. Relative median incomes and ratios of aged to nonaged median incomes are shown.

²⁸A panel established by the Committee on National Statistics of the National Academy of Sciences has been studying the measurement of poverty, including the role of noncash income. The panel's report was not available when this paper was written.

The estimates presented in this section are merely illustrations and, because of the crude assumptions made, should not be considered precise estimates. The estimates are presented to show that different assumptions about needs associated with noncash income can produce substantial differences in estimates of the economic well-being of the aged.

A. ADJUSTMENTS COMPARED

Four treatments of differential needs are applied to income data to assess the sensitivity of the measured economic well-being of the aged to the assumptions used in those treatments. The four treatments are discussed in this subsection. Estimates of adjusted income produced by adjusting (dividing) income amounts by the equivalence scale values for those treatments are shown later in this section.

The first treatment consists of no adjustment to income amounts; this treatment will be referred to as UNADJ. The other three treatments are adjustments applied to income amounts and are expressed as equivalence scale values.

The first of these three adjustments considers only needs for cash income. The other two adjustments take needs associated with noncash income into account and are intended for use with noncash income types that have associated needs which are assumed to be missing from poverty threshold needs. Medicare noncash income is used with these adjustments to produce the estimates shown.

The first adjustment (POV) was derived from the official poverty thresholds.²⁹ The equivalence scale value for POV for a given family unit was the ratio of the cash needs of that

²⁹A different frequently used equivalence scale not based on the poverty thresholds could have been used. The general pattern of the results would be expected to be similar to the pattern found here.

unit at the poverty level to the cash needs of a base unit at the poverty level. The use of this scale with an income definition that includes noncash income implicitly assumes that needs associated with noncash income are already included in the official poverty thresholds (or more precisely that equivalence scale values are unchanged for all relevant groups when noncash income is added). We have argued earlier in this paper that, at least in some cases, this is not a good assumption. The official scale has been used as an equivalence scale by many researchers directly, or indirectly as the denominator of a welfare ratio.³⁰

The form of this adjustment is:

$$POV_i = \frac{p_i}{p_b}$$

where POV_i is the equivalence scale value for unit i , p_i is the poverty threshold applicable to unit i , and p_b is the poverty threshold for the base unit. This scale is applied at all income levels.

This equivalence scale was calculated using the 1992 weighted average poverty thresholds (Bureau of the Census 1993a). The scale based on the official thresholds was modified to

³⁰A unit's welfare ratio is the ratio of the unit's cash income to the poverty threshold applicable to that unit.

eliminate the age differential for 1- and 2-person units; the all ages values were used for units of those sizes. The base unit was a 1-person unit.^{31 32}

The next adjustment (PNY) is based on POV, but PNY takes into account amounts of noncash income. The equivalence scale value for PNY for a given family unit is the ratio of the cash needs plus the noncash needs associated with Medicare of that unit at the poverty level to the cash needs of the base unit at the poverty level. (The base unit is assumed to have no noncash income and therefore no needs associated with Medicare.)

Two strong assumptions used in this adjustment should be noted. First, for units with the included noncash income type, at the poverty level of living the amount of needs associated with that noncash income added to cash needs is assumed to be equal to the amount of the noncash income. It is assumed that the needs associated with the noncash income included in the definition of income are excluded entirely from the needs represented in the poverty thresholds.

Second, for those units without the noncash income type, no needs are added to total cash needs. That is, the absence of noncash income is assumed to imply the absence of the associated

³¹The scale used was: 1 person, 1.000; 2 persons, 1.279; 3 persons, 1.566; 4 persons, 2.007; 5 persons, 2.373; 6 persons, 2.679; 7 persons, 3.023; 8 persons, 3.367; 9 persons or more, 4.024. This modified version was used in order to simplify the calculations. As noted earlier, in the official thresholds, aged 1- and 2-person units need 8-10 percent less than nonaged units of the corresponding size. This aged-nonaged differential, however, has been controversial and some analysts have advocated its removal (e.g., Ruggles 1990). Since the estimates shown are intended merely to show sensitivity to different assumptions, this modification, which will affect the levels of the estimates, is not important here.

³²The poverty threshold for the base unit was \$7,143. The thresholds used for other unit sizes can be found in Bureau of the Census (1993a) or can be calculated using the equivalence scale values.

needs. Since only Medicare is added to cash income, this second assumption probably is not very important for the aged because only 3 percent of family units in that group do not receive Medicare (appendix table A-2) and therefore do not have their extra medical needs added. For the nonaged (i.e., the disabled nonaged), however, this assumption is more likely to be important. The disabled nonaged who are not covered by Medicare do not have their extra medical needs added. These two strong assumptions (and the crudeness of the adjustment formulations used) limit the appropriate use of these estimates to the type of sensitivity analysis shown here.

The form of PNY is:

$$PNY_i = \frac{p_i + m_i}{p_b}$$

where m_i is the amount of the specific noncash income type (Medicare) included in the definition of income used. The numerator represents total needs of unit i at the poverty level, and the denominator represents total needs of the base unit at the poverty level. This measure can be viewed as an analog of POV for the case in which needs associated with noncash income are added to needs associated with cash income.

In this formulation, p_i represents needs associated with cash income at the poverty level (i.e., the amount of cash income that brings the unit up to the poverty level). The other part of the numerator, m_i , is the amount of needs associated with noncash income at the poverty level. As noted above, in PNY for unit i , those needs are assumed to be equal to the amount of noncash income of that type received by unit i , m_i . Like POV, this scale is applied at all income levels. When PNY is applied, for the case in which the definition of income is limited to cash, m_i in PNY is zero.

The equivalence scale value for the final adjustment (PHNY) for a given family unit is the ratio of cash needs plus half the noncash needs associated with Medicare of that unit at the poverty level to the cash needs of the base unit at the poverty level. (As in the case of PNY, the base unit is assumed to have no noncash income and therefore no needs associated with Medicare.)

Two strong assumptions are also used in PHNY. The first is a modified version of the assumption used for PNY. In PHNY, it is assumed that for units with the included noncash income type, at the poverty level of living the amount of needs associated with that noncash income added to cash income is half the amount of the noncash income. This assumption is merely meant for use in this paper's sensitivity analysis. The interpretation of this assumption used here is that half of the needs associated with the noncash income already is included in needs associated with cash income. Thus, only half is unmeasured by needs associated with cash income, and that unmeasured half should be added.³³

The second strong assumption is that, for those units without the noncash income type, no needs are added to total cash needs. This assumption is identical to the one used for PNY.

³³An alternative interpretation that produces the same results is that the needs associated with Medicare are equal to half the amount of Medicare income and that all of those needs are unmeasured and should be added.

The form of this adjustment is:

$$PHNY_i = \frac{p_i + \frac{m_i}{2}}{p_b}$$

As in the other adjustments, the numerator represents total needs of unit i at the poverty level, and the denominator represents total needs of the base unit at the poverty level. Like POV and PNY, this scale is applied at all income levels. When PHNY is applied, for the case in which only cash income is used, m_i in PHNY is zero.

In the context of the sensitivity analysis in this paper, PHNY is a useful example because it is intermediate between POV and PNY. In POV, no needs associated with noncash income are added to cash needs. In PNY, the amount of noncash income is added to needs at the poverty level, and in PHNY half the amount of noncash income is added to needs at the poverty level. It should be noted that, for a given unit without noncash income, POV, PNY, and PHNY all have the same equivalence scale value.

Table 1 shows selected equivalence scale values for the four treatments discussed here. The values for UNADJ and POV do not depend on the unit's amount of noncash income, while the values for PNY and PHNY do. In Case A, the unit is assumed to have no noncash income, while in Case B the unit is assumed to have \$3,000 noncash income. For PNY and PHNY, the scale values are higher for Case B than for Case A because of the inclusion of needs associated with the noncash income. Income amounts are divided by the equivalence scale values to obtain the amounts of adjusted income used later in this section.

A simple example can illustrate the way in which income is adjusted using the different adjustments. This is only an illustration; the magnitudes of the differences can vary with the

amounts of cash and noncash income and with unit size. Assume there are two 2-person units: A, which has \$15,000 cash income and no noncash income; and B, which has \$15,000 cash income but also has \$3,000 noncash income. Cash plus noncash income will be used as the definition of income.

Unit A has \$15,000 adjusted income using UNADJ and \$11,719 ($\$15,000/1.28$) using POV, PNY, and PHNY. Unit B has \$18,000 adjusted total income using UNADJ, and \$14,062 ($\$18,000/1.28$) using POV. When PNY is used, unit B has \$10,588 ($\$18,000/1.70$), and when PHNY is used, unit B has \$12,080 ($\$18,000/1.49$).

In this particular example, when UNADJ is used, B has 20 percent more income than A. The application of POV leaves B with 20 percent more adjusted income than A since the same adjustment factor is applied to both units. When PNY is used, however, B has 10 percent less adjusted income than A because in PNY the equivalence scale value for B is about 33 percent higher than for A, but total income is only 20 percent higher. When PHNY is used, B's adjusted income is 3 percent higher than A's because in PHNY the equivalence scale value for B is about 16 percent higher than for A, but total income is again 20 percent higher. As noted above, these differences are sensitive to the example chosen. The results obtained when these adjustments are applied to the actual distribution of income are shown later in this section.

It is useful to compare the interesting adjustment formulation used by Smeeding et al. (1993) in their poverty estimates with the type of method shown here that takes needs associated with noncash income into account. Smeeding et al. treated needs associated with noncash income differently from those associated with cash income. They used one equivalence scale for cash income and a different scale for noncash income. The cash income scale was 1.0 for

the first adult, 0.4 for each additional adult, and 0.3 for each child. The noncash income scale was the per capita scale, on the grounds that the noncash income types they included (imputed rent, health care, and education), taken together, showed no important economies of scale. Thus, a four-person unit was assumed to need four times as much noncash income as a one-person unit. Only unit size and adult-child differences were used in their formulation.

If their type of treatment were applied to the problem discussed here, there could be important differences between the effects of their method and the type of method shown here. Using Medicare as an example, assume that aged and nonaged 1-person units are being compared, that the aged person receives Medicare noncash income while the nonaged person does not, and that the definition of income used includes the noncash income. In their formulation, both persons are implicitly assumed to have the same needs and, if cash income is equal for the two persons, the aged person will be measured to be better off by the value of the Medicare.³⁴ In this case this is the same consistency problem as when only purely cash needs are considered.³⁵ Smeeding et al., however, included several types of noncash income in their

³⁴For example, assume that the nonaged person receives \$10,000 cash income and no Medicare income, and that the aged person receives \$10,000 cash income and \$3,000 in Medicare income. Applying the equivalence scales used by Smeeding et al., adjusted income for the nonaged person is \$10,000 (i.e., $\$10,000/1$). Adjusted income for the aged person is \$10,000 cash income (i.e., $\$10,000/1$) plus \$3,000 Medicare income (i.e., $\$3,000/1$), or \$13,000.

³⁵If there are two or more persons in the unit, there is still a potential consistency problem because only unit size and adult-child differences are taken into account, but the case is not the same as when only cash needs are considered because of the per capita adjustment of the noncash amount. The 1-person unit case is very important because a substantial proportion of aged persons (about one-third in the data used here) live in 1-person units.

particular analysis and it is not clear whether their overall results using adjusted income contain a bias in the estimated relative status of the aged.

B. DATA

The data used in this paper are from the March 1993 Current Population Survey (CPS). The CPS is conducted monthly by the Bureau of the Census; about 57,000 households were interviewed in March 1993. The March survey each year contains information on cash income and several types of noncash income for the previous calendar year. All income data used in this paper, both cash and noncash, were produced by the Bureau of the Census.

The amounts of cash income were obtained by asking respondents for those amounts. For Medicare noncash income, the only type of noncash income used in the estimates, information on receipt of the type was collected in the survey, but income values had to be imputed. The value of Medicare used here was the market value (calculated on an insurance basis), which was imputed by taking mean government outlays per enrollee by State and risk class.³⁶

The estimates of Medicare noncash income produced by the Bureau of the Census are useful to illustrate the main points of this paper. It is not important here whether those estimates are precise. The important issue is, given the estimates of noncash income used, what are the implications for equivalence scales to be applied to those estimates? Although the estimating method used to obtain the noncash estimates can affect the equivalence scales that are appropriate, that is not the focus of this paper. The specific method used to estimate noncash income, although a very important topic, is of lesser importance here.

³⁶See the appendix for more information about the Medicare estimates.

Medicare noncash income was very important for the aged and unimportant for the nonaged. In 1992, the market value of Medicare amounted to 18 percent of cash income for the aged; 97 percent of aged units received that type. For aged units receiving Medicare, the mean amount was \$4,500.³⁷ For the bottom cash income quintile of the aged, Medicare amounted to 62 percent of cash income, and the mean amount was about \$3,700. Within the aged group, Medicare was more important for the older aged than for the younger aged, for both the age groups as a whole and for the bottom quintiles. For the nonaged, Medicare amounted to only 1 percent of cash income. (See the appendix for estimates of the importance of several types of noncash income relative to cash income.) These estimates of the relative importance of Medicare noncash income show that the values are large enough to have an important impact on the measured economic well-being of the aged.

C. RELATIVE MEDIANS

The estimates shown here are not intended to be precise estimates; rather they are best interpreted as illustrations of possible magnitudes involved using selected alternative adjustments. Estimates for two definitions of income--cash income before taxes (Cash), and cash income before taxes plus the market value of Medicare (Cash + Medicare)--are shown here. The focus is on the aged.

When cash income before taxes was used as the definition of income and no adjustment for needs (UNADJ) was applied, the age-income relationship was a familiar one. Median family unit income was relatively high in the middle age groups and relatively low at young and old

³⁷Mean cash income before tax (unadjusted for needs) was \$35,200 for all family units, \$24,200 for aged family units, and \$38,000 for nonaged family units.

ages (table 2).³⁸ It was lower for the older old than for the younger old. In terms of relative medians (the median for the specific group divided by the median for all units), the 65 and over age group showed a value of 0.62, while the value for the 65-74 age group was 0.73 and the value for the 75 and over age group was 0.49. The highest relative median (1.55) was in the 45-54 age group. Relative medians for the elderly age groups shown were below the relative medians for all other age groups except the under 25 age group.

The application of POV produced shifts in the relative medians that were related to differences in unit sizes. The relative median for the 65 and over age group rose to 0.72 (a 16 percent increase), the value for the 65-74 age group rose to 0.82 (12 percent), and the value for the 75 and over group rose to 0.60 (22 percent). Among nonaged age groups, the under 25 and 55-64 age groups showed increases, while the 35-54 groups showed decreases. The general relationship among age groups still held: relative medians for the elderly were below those for ages 25-64. The other two adjustments--PNY and PHNY--by definition produce results identical to POV when only cash income is considered because in that case only cash needs are included.

When Cash + Medicare is used as the definition of income and the different adjustments are compared, there is a wide range of estimates for the aged (table 3). Moving from UNADJ to POV raised the relative median of the 65 and over group from 0.75 to 0.87 (16 percent). The relative median of the 65-74 age group rose from 0.87 to 0.97 (11 percent) and the relative median of the 75 and over age group rose from 0.62 to 0.76 (23 percent) (figure 1). These changes resulted from the generally smaller unit size for the aged than for the nonaged (and for

³⁸In the estimates in this paper, each family unit was counted once, regardless of the number of persons in the unit. Sample weights were used in the tabulations. Also, negative amounts of total cash income were treated as zeros.

the old old than for the young old). The relative medians for the aged obtained using POV and Cash + Medicare are considered overestimates because the needs associated with Medicare noncash income are not taken into account. This is an example of the usual case in which there is a consistency problem.

Moving from POV to PNY produced large shifts. The relative median of the 65 and over age group fell from 0.87 to 0.63 (28 percent), the relative median of the 65-74 age group fell from 0.97 to 0.71 (27 percent), and the relative median of the 75 and over group fell from 0.76 to 0.55 (28 percent). These substantial declines resulted from the large increases in needs (i.e., the needs associated with noncash income) in moving from POV to PNY.

Finally, the shift from PNY to PHNY produced smaller, but still substantial, changes. The relative median of the 65 and over age group rose from 0.63 to 0.73 (16 percent), the relative median of the 65-74 age group rose from 0.71 to 0.82 (15 percent), and the relative median of the 75 and over age group rose from 0.55 to 0.64 (16 percent). These increases resulted from the decreases in added needs associated with noncash income when the adjustment was shifted from PNY to PHNY.

It is also useful to examine the changes in relative medians for the same adjustment when Medicare was added to the definition of income. Using POV, the addition of Medicare to the definition of income raised the relative median of the 65 and over group from 0.72 to 0.87 (21 percent)(tables 2 and 3). The relative median of the 65-74 group increased from 0.82 to 0.97 (18 percent) and the relative median of the 75 and over age group rose from 0.60 to 0.76

(27 percent).³⁹ These shifts occurred because the aged received more income from Medicare than the nonaged and there was no change in the adjustment for needs. (Those percentage differences were the same when UNADJ was used and Medicare was added to the definition of income.)

When PNY was used and Medicare was added to the definition of income, the relative median of the 65 and over age group fell from 0.72 to 0.63 (12 percent), the relative median of the 65-74 age group fell from 0.82 to 0.71 (13 percent), and the relative median of the 75 and over age group fell from 0.60 to 0.55 (8 percent). These declines occurred because, for these age groups, the percentage increase in needs more than offset the percentage increase in income.⁴⁰ When cash income is above the poverty threshold, that is the expected outcome using PNY. The decline was smaller for the old old than for the young old because the old old generally have lower cash income relative to the poverty threshold.

When PHNY was used and Medicare was added to the definition of income, the relative median of the 65 and over age group rose slightly from 0.72 to 0.73 (1 percent). The relative median of the 65-74 age group was 0.82 in both cases, and the relative median of the 75 and over group rose from 0.60 to 0.64 (7 percent). Because the level of needs was not increased

³⁹For a given unit size, the 75 and over age group generally has a greater need than the 65-74 age group for medical care. No such age distinction was used in the assignment of amounts of the market value of Medicare; therefore, in order to be consistent, the associated medical needs should not reflect that age differential either. The assumption used here did not include that age differential.

⁴⁰A comparison of cash income and total needs (including needs associated with Medicare) can also be made. When income was defined as Cash and PNY including needs associated with Medicare was used as the adjustment, the relative median of the 65 and over age group was only 0.52. Thus, when needs (including needs associated with Medicare) were held constant, adding Medicare to income raised the relative median of the 65 and over age group from 0.52 to 0.63.

as much using PHNY as using PNY, the relative medians using PHNY rose slightly or remained the same, rather than falling as occurred using PNY. These changes, which are relatively small, are the same as changes from POV and Cash to PHNY and Cash + Medicare because when Cash is used, estimates using POV and estimates using PHNY are the same (table 2).

Relative medians for POV and PNY using Cash + Medicare, and for POV using Cash are shown as age-income curves in figure 2. One of these curves, POV using Cash + Medicare, had the highest relative medians for the aged of any of the adjustments shown. This is the common case that is affected by the consistency problem. Another, PNY using Cash + Medicare, had the lowest of any method in which income was adjusted. The third curve, POV using Cash, is included as a baseline estimate; this is the basic estimate using cash income adjusted for unit size that is typically used when noncash income is omitted.

The three curves show somewhat different patterns. The relative medians for POV using Cash + Medicare are below those for PNY and for POV using Cash for all nonaged age groups. As noted, for the aged, relative medians for POV using Cash + Medicare are above those for PNY and for POV using Cash. Because POV using Cash + Medicare includes Medicare noncash income, but makes no addition to needs, the relative medians of the aged are raised and the relative medians of the nonaged are lowered compared with POV using Cash. For each of the seven age groups, the relative median for POV using Cash was between the relative medians for the other two measures. The baseline estimate POV using Cash omits both Medicare noncash income and the associated needs, while PNY includes Medicare noncash income and the associated needs in a way that, compared with POV using Cash, reduces the relative medians of the aged and increases the relative medians of the nonaged.

An important point is illustrated in figure 2. The range of estimates for the aged is quite large--the values for POV using Cash + Medicare are substantially higher than for PNY. Even though those estimates are flawed--the relative medians for the aged using POV and Cash + Medicare are considered to be biased upward and PNY is a very crude adjustment that produces relative medians for the aged that could be too low--these illustrative results suggest that there is substantial uncertainty about the true relative position of the aged.⁴¹

D. AGED-NONAGED RATIOS OF MEDIANS

Differences among the estimates can be summarized by examining the ratio of aged to nonaged median incomes for each combination of adjustment and definition of income (table 4). For Cash, the ratio was 0.55 for UNADJ and 0.66 for the other three measures. The ratio for the other three measures was 20 percent higher than the ratio for UNADJ. For Cash + Medicare, the ratios ranged from 0.55 for PNY to 0.83 for POV; the lowest ratio was only 66 percent of the highest.

When income was not adjusted (UNADJ), the ratio rose from 0.55 for Cash to 0.69 for Cash + Medicare, an increase of 25 percent. For POV, the ratio rose 26 percent, from 0.66 to 0.83, when Medicare was added to the definition of income. For PNY, the ratio fell 17 percent, from 0.66 to 0.55, and for PHNY, the ratio was unchanged at 0.66 when Medicare was added to the definition of income.

Compared With UNADJ, using POV raised the ratio by about 20 percent for both definitions of income. Moving from POV to PNY decreased the ratio for Cash + Medicare by

⁴¹It is important to note that this range does not show general upper and lower bounds, but only the range for the adjustments used here.

34 percent, from 0.83 to 0.55, and moving from PNY to PHNY increased the ratio for Cash + Medicare by 20 percent, from 0.55 to 0.66.⁴²

Two important points are shown by the sensitivity analysis in this section. First, the common type of estimate made using POV and Cash + Medicare, a type that is affected by the consistency problem, produces a substantial overestimate of the relative status of the aged. Second, there is a great deal of uncertainty regarding the true relative status of the aged.

IV. SUMMARY AND CONCLUSIONS

In this exploratory paper we have suggested that a consistency problem between the definitions used on the income and needs sides in comparisons of economic well-being can be important for the assessment of the economic well-being of subgroups of the population. The same equivalence scale usually is applied to different definitions of resources. This use is generally inappropriate conceptually and is likely to be an important problem empirically in at least some important cases. Some combinations of equivalence scales and definitions of income that have been used are inconsistent and in some cases probably produced seriously biased estimates.

Most equivalence scales have been formulated or estimated for use with cash income. The equivalence scales ordinarily used may not be appropriate for a definition of income that includes noncash income because of needs associated with that noncash income that are

⁴²Aged-nonaged ratios of medians were also calculated using after-tax income. The level of these ratios was higher using after-tax income because the aged generally pay a lower percentage of their income in taxes than the nonaged. The pattern of differences among the alternative adjustments, however, was similar using after-tax and before-tax incomes. For the purposes of this paper, the levels of the ratios are not important. Adjustment for underreporting of cash income also would tend to raise aged-nonaged ratios of income. The aged have been found to underreport more than the nonaged (Radner 1983).

unmeasured in those scales. Inconsistencies between the income and needs sides can produce misleading results. The effects of inconsistencies will vary with the types and valuations of the noncash income included and with the equivalence scales chosen.

Some types of noncash income, such as food stamps, are not important sources of potential bias because they generally do not have unmeasured needs associated with them. This paper focused on noncash income types, such as Medicare, that have unmeasured needs associated with them.

The discussion of poverty thresholds and noncash income in recent years has shown that there can be a consistency problem at low levels of income when the official poverty threshold values (which were computed for use with cash income) are used to represent relative needs including those associated with medical noncash income. The implications of that discussion are important for other measures of relative needs (equivalence scales) also. The discussion of poverty thresholds and noncash income in the literature, however, has had little or no effect on the choice of equivalence scales for general assessments of the economic well-being of the aged and of other subgroups of the population. The evidence suggests that, at least at the poverty income level, the equivalence scales ordinarily used do not take account of needs associated with Medicare noncash income.

This paper presented an example of the general consistency problem: the economic well-being of the aged and the role of Medicare. Four treatments of differential needs were applied to income data from the Current Population Survey to produce illustrative estimates of adjusted income for the aged and for other age groups. The first two treatments made no adjustment for needs associated with noncash income. One of these treatments was no adjustment for any

differential needs. The second was adjustment using an equivalence scale based on the U.S. poverty thresholds.

The other two treatments applied equivalence scales in which needs associated with noncash income were added to cash needs. These treatments differed in the extent to which noncash needs were included. In one of these treatments it was assumed that needs associated with Medicare noncash income (assumed to be equal to that amount of noncash income) were not taken into account in the poverty threshold equivalence scale at a poverty level of living. Those needs were added to cash needs in the calculation of the equivalence scale. In the other treatment, it was assumed that half the needs associated with Medicare noncash income were not taken into account in the poverty threshold equivalence scale at a poverty level of living. That half was added to cash needs in the calculation of the scale.

The four treatments were applied to income data using two definitions of income--cash income before tax, and cash income before tax plus the market value of Medicare (calculated on an insurance basis). Relative medians for the aged produced by the four treatments differed widely--for cash income plus Medicare, the relative medians ranged from 0.63 to 0.87. For that definition of income, the ratio of aged to nonaged median incomes ranged from 0.55 to 0.83. In all cases examined, the adjustment based on the poverty thresholds that did not adjust for needs associated with noncash income produced the highest relative medians for the aged and the highest aged-nonaged ratios of medians.

Not adjusting for needs associated with noncash income produced what are considered here to be overestimates of the economic status of the aged. The specific adjustments presented here that took needs associated with noncash income into account are not satisfactory either; they

used crude assumptions about the amount of those needs that should be added. Those adjustments are merely examples used to provide evidence about the empirical importance of the consistency problem. The conclusion is that there is substantial uncertainty about the true relative economic status of the aged. The usual measures that include both cash and noncash income but take only cash needs into account tend to overestimate the economic status of the aged, but the amount of overstatement, although it is likely to be substantial, is not known.

Of course, looking only at Medicare noncash income is merely a partial analysis. It is possible that offsetting biases would produce more reasonable results if other noncash income types were also included. For example, a noncash income type received disproportionately by the young, such as education subsidies, could have substantial unmeasured needs associated with it.⁴³ Those unmeasured needs could offset, at least to some degree, the unmeasured needs associated with Medicare. In that case, the equivalence scale values for the young and old could be in roughly the correct relationship. The measured relative status of groups that receive neither Medicare nor education subsidies, however, would likely be biased. Also, it should be noted that the relative importance of any offsetting biases could change over time, and, therefore, at some point those biases might no longer offset each other.

The magnitudes of differences shown in the illustrative sensitivity analysis should be considered specific to the example used--age group comparisons and Medicare noncash income. The importance of the consistency problem for subgroups other than age groups should be explored. The importance in cases in which more types of noncash income are included should

⁴³Smeeding et al. (1993) included education subsidies, net of property taxes, in their analysis.

also be examined. It is certainly possible that looking only at Medicare noncash income produces larger differences than looking at more comprehensive sets of noncash income types. The effects of the consistency problem, however, are likely to be important in many cases. Those effects should be explored and not merely assumed to be insignificant. Further exploration of the magnitudes of differences among alternative adjustment methods is warranted by the results shown here.

Also, the strong assumptions regarding the relationship between amounts of noncash income and amounts of the associated needs added to cash needs should obviously be improved upon. The role of the valuation of noncash income types should be explored in this context. In addition, the appropriate equivalence scale could differ by income level. That possibility should be explored.

Perhaps a new method for valuation of noncash income proposed by Wolfe and Moffitt (1991) could provide a useful direction for obtaining better and consistent estimates of needs. Their method, which is particularly appropriate for medical noncash income, is related to an insurance value method. In their method the values are specific to the person or unit and take such factors as health status into account. Perhaps a needs measure based on their valuation method could be constructed and used in conjunction with their valuation of noncash income. Wolfe and Moffitt warned against use of their valuation method for comparisons of economic well-being across subgroups primarily because differences in needs affect the valuation. For example, those in poor health were assigned a higher valuation of medical noncash income. The use of a consistent estimate of needs could eliminate this problem.

Although this paper is exploratory, the discussion and results suggest several general conclusions. When noncash income is included in the definition of income, the equivalence scale (or scales) used should be chosen carefully, with the income definition taken into account. Particularly for subgroups of the population that are of importance to the analysis being performed, the researcher should consider whether a specific equivalence scale is appropriate, given the definition of income used. In the case of uncertainty about the appropriateness of different scales, a conservative approach (i.e., a choice that does not produce extreme results) is recommended. When appropriate, readers should be warned that there is a possible problem resulting from inconsistency.

When it is feasible, a solution is to estimate equivalence scales that are consistent with the definition of income used. In other cases, results could be presented using several alternative equivalence scales to reflect uncertainty regarding the proper scale. That is frequently done now, but the alternative scales generally reflect only differences in economies of scale associated with unit size. When results using alternative scales are shown, it is important to include scales that incorporate unmeasured needs associated with the noncash income included.

The true effects of adding Medicare noncash income (and therefore probably all medical noncash income types) are sufficiently uncertain that medical noncash income types should be excluded from income, at least until better measures of relative needs can be developed.⁴⁴ The potential for misleading results is substantial if an inappropriate equivalence scale is used. At

⁴⁴This recommendation is inconsistent with the assumption in this paper that the definition of income has already been chosen and that the issue is the choice of an appropriate equivalence scale for that definition of income. Medical noncash income is a case, however, for which no satisfactory adjustment for needs is currently available. Therefore, in this case, the definition of income should be changed to exclude medical noncash income.

a minimum, estimates should be shown with and without the inclusion of medical noncash income. This is sometimes done at the present time.

This paper clearly is not a complete analysis of all (or most) possible adjustments for needs associated with noncash income. Noncash income is important to economic well-being, but in many cases we do not have a satisfactory method of measuring that importance, especially on the needs side of the comparison. No satisfactory adjustment method is proposed. It does appear, however, that some adjustment to needs for noncash income often is appropriate.

Nelson (1993) has suggested that, given the high degree of uncertainty about appropriate equivalence scales, analysts should use a common sense approach to the choice of a scale. The views set forth in this paper are consistent with her suggestion; one important factor in the choice should be the potential effects of inconsistency between the definitions of income and needs used.

This exploratory paper has only scratched the surface of the problem of consistency between the definitions of resources and needs. The paper raises more questions than it answers. The principal purpose of the paper is to make the point that we need to pay more attention to this consistency problem, a problem that can produce seriously misleading results. Although this paper focused on a specific example, the basic problem is not confined to the treatment of Medicare or to the United States, but is much broader in nature.

Table 1. Examples of equivalence scale values

<u>Adjustment</u>	<u>Unit size</u>			
	<u>1 person</u>	<u>2 persons</u>	<u>3 persons</u>	<u>4 persons</u>
UNADJ	1.00	1.00	1.00	1.00
POV	1.00	1.28	1.57	2.01
<u>Case A</u>				
PNY	1.00	1.28	1.57	2.01
PHNY	1.00	1.28	1.57	2.01
<u>Case B</u>				
PNY	1.42	1.70	1.99	2.43
PHNY	1.21	1.49	1.78	2.22

NOTES: Case A: zero noncash income
Case B: \$3,000 noncash income for each unit
Base unit: 1-person unit, zero noncash income

**Table 2. Relative medians for alternative adjustments,
family unit cash income before tax, 1992**

<u>Age of householder</u>	<u>Adjustment</u>			
	<u>UNADJ</u>	<u>POV</u>	<u>PNY</u>	<u>PHNY</u>
All ages	1.00	1.00	1.00	1.00
65 and over	0.62	0.72	0.72	0.72
Under 25	0.44	0.52	0.52	0.52
25-34	0.98	0.98	0.98	0.98
35-44	1.34	1.15	1.15	1.15
45-54	1.55	1.41	1.41	1.41
55-64	1.18	1.23	1.23	1.23
65-74	0.73	0.82	0.82	0.82
75 and over	0.49	0.60	0.60	0.60

**Table 3. Relative medians using alternative adjustments,
family unit cash income before tax plus market
value of Medicare, 1992**

Age of householder	Adjustment			
	<u>UNADJ</u>	<u>POV</u>	<u>PNY</u>	<u>PHNY</u>
All ages	1.00	1.00	1.00	1.00
65 and over	0.75	0.87	0.63	0.73
Under 25	0.42	0.50	0.56	0.53
25-34	0.94	0.94	1.03	0.99
35-44	1.29	1.11	1.22	1.17
45-54	1.49	1.36	1.49	1.44
55-64	1.15	1.20	1.27	1.24
65-74	0.87	0.97	0.71	0.82
75 and over	0.62	0.76	0.55	0.64

Table 4. Ratio of aged to nonaged median incomes before tax using alternative definitions of income and adjustments, 1992

<u>Adjustment</u>	<u>Definition of income</u>	
	<u>Cash</u>	<u>Cash + Medicare</u>
UNADJ	0.55	0.69
POV	0.66	0.83
PNY	0.66	0.55
PHNY	0.66	0.66

Figure 1. Relative medians for the aged, 1992
Cash income + Medicare noncash income

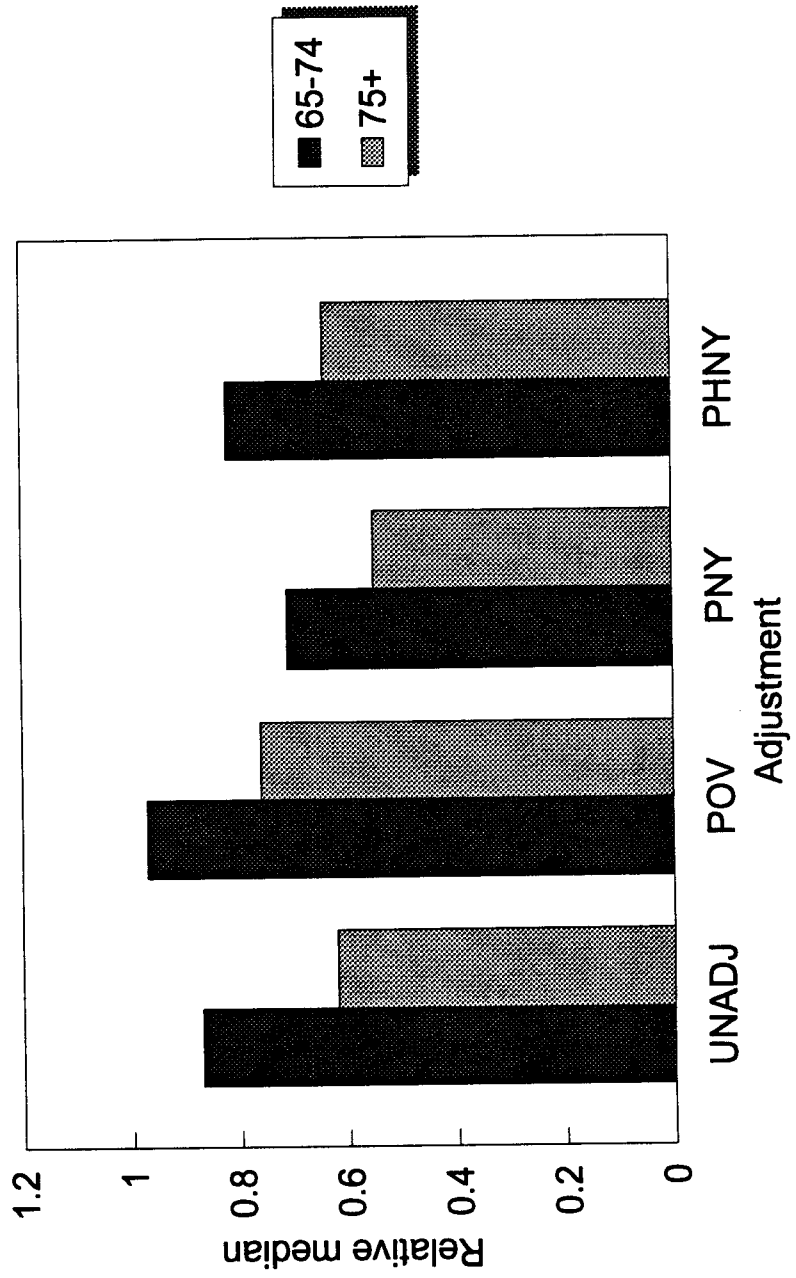
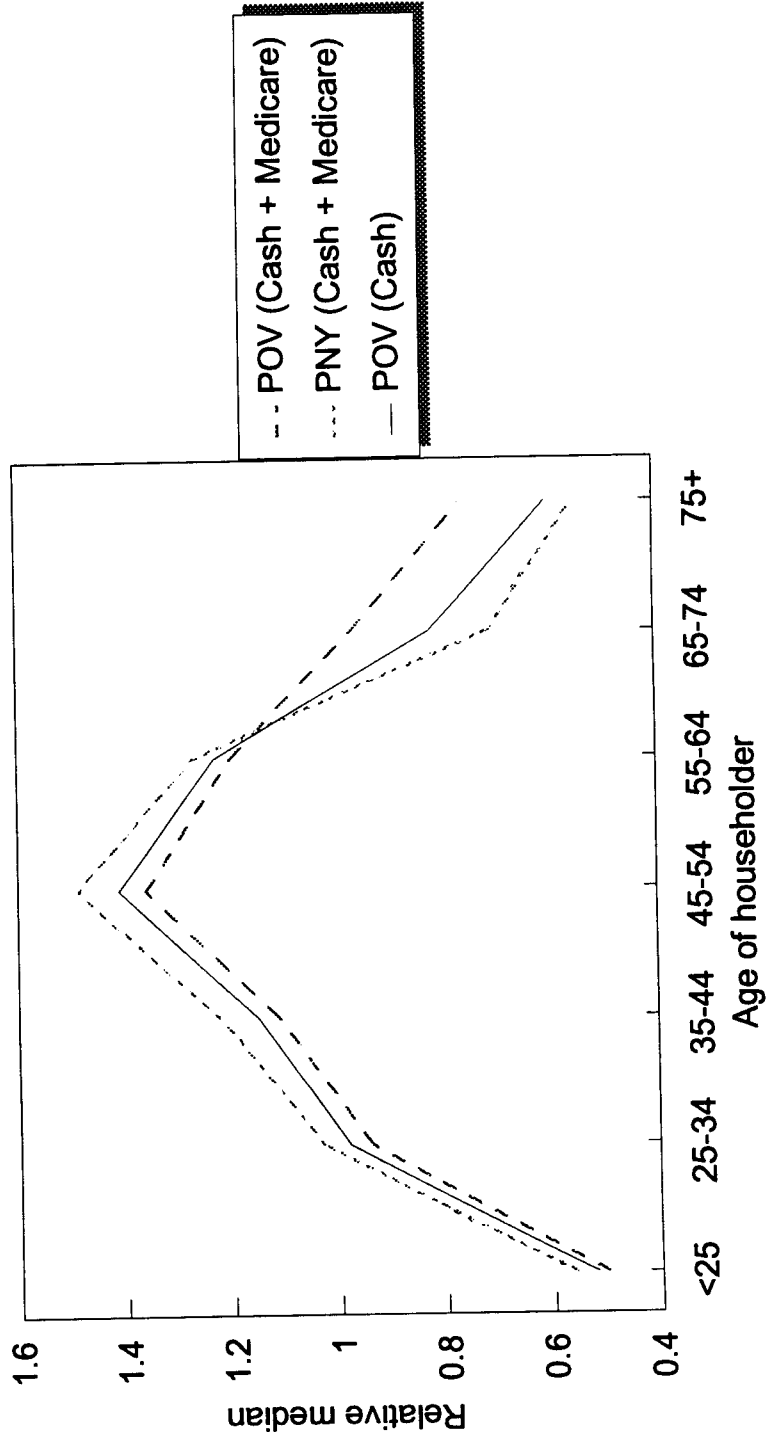


Figure 2. Selected relative medians, 1992



APPENDIX. RELATIVE IMPORTANCE OF NONCASH INCOME

The importance of several types of noncash income relative to cash income and to each other is shown in this appendix. The estimates show that Medicare was the most important of these types of noncash income for the aged. The other two types of medical noncash income (Medicaid and employer contributions to health insurance) were far less important. Return on home equity was another important type for the aged.

As noted in the text, the basic data are from the March 1993 CPS. Several other sources of data were used by the Bureau of the Census in the valuation of some noncash income types (Bureau of the Census 1993b). The sources of the noncash income types varied by income type. For most types of noncash income, information on receipt of the type was collected in the survey, but income values had to be imputed. Seven income types are shown in this appendix: Medicare, Medicaid, employer contributions to health insurance, food stamps, school lunch subsidies, housing subsidies, and return on home equity.

Medicare is a government health plan that provides medical care for the aged and the disabled. Medicaid is a government program that provides medical assistance for certain needy families and individuals. The values of Medicare and Medicaid used here were the market values (calculated on an insurance basis), which were imputed by taking mean government outlays per enrollee by State and risk class for the two programs separately.⁴⁵

⁴⁵There were two risk classes for Medicare: age 65 and over; and blind and disabled. There were four risk classes for Medicaid: age 65 and over; blind and disabled; age 21-64, nondisabled; and age less than 21, nondisabled. For each of these two programs, persons who were covered by the program (based on replies to a question in the survey) were assumed to be covered for the entire year. The Medicare and Medicaid estimates used by the Bureau of the

Employer contributions to health insurance were received by persons covered by a health insurance plan obtained through an employer or union. The value of employer contributions to health insurance was imputed using data from the National Medical Care Expenditures Survey.

Food stamps is a program that increases food purchasing power for needy units by providing them with coupons that can be used to buy food. The value of food stamps was obtained by asking respondents; the face value was used.

The school lunch program provides subsidies to students eating lunches at participating schools. The value of school lunch subsidies was imputed using responses on the number of children in the family unit involved in that program and information from the Department of Agriculture on subsidies per meal. Housing programs taken into account include public housing and rental assistance programs. The value of housing subsidies was imputed using a model based on data from the American Housing Survey.

Return on equity in owner-occupied homes was assigned using data on home equity from the American Housing Survey and a selected rate of return on that equity.⁴⁶ (See Bureau of the Census (1993b) for more detailed descriptions of the estimation of noncash income amounts and Social Security Administration (1993) for descriptions of several of the government programs involved.)

Census in their published estimates of the distribution of income were the fungible values (Bureau of the Census 1993b). The market values used here were also imputed by the Bureau of the Census.

⁴⁶Estimates published by the Bureau of the Census subtracted property taxes from the amounts obtained by applying a rate of return to home equity. Property taxes were not subtracted in the estimates shown here.

The importance of noncash income relative to cash income before tax and the relative importance of different types of noncash income are shown next. The estimates shown here reflect the valuation methods described above and can be sensitive to the valuation methods chosen. Thus, these estimates should be interpreted as general patterns.⁴⁷

The relative importance of different types of noncash income for aged and nonaged family units (classified by the age of the reference person) is shown in table A-1, and the percentage of family units receiving each type is shown in table A-2. One set of estimates in each of those tables is for entire age groups; the second set is for the bottom cash income quintile within each age group.⁴⁸

Noncash income associated with health care was very important for the aged. As noted in the text, the market value of Medicare amounted to 18 percent of cash income for the aged; 97 percent of aged units received that type. For aged units receiving Medicare, the mean amount was \$4,500. For the bottom quintile of the aged, Medicare amounted to 62 percent of cash income, and the mean amount for those receiving it was about \$3,700.

The market value of Medicaid was important for the bottom quintiles of both the nonaged and aged, but it was slightly more important for the nonaged. For those receiving Medicaid, the average amounts in the bottom quintile were large--about \$4,300 for the nonaged and about

⁴⁷The importance of noncash income relative to cash income shown by these estimates is probably overstated somewhat because cash income was underreported and most noncash income types were imputed to be the correct aggregate amount.

⁴⁸The quintiles were based on family unit cash income before tax adjusted using an equivalence scale derived from the U.S. poverty thresholds. Those scale values differed by size of family unit and age of the reference person. The percentages shown in table A-1 were calculated using unadjusted income.

\$3,400 for the aged. Employer contributions to health insurance were more important for the nonaged than for the aged. This type, unlike the others shown, was more important for entire age groups than for the bottom quintile. For those receiving employer contributions to health insurance, the nonaged as a whole had a mean amount of about \$3,100, while the relatively few aged receiving this type had a mean amount of about \$2,200.

The three medical types of noncash income amounted to 21 percent of cash income for the aged as a whole, but only 7 percent for the nonaged. For the bottom quintile, those types amounted to 81 percent of cash income for the aged, and 34 percent for the nonaged.

Food stamps, school lunch subsidies, and housing subsidies are unimportant for each age group as a whole. Each of those income types amounted to less than 0.5 percent of cash income. Although 23 percent of nonaged units received school lunch subsidies, the amounts were small. These income types were more important for the bottom quintile. Food stamps was the most important of the three, amounting to 8 percent of cash income for all ages; 34 percent of units in the bottom quintile received that type.

Return on home equity was more important for the bottom quintile than for the entire age group and was more important for the aged than for the nonaged. For those receiving this type, both the nonaged and aged had mean amounts of about \$4,600. Return on home equity was received by a higher percentage of the aged than of the nonaged.

When the 7 noncash types shown were taken together, they amounted to 34 percent of cash income for the aged and 14 percent for the nonaged. For the bottom quintile, however, those types amounted to 131 percent of cash income for the aged and 77 percent for the nonaged.

Medicare noncash income was used in the estimates presented in the text. The importance of that type is shown in more age detail in table A-3. Within the aged group, Medicare was more important for the older aged than for the younger aged, for both the age groups as a whole and for the bottom quintiles. Within the nonaged group, for the age groups as a whole, the percentages were low (0-2 percent) for all detailed age groups. For the bottom quintile, however, Medicare was more important for the 55-64 age group than for the other nonaged age groups. The disabled in that age group are important here.

Table A-1. Noncash income types as percentages of cash income before tax, 1992

Income type	All income quintiles			Bottom cash income quintile		
	All ages	Under 65	65 and over	All ages	Under 65	65 and over
Medicare, market value	3	1	18	15	5	62
Medicaid, market value	1	1	2	23	25	18
Employer contributions to health insurance	4	5	1	3	4	0
Food stamps	0	0	0	8	9	3
School lunch	0	0	0	2	2	0
Housing subsidy	0	0	0	5	5	6
Return on home equity	8	7	13	30	27	42
Total of types shown	16	14	34	86	77	131

Note: These estimates are based on family unit income and age of the householder. The income quintiles are defined within the age group. Zero denotes less than 0.5.

Table A-2. Percentage of family units with the type of noncash income, 1992

<u>Income type</u>	<u>All income quintiles</u>			<u>Bottom cash income quintile</u>		
	<u>All ages</u>	<u>Under 65</u>	<u>65 and over</u>	<u>All Ages</u>	<u>Under 65</u>	<u>65 and over</u>
Medicare, market value	24	6	97	27	9	98
Medicaid, market value	12	12	12	39	41	31
Employer contributions to health insurance	51	61	12	10	13	1
Food stamps	9	9	5	34	38	21
School lunch	19	23	2	26	31	3
Housing subsidy	5	4	6	16	15	17
Return on home equity	62	61	68	51	48	61

Note: These estimates are based on family unit income and age of the householder.
The income quintiles are defined within the age group.

Table A-3. Medicare noncash income as a percentage of cash income before tax, by age of householder, 1992

<u>Age of householder</u>	<u>All quintiles</u>	<u>Bottom cash income quintile</u>
All ages	3	15
65 and over	18	62
Under 25	0	3
25-34	0	3
35-44	0	3
45-54	1	5
55-64	2	15
65-74	16	56
75 and over	23	68

Note: These estimates are based on family unit income. The income quintiles are defined within the age group using adjusted income.

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