THE SURVEY OF INCOME AND PROGRAM PARTICIPATION

Measuring Poverty and Crises: A Comparison of Annual and Subannual Accounting Periods Using the Survey of Income and Program Participation

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Martin David and John Fitzgerald
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1. OFFICIAL VERSUS UNOFFICIAL MEASURES OF POVERTY

Poverty statistics published in the P-60 series of the Current Population Reports rely on an established set of definitions. Poverty thresholds that are adjusted annually by the Office of Management and the Budget are compared to cash incomes. Debate on the meaning of this comparison has raised questions about both the threshold and the resources to which thresholds are compared. The Bureau of the Census held a conference on treatment of non-cash income (1985); the Institute for Research on Poverty held a symposium on the role of asset tests for defining eligibility for welfare programs (1977); the economics profession has had extensive debate on the appropriateness of alternative techniques for comparing the well-being of different kinds of families (Deaton and Muellbauer, 1980; Danziger, et al., 1984; van der Gaag and Smolensky, 1982.)

In this paper we demonstrate that the official poverty measure is conceptually deficient, and discuss how to remedy those deficiencies that have varying impact on measures defined on alternative accounting periods. In order to avoid confusion, we refer to a generic problem of understanding problems of deprivation as measuring poverty. The procedures used in P-60 and other government reports are designated official poverty measurements. We introduce an alternative that we refer to as crisis measurement.

2. POVERTY INCIDENCE AND THE ACCOUNTING PERIOD

"Poverty" connotes a condition of economic deprivation. It generally refers to the current situation of a person or family, but also may designate a circumstance of longer duration -- "Half of all children grow up in families in poverty". At one extreme we are interested to know who is chronically poor (in poverty over a lifetime) and who are exposed to poverty at some point in their lifetimes. At the other extreme we are interested in knowing who is poor at this instant of time and how the social "safety net" responds to the deprivation of those in poverty.

Measuring poverty over long accounting periods obviously gives an insight into problems related to chronic deprivation. Long accounting periods also lower the probability that a person who is nonpoor on a lifetime basis will be measured as poor due to a transitory income short- fall.

Measuring poverty over a short period will enlarge the count of poor from chronically poor to a group that has temporary hardships. If con- sumption flow is used to calculate the measure of poverty, changing from long to short accounting periods causes miminmal statistical dif- ficulties. If income flows are used to calculate poverty, the problem is to distinguish those with real hardships from others who can alleviate their problems by selling assets, increasing debts, and liquidating inventories. Short-term, income-related measures of poverty must thus be designed to account for the capability that the economic unit has for smoothing consumption by dissaving or borrowing. Thus measures of resources used to determine poverty should include some adjustments to

allow for cash flow other than income: dissaving, borrowing and cash and noncash transfers.

We define an economic crisis to occur for a household (taken as the relevant decision making group) when adjusted cash flow is insufficient to meet current costs of consumption. We explore this concept and consider what time period is most appropriate for defining economic crises in light of the existing measurements in the Survey of Income and Program Participation (SIPP). The discussion of how to adjust short-term measures to include assets goes back to 1959. David (1959) includes liquid assets in a measure of welfare; Hansen and Weisbrod (1968) and Bixby (1972) annuitize wealth to arrive at augmented cash flow; Steuerle and McClung (1977) discuss a variety of ways to augment the income definition in measuring poverty. Some results from these studies are presented in section 4.

We approach the problem of measuring a crisis in two steps:

a. We consider the mathematical problem of aggregating resources and poverty thresholds over time.

b. We indicate how implementation of the measures on SIPP is affected by the measurement, imputation, and weighting procedures in cross-sectional and longitudinal samples.

3. TIME AGGREGATION OF POVERTY MEASURES

Instantaneous concepts

We define an instantaneous measure of CRISIS as follows:

a. $z(t)$ is a vector defining the structure of the household, including age, sex and other characteristics of members that are relevant to the cost of the minimum susbsistence consumption level, $n(z)$, for an instant of time.

b.   h(z) extracts household membership from z and the total income of the household at any instant of time is given by

(1) $yh(t) = \sum_{i \varepsilon h(z)} y(i, t)$

where $y(i, t)$ is the income flow for the i th individual at the instant t. Similarly, the sum of fungible assets of the household at the instant t is given by

(2) $fh(t) = \sum_{i \varepsilon h(z)} f(i, t)$

c.   CRISIS is defined as

(3) $CI(yh(t) + fh(t) < n(z))$

where the CI function is an indicator whose value is 1 if the inequality is true and 0 otherwise. In the same notation, the instantaneous official poverty indicator is

(4) $OI(yh(t) < n(z))$

Time aggregation to accounting periods of length T.

Aggregating the total need of households with which a particular individual is associated for a period of time from 0 to T is given by

(5) $n[T] = \int_0^T n(z(t))\, dt$

(The square brackets will be used to denote the time integral). Since the individual is associated with only one household at each point in

time, this sum is unique regardless of changes in household structure and living arrangements.

Aggregation of incomes can be achieved in the same manner

$$(6) \quad yh[T] = \int_0^T yh(t)\, dt$$

The definition of crisis can now be revised to indicate potential maximal consumption during the period

$$(7) \quad CI[T] = CI(yh[T] + fh(0) < n[T])$$

That is, if the total of fungible assets at the beginning of the period plus income flows during the period ending at T is less than the cost of a subsistence level of consumption during that period, the individual will be classified as in crisis. Note that the resources and needs of each household are represented in the calculation in proportion to the time that the individual in question is at risk in (i.e. a member of) that household. Therefore no double counting of needs or income occurs.

The official poverty rate over the interval [0,T] will be

$$(8) \quad OI[T] = OI(yh[T] < n[T])$$

It is clear that OI[T] > CI[T].

One issue requires conceptual clarification: What part of total wealth, $w(0)$, should be included in $fh(0)$? Clearly, many assets are not convertible to cash at an instant in time. However, the longer the period over which they can be converted, the greater the likelihood that they can be sold and that they can be sold at a price near a "fair market value". The notion of "fair market value" is intended to convey a distinction

between liquid and illiquid assets. We incorporate these ideas by defining

$$(9) \quad fh[0,T] = \int_0^T \exp(-rt)\, m(t) w(0)(1 - M(t))\, dt$$

where $m(t)$ is the proportion of wealth that can be converted to cash at exactly time t. $M(t)$ is the proportion of assets that have cumulatively been converted to cash at time t,

$$M(t) = \int_0^t m(t) dt.$$

Equation (7) is now restated

$$(10) \quad CI[T] = CI(yh[T] + fh[0,T] < n[T])$$

where the $fh[0,T]$ is used to connote the maximum of wealth that could be liquidated at "fair market value" in the interval [0,T]. Clearly $fh[0,T]$ varies over individuals; $m(t)$ varies as the composition of their wealth varies; and the total fungible wealth will vary with the level of $w(0)$.

4. PAST EMPIRICAL RESULTS ON POVERTY AND WEALTH

Several studies have indicated the importance of wealth holdings among those classified as poor on an income basis. We present tables from three such studies. David (1959) uses data from the 1956 Survey of Consumer Finances to construct Table 1. On line 1 the net index compares a measure of income based on disposable income plus home grown food plus imputed home rent to the cost of a bundle of basic needs. The gross index adds liquid assets to the income above and compares this to the

same needs standard. The index of poverty that includes liquid assets is 23 percent lower. David further shows the size of mistakes (20 percent) that result form using only disposable income to classify persons, when the gross index is assumed to be the true index of welfare.

Hansen and Weisbrod (1968) match asset data from the Survey of Financial Characteristics of Consumers (1962) to data from the 1962 Cuurent Population Survey. They compute a measure of resources which includes income and the annuity value of net worth. As shown in Table 2, if the poverty threshold is taken to be a resource level of $3000 per family, the number of poor declines from 20 percent to 17 percent when the annuity value of net worth is included.

Steuerle and McClung (1977) present several measures of household resources and include wealth in different ways. Their data is from the 1966 Survey of Economic Opportunity. The five resource definitions used in Table 3 are: (1) Income: 1966 total nonassistance family CPS income, plus lump sum income; (2) Income/Liquid Assets: Income (1) plus liquid assets; (3) Income/Net Worth: Income (1) plus assets, minus debt, less one half money income from assets; (4) Income/Fraction of Net Worth: Income (1) plus 10 percent of net worth, less income from assets; (5) Income/Annuity: Income (1) plus annuity value of net worth, less income from assets. The table shows that wealth can have a substantial impact—inclusion of liquid assets lowers the poverty rate by 18 percent, inclusion of net worth lowers the poverty rate by 41 percent.

These studies show the importance of wealth adjustments on an annual basis; we can expect larger effects on a shorter accounting period.

5. CONCEPTUAL ADVANTAGES OF CI[T] AND THE RELATIONSHIP BETWEEN CI[T] AND OI[T]

In some small intervals of time, it is quite possible that yh[T] = 0. Between pay periods many workers have no sources of cash flow. Self-employed with intermittent receipts also will have periods of zero cash flow. In that case, the affected family will be classified as poor according to the OI[T], even though adequate liquid assets are available. The probability of this eventuality decreases as the accounting period lengthens. Only self-employed are likely not to receive some income payments on a schedule of one month or less.

A second observation is that most households will maintain sufficient fungible assets to meet the "transaction needs" of the interval between income receipts. Thus fh[0,0] will be at a minimum just before the receipt of recurrent income flows. This behavior is independent of the accounting period.

In any case, taking the cash on hand at the beginning of the period as fixed and considering successivly longer period for the receipt of income gives the following relationship

$$(11) \quad \frac{d(yh[T])}{dT} = \frac{d(fh[0,0] + yh[T])}{dT}$$

That is, we would expect the same rate of increase of income using both measures, if the measure of fungible assets is fixed at cash and near cash as of the beginning of the period. When increases in fungibility of assets are considered, the rate of increase indicated by the broader measure must rise more quickly than yh[T] with increasing T over some interval $0 < T < A$

$$(12) \qquad \frac{d(yh[T])}{dT} < \frac{d(fh[0,T] + yh[T])}{dT} \qquad 0 < T < A.$$

Because the rate of increase of $n[T]$ is identical for both $OI[T]$ and $CI[T]$, equation (12) implies that poverty rates using the broader measure will initially fall faster than $OI[T]$ as the accounting period is lengthened.

Up till now we have only considered the resources available to the household from the sale of net worth. Borrowing against net worth would cause little change in the measure, except that the cost of interest probably should be added to $n[T]$. Borrowing would clearly be desirable in those instances where assets are required for income-earning (i.e. tools of the self-employed, automobiles required for transport to work, etc.).

The more important form of borrowing is borrowing against future earning capacity. This occurs when consumers borrow on their credit cards, default on mortgage loan payments, and take out personal loans. Information on the capacity of the household to incur such debts should be included in the broader measure of poverty. Since none of this information is available in the SIPP core data, we shall not belabor the point.

6. MEASUREMENT ISSUES USING SIPP

The Survey of Income and Program Participation (SIPP) is a nationally representative sample of the noninstitutionalized U.S. population. It includes monthly data on income, program participation and demographics for over 20,000 U.S. households. A household is interviewed every four

months, and these data are organized into four month pieces called waves. Due to a staggered system of interviewing, one quarter of the sample households are interviewed in each calendar month, and thus a wave includes an overlapping mix of calendar months for the four sample groups.

Our longitudinal sample time period corresponds roughly to calendar 1984: for one quarter of the sample it is October 1983 to September 1984, for the second quarter it is November 1983 to October 1984, and so on. We include persons in households continuously present for the first four interviews; thus we follow only persons who were part of the nationally representative sample. To guard against potential bias in poverty and crisis rates due to differential sample attrition, we calculated and use a system of longitudinal sample weights that adjust for differential probabilities of inclusion in our longitudinal sample. David and Fitzgerald (1987) describes this procedure in detail. Our longitudinal sample includes 44,639 persons.

We also present some results based on the third wave interview. This cross-section is larger (48,357 persons) since we do not require continuous presence in the sample for four interviews. (We do require that the person is part of the representative sample, i.e., was present at the first wave interview.)

The wave 3 sample increases precision of estimates for small groups. It also is subject to less potential bias from attrition. Most importantly, imputation for missing data is consistent for each individual. The wave 3 sample incorporates the dynamics of changing household composition, and differs from the Current Population Survey (CPS) and the

first wave of SIPP in that regard. The time period for this sample is centered at May to June 1984. We use the same method as above to develop sample weights for this cross-section.

The SIPP uses an imputation procedure to simulate values for missing data. Data is imputed cross-sectionally, i.e., without reference to a person's data in other waves, and thus poses some problem for our longitudinal work. We elected to use the imputed data and recognize that the imputations add variance to longitudinal income totals. For example, imputation or a missing report of interest income does not make use of the level of interest reported at another interview. By our sample inclusion criteria, we have excluded persons with fully imputed records.[1]

To use longitudinal data we must deal with changes in household compostion. The four month reference period of SIPP allows close tracking of household composition changes and income changes; this is clearly an advantage over surveys such as the CPS. Our results tabulate individuals in households. Each individual is classified according to the time-weighted averages of income and poverty thresholds that apply to the households in which those individuals lived during the 12-month year. For example, an individual spends 6 months in a household with $7,000 of income and a poverty threshold of $5000 during those six months; she spends the remainder of the year in a separate household with $500 income and a poverty threshold of $3000. The individual will then be attributed a status of poverty for the 12-month period -- the cumulative $7500 of income with which that person is associated during the year is less than the cumulative $8000 of poverty thresholds.

A crucial part of our study is the measurement of fungible assets at the beginning of the accounting period, $fh(0)$. This data is not directly reported in SIPP each wave. Thus we construct an asset balance measure based on income flows from the assets. Because we are interested in assets held at the beginning of the accounting period, we base our measure on asset income flows from the prior period.

Our primary focus is on liquid assets which can be converted to cash (then consumption) over a short period of time. For this purpose we measure liquid assets as the capitalized value of interest income (income from savings accounts, bonds, money market funds). We later show that our crisis measure would not be sensitive to the inclusion of all property income assets regardless of their liquidity.

For a large part of the sample the interest reported in SIPP was imputed by the Bureau of the Census based on the asset balances reported. For these persons, capitalizing the interest income at the interest rate used by the Census (6 percent) recovers the account balances. For the rest of the sample an interest rate must be assumed, and we chose to use the same 6 percent rate. The interest income amount is collected by the Census as a four month aggregate. Thus we do not have monthly interest income amounts and cannot calculate monthly balances. We therefore present crisis measures for only the first month of a wave, and estimate cash assets from interest amounts paid during the prior wave.

The crisis measure is obtained by adding the estimated value of assets to the income recorded for the household with which the individual was associated in the first month of the period. That is, if three persons, mother, father, and daughter, were in the household for the first

six months and the daughter established separate housekeeping thereafter, the crisis measure requires the following calculation:

1. The asset income of each person in the four months prior to the beginning of the period is calculated by summing interest on cash in banks, savings accounts, and money market mutual funds (asset types 100-104). (Income received from assets that are jointly owned is allocated to each person involved.)

2. The asset income is capitalized at a 6 percent rate of annual interest. The capital amount is therefore 50 times the reported interest for the prior four-month period.[2]

3. The capital amounts are aggregated according to household structure at the beginning of the period for which the crisis measure is calculated. In our example, this is the mother, father and daughter.

The logic behind this procedure is that the initial household is an economic decision-making group and that the decision to alter that group is made in relation to what the members know about the initial asset position of the group as a whole. Subsequent changes in household composition are endogenous to the balance sheet at the beginning of the measurement period.

7. POVERTY AND CRISIS LEVELS

We begin our presentation of results by illustrating the effect of shortening the accounting period on measures of poverty and crisis. Using the longitudinal sample, we construct measures for three accounting periods: twelve month, four months (one wave), and one month (the first month of a wave). The twelve months of data in the longitudinal sample generate 1 12-month measure (loosely 1984), 3 consecutive 4-month measures that use the same data, and 3 1-month measures that are based on

the first, fifth and ninth month in the 12-month period. Table 4 presents the results. The four- and one-month measures are averages of the three measures obtained within the 1984 year.

As the accounting period becomes shorter the poverty measure indicates a substantial rise in the number of persons classified as poor. On a one month basis, 14 percent of the population is poor--a figure 24 percent larger than the annual poverty rate. Annual poverty rates do not detect a large number of persons who experience temporary income shortfalls. These figures are comparable to Williams (1986), who uses a slightly different sample and unweighted estimates. The crisis measure rises by much less as we shorten the accounting period, and even falls slightly between the one and four month measure. This is because a given amount of assets increases in importance relative to income as the accounting period gets shorter.

We further compare poverty and crisis measures in Table 5. The difference between the measures shows the reduction in measured poverty that occurs when we exclude persons whose liquid assets high enough for their consumption to remain above the poverty line during the accounting period. More simply, taking the crisis measure as a more accurate measure of hardship, this difference shows the persons misclassified as in hardship by ignoring assets. Note that as the accounting period shortens the crisis measure screens out an increasing proportion of persons who are so misclassified. On average 21 percent of the one month poor are misclassified.

Table 5 also shows the variability and trend in the measures through calendar 1984. Both the poverty and crisis ratio fall through the year.

In appendix Table A1 we show the joint distribution of the crisis and poverty measures and the means of liquid assets within that distribution. The table shows that some persons classified as poor by the official measure hold substantial quantities of liquid assets.

To summarize, as the accounting period becomes shorter the poverty measure classifies an increasing number of persons as poor due to income variability (temporary shortfalls). The crisis measure screens out increasing numbers with asset cushions sufficient to continue poverty line consumption levels. The net result is that the one month crisis measure is only six percent above its annual level, even though the one month poverty measure is 24 percent above its annual level.

8. POVERTY AND CRISIS TRANSITIONS

A number of writers have stressed the large turnover of the poverty population--particularly over short periods (e.g., Williams 1986, Ruggles and Williams, 1987). Accepting that the official poverty measure overstates the short term level of hardship by ignoring assets, we next ask the extent to which transitions in or out of poverty are overstated. That is, to what extent do those experiencing transitions in or out of poverty have enough assets that they never were in hardship according to the crisis measure? How well can those experiencing short term income fluctuations that cause poverty transitions cushion their impact with assets?

Table 6 addresses these questions by looking at two period transitions into or out of poverty and crisis. The one-month transitions show status in one month compared with a month four months later. The four-month transitions show changes between consecutive four-month

measures. (Thus the calendar time changes are comparable between the one and four-month transitions.) Consider the one-month transitions in column 2 of Table 6. Of those measured as entering poverty (e.g., not poor in month 1 but poor in month 5), almost 40 percent never experienced a crisis--ie. had assets enought to finance consumption above the poverty line in both months. Of those measured as exiting poverty on a monthly basis, nearly 40 percent never experienced a crisis. Of those who were in poverty for both months (labelled always poor), 17 percent escaped a crisis in one or the other of the months.

Clearly, the monthly poverty measure substantially overstates the frequency of transitions. The mobility of those truly in hardship, as measured by the crisis measure, is much lower. Alternatively, those who make poverty transitions often do have asset cushions. We show below, however, that there is a big difference across demographic groups in the ability to cushion a shortfall. The four-month measures tell a similar story, but the averaging implicit in the four-month measures lowers the magnitudes of the difference between the poverty and crisis measures.

Another way of viewing transitions is to look at the three 4-month periods within the 1984 year as a three period history. Table 6-A shows that the proportion of persons measured as in crisis for three con-secutive periods (Always) is a little over two-thirds of the annual rate; the comparable poverty number is slightly higher. From row 2(a) and (b) we find that 16 percent of the population had a least one 4 month period of crisis, a proportion 55 percent higher than the annual rate (row 3(b)). The comparable figure for "ever poor" is 70 percent above its annual rate. The crisis measure shows less occasional hardship: the

proportion having one or two periods of hardship during the year (row 2(b)) is 19 percent lower for the crisis measure than the poverty measure.

9. ALTERNATIVE ASSET MEASURES

Before turning to differences in the measures in specific sub-populations, we address the sensitivity of our crisis measure to an alternative asset definition. We have concentrated on liquid assets measured by capitalized interest income flows. Another natural asset measure is the capitalized value of all property income flows. This would add income from stocks and rental property to our measure. These types of assets are expected to have a larger variance in returns and be less liquid. Owner occupied housing and consumer durables do not generate property income, and are thus excluded. Since our concern is with financing short term consumption this exclusion seems reasonable, although it ignores the potential to borrow against these assets.

Table 7 shows that the population of persons experiencing a four month crisis receives very little property income that is not interest. To make this comparison we again used a 6 percent rate to capitalize all property income in excess of interest income. To the extent that the 6 percent rate understates the return available on these assets, our capitalization overstates the value of these assets. The table shows that 94 percent of those in crisis receive no noninterest property income. If we were to include all property income assets in our crisis measure, and assume that anyone who receives even one dollar of noninterest property income is moved out of crisis, then our crisis measure would fall by 6 percent. For the average four month measure this would be a change from

11.3 percent to 10.6 percent, increasing differences between the crisis
and poverty measures (see Table 4). (The negative property income cases
shown in the table are most likely wealthy persons taking property income
(e.g. rental) losses.)

10. SIGNIFICANT DEMOGRAPHIC RELATIONSHIPS

We suggested above that the crisis measure can change our perception
of the number of persons in hardship in the short run. In this section we
ask how our perceptions change about the distribution of hardship across
demographic groups. We proceed by calculating the difference between the
poverty and crisis measures for various demographic groups as a percen-
tage of the poverty measure. Persons in groups that show large differen-
ces are more likely to have significant liquid assets, and thus tend to
be misclassified by the poverty measure over a short accounting period.

Table 8 shows the distribution of the 4 month measure, for the wave 3
sample, classified by household structure. Since a household can include
nonrelated individuals, we separately classify households that include
such persons. The household is classified by the marital status of the
household reference person, designated by the Census Bureau, at the
beginning of the SIPP sample panel. Changes in status are not reflected
here. Both the poverty measure and the crisis measure show that nonwhi-
tes are roughly three times more likely to be poor or in crisis than whi-
tes. As expected, single-headed households with children are most likely
to have hardship, while married-couple households without children are
least likely.

In general, the difference between the poverty and crisis measure is
larger for whites, particularly for those households without children.

These households apparently are more able to accumulate assets. The measures show smaller differences for nonwhites—liquid asset balances offer little cushion when incomes fall below the poverty standard. Single-headed households with children show small differences between the measures for both whites and nonwhites. Conversely, availability of assets makes white households without children less likely to have a crisis. Panel B shows households that include nonrelatives. The single head categories may include consensual unions not recorded as marriages by the Census Bureau. The results are qualitatively similar to those for households of related individuals, but the magnitudes are smaller.

To describe the distribution of the measures further, Table 9 classifies persons by age and gender. The table shows that children have the highest incidence of poverty and crisis. The most striking feature of the table is the difference between the two measures for elderly women. These women, many of whom are likely to be widows, seem to hold sizable quantities of liquid assets.

We stress care in interpreting the results for the elderly. Cash in savings accounts may represent the source of a significant part of total income. Also these households are not likely to realize income from earnings. As a consequence it may be more reasonable to count assets of the aged on the annuitized basis that was used by Hansen and Weisbrod (1968) and Bixby et al. (1975). Having cautioned against too rigid an interpretation of the crisis measure, we must reiterate that the results here support the work of Danziger et al. (1984), which indicates that deprivation of the aged tends to be overstated by income measures as compared to consumption. The crisis measure represents a rough adjustment to understand the nature of this overstatement.

How do human capital levels affect the ability to accumulate assets and avoid short-term crises? Table 10 categorizes persons over the age of 15 by highest grade completed and race. The difference between the poverty and crisis measure shows that those with higher educational levels have accumulated more liquid assets. Importantly, this is true for both whites and nonwhites. Nevertheless, the most educated nonwhites have accumulated only slightly more assets (in relation to their poverty budget) than the least educated whites. Thus education levels alone do not explain racial differences.

We earlier stressed the substantial overstatement of poverty transitions by the official poverty measure. This overstatement varies dramatically by demographic group as is seen in Table 11. For nonwhites and single head households with children the occurance of "false" transitions (measured poverty transition by a persons never in crisis) is much smaller than for other groups. For the elderly and married head households without children over half of those measured as entering poverty experience no crisis, and slighlty under half of those measured as leaving poverty were initially in a crisis. For these groups the mobility in or out of hardship is dramatically overstated by the poverty measure. In general, households without children show large proportions of "false" poverty transitions. The table also shows that mobility is quite restricted for some groups, notably single heads with children. While 8.8 percent of the total population experienced a crisis in both four month periods, 36.2 of the single head with children group had two consecutive periods of crisis.

11. TARGET EFFICIENCY, THE ACCOUNTING PERIOD, AND MEASURE OF HARDSHIP

One way to evaluate the crisis measure of hardship is to ask whether it increases our understanding of social policy in comparison to the poverty measure. We attempt this evaluation by studying the distribution of benefits under means-tested transfer programs. Two normative criteria aid in this evaluation:

A. In a desirable program the probability of receiving benefits should rise in proportion to the measure of hardship.

B. The expected benefit from the program should increase as the measure of hardship increases.

(We recognize that target efficiency measures do not measure economic effficiency (see Sadka, Garfinkel, and Moreland, 1982), but they offer a basis for intelligent program design.)

The first criterion motivates a presentation of the proportion of the population that is served by a means tested program in relation to the prewelfare crisis ratio (i.e market income, transfers other than means tested transfers, and cash assets divided by the poverty threshold). We present tabulations based on the Wave 3 cross section, using the four month poverty and crisis measures, because of the consistency of imputations and the integrity of asset income on the four month interval. In Table 12 the first row shows that nearly three-quarters of those in deep crisis receive cash transfers and about a third of those whose resources command between 0.5 and the poverty line are recipients. The second row of the table informs us that recipiency of these benefits ranges between 12 and 20 percent of the poor who are not in crisis. Since these percentages are below those in the first two

columns, classifying those in need by the poverty measure rather than crisis would produce a lower average rate of recipiency by persons with unmet need. The third row indicates an even smaller recipiency rate for those who are neither poor nor in crisis. The second panel of the table show a similar analysis for non-cash benefits consisting of food stamps, WIC, and energy assistance. For both kinds of benefits recipiency declines monotonically with the crisis ratio and the poor receive at a greater rate than the non-poor.

Some indication of the concentration of expenditures on the most needy is given by the analysis of share of benefits accoridng to the same matrix. For cash transfers seventy percent are directed to persons in crisis. Slightly more than two additional percent of benefits are paid to the poor who are not in crisis. This suggests that the 14 percent of persons who are poor but not in crisis seldom meet eligibility criteria to participate in means-tested programs. Conversely, for reasons that may be entirely consistent with the mandates of a number of means-tested programs, 27.5% of cash benefits are paid to persons who are not poor.

The share of non-cash benefits that is received by persons in crisis is larger than for cash benefits. Few benefits are paid to poor that are not in crisis. Almost no non-cash benefits are paid to persons whose resources in the absence of means-tested program place them at or above twice the poverty threshold.

We conclude that the crisis measure gives a clearer understanding of mechanisms by which means-tested transfers are distributed than the poverty ratio, which would classify all persons shown on the rows labelled (B) as poor. It does this without incorporating specifics about

those distribution mechanisms, but relies on a concept of potential consumption for its conceptual underpinnings.

The implications of Table 12 for the expected benefit paid are shown in Table 13. Columns 1 and 2 display the mean payment according to the crisis measure and poverty classification used in Table 12. Again, the expected payment declines monotonicallly with increase in the crisis ratio. In the case of non-cash programs this is the result of both decreases in eligibility and the mean payment to recipients as the level of the crisis ratio rises. For cash programs there are a number of recipients who receive large payments despite a high crisis ratio, so that most of the apparent decline is due to reduction in recipiency rates. Column 3 of Table 13 shows the difference between the poverty gap and available resources for each group. A negative amount indicates resources in excess of the poverty threshold.

We can further view the responsiveness of transfers to need by graphing the relationship. For convenience we scale the amount of transfer payments received by the poverty threshold, called relative transfers, and compare it to the crisis gap scaled by the same threshold, called the relative crisis gap. (The relative crisis gap equals one minus the crisis ratio.) Figure 1 displays this relationship. With this scaling, the dotted 45 degree line in the figure shows the level of relative transfers necessary to eliminate the crisis gap. Thus the distance between this line and the estimated level of transfers shows the unfilled crisis gap. (The effect of a more liberal poverty threshold can be seen by displacing the line to the left, as would be the case for the Food Stamps program which recognizes a need to pay some benefits to families up to 125% of the poverty threshold.)

The solid line segments show the ordinary least squares regression lines for relative transfers on the relative gap, run separately for each of the indicated segments; there are at least 950 unweighted observations on each segment. The dot shows the mean for the observations in each segment. The kinked dotted line shows a spline regression of the relation where the endpoints of the segments are constrained to meet. Table 15 presents coefficients and summary statistics for the spline regression.

As is apparent in the figure, persons with small crisis gaps are on average moved out of crisis, but the transfer system allows increasing proportions of unmet need until the relative gap reaches .75. Then the transfer system responds with a dollar of transfer for a dollar increase in need. Also of interest is the dispersion of transfers for persons of equal need. Large dispersion indicates targetting on a basis other than need--redistributions among persons with the same need could increase average well being. The R-squared for the spline regression shows that, for the group of persons with prewelfare crisis ratios less than 3, 45 percent (1-.552) of the variance in transfers is not explained by variation in the level of need.

One might ask if this is a reasonable summary of means-tested programs when we know that eligibility is frequently determined by family characterisitics. Figure 2 shows a spline regression for each of the four household types analyzed earlier. A good part of the dispersion is accounted for by household structure--an F test shows that the coefficients differ significantly across the groups. Somewhat surprisingly, the group receiving the largest expected transfers are married couples

without children. This group likely includes many elderly who receive
SSI and certain means-tested veteran's benefits. The least targetted
group is married couples with children. Based solely on the crisis gap
as a measure of need, redistribution toward this group is warranted.

The R-squared in the bottom panel of Table 15 shows that there is a
good deal of dispersion of transfers even within these household groups.
Transfers to single head households with children show the least
unexplained variation (34 percent), while the married without children
group shows the most (72 percent). Again, this latter group likely mixes
elderly who receive SSI mixed with younger couples who receive nothing.

12. CONCLUSION

We argue that the official poverty measure based on cash income is a
deficient measure of hardship, particularly for short accounting periods.
We propose an asset adjusted poverty measure, our crisis measure, that
screens out those persons with liquid assets adequate to maintain con-
sumption at the poverty threshold level during the accounting period.
The difference in levels between the two measures reveal that a portion
of the offically measured poor are misclassified according to our crisis
measure. Further, the poverty measure substantially overstates tran-
sitions in or out of hardship--those in crisis, the asset and income
poor, show much lower mobility than the offically measured cash income
poor.

For some groups, like nonwhites or single head households with
children, the two measures do not differ by much; these groups hold few
assets. For the elderly and married couples without children the
measures differ substantially. When we look at the targetting of means

tested transfer programs, we find that programs tend to be targetted more toward those in crisis than those in official poverty. The offical poor who are not in crisis do not receive many transfers, probably due to asset tests in transfer programs.

Given the sample design of SIPP, we have most confidence in measures taken on a four month basis. One advantage of subannual measures is that we can more closely match household composition to income. Further, we can more accurately portray hardship at a point in time as long as assets have been included as resources. The SIPP does not allow computation of assets on a monthly basis. Aggregation to annual measures requires sample weighting for attrition, longitudinal imputation of missing data, and methods for handling changes in family composition. Our results suggest the importance of gathering asset information on a subannual basis in order to measure hardship on a subannual basis.

Along with this last suggestion, further work showing how the transfer system affects the consumption pattern of households seems a useful extension. This would require comparisons across accounting periods that consider the potential lag of the transfer system response to need. Improved data on assets or actual consumption of households would be necessary. Moreover, the effects of changes in marital status, or other household compostion effects, should be considered. On a subannual basis, measurement of well being depends on understanding how resources, both income and assets, are distributed when household composition changes.

Notes

[1]We exclude persons from the sample who report data for less than the 4-month reference period. In part, this decision was taken because a high proportion of such persons have imputed data. Deceased persons and persons who move out of sample households without interviews are type z nonreponse and will receive a completely imputed record. This procedure does not exclude persons who move and are interviewed at their new address, and whose presence in another household earlier in the reference period is appropriately recorded by month.

Short and McArthur (1986) estimate the attrition cumulatively to wave 4 for persons 15 years of age and older in rotation groups 1-3 of the sample. The attrition is 17.80 percent, given the interview in wave 1. The slightly different rule for inclusion stated above yields attrition of 16.15 percent (44,639/53,172) for all persons listed in wave 1.

[2]This calculation assumes that all such accounts earn the same rate of interest. It also assumes that assets are carried over into the following period.

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Table 1

"WELFARE, INCOME, AND BUDGET NEEDS"
Review of Economics and Statistics 41 (1959)

TABLE 3-A. — COMPARISON OF NET AND GROSS INDEXES OF WELFARE WITH DISPOSABLE INCOME AS A MEASURE OF WELFARE LEVELS IN THE UNITED STATES

Level of welfare of the spending unit	Gross index	< 1.0	Gross index	≥ 1.0	Total	Net index	< 1.0	Net index	≥ 1.0	Total
% of the population with that level of welfare	28.7		71.3		100.0	35.4		64.6		100.0
Disposable income of the spending unit	< $1000	≥ $1000	< $1000	≥ $1000		< $1000	≥ $1000	< $1000	≥ $1000	
% of the population with the indicated income and welfare	9.5	19.2	2.0	69.3	100.0	11.4	24.0	0.1	64.5	100.0
% of the population whose welfare is misrepresented by the income bracket in line 3		21.2					24.1			
Disposable income of the spending unit	< $2000	≥ $2000	< $2000	≥ $2000		< $2000	≥ $2000	< $2000	≥ $2000	
% of the population with the indicated income and welfare	18.1	10.5	6.8	64.5	100.0	23.1	12.3	1.7	62.8	100.0
% of the population whose welfare is misrepresented by the income bracket in line 6		17.3					14.0			
Disposable income of the spending unit	< $3000	≥ $3000	< $3000	≥ $3000		< $3000	≥ $3000	< $3000	≥ $3000	
% of the population with the indicated income and welfare	24.3	4.3	15.2	56.1	100.0	30.3	5.1	9.3	55.3	100.0
% of the population whose welfare is misrepresented by the income bracket in line 9		19.6					14.4			

Source: Martin David.

Table 2

"An Income-Net Worth Approach to Economic Welfare"

THE AMERICAN ECONOMIC REVIEW 58 (December 1968)

TABLE 4—NUMBERS AND PERCENTAGES OF FAMILIES WITH INCOMES AND INCOME-NET WORTH OF LESS THAN $3,000 PER YEAR, AND OF MORE THAN $10,000 PER YEAR, BY AGE OF HEAD, 1962

Age of Family Head	Less Than $3,000 Per Year					
	Families With Current Money Income Below $3,000		Families With Current Income—Net Worth Below $3,000, at			
			4 Per Cent Interest Rate		10 Per Cent Interest Rate	
	Per Cent of All Families in Age Group	Number of Families (Millions)	Per Cent of All Families in Age Group	Number of Families (Millions)	Per Cent of All Families in Age Group	Number of Families (Millions)
	(1)	(2)	(3)	(4)	(5)	(6)
Under 35	17	2.0	17	2.0	17	2.0
35–54	13	2.7	12	2.7	12	2.6
55–64	19	1.4	17	1.2	15	1.1
65 and over	47	3.2	36	2.4	32	2.2
All	20	9.3	13	8.4	17	8.0

Age of Family Head	More Than $10,000 Per Year					
	Families With Current Money Income Over $10,000		Families With Current Income—Net Worth Above $10,000			
			4 Per Cent Interest Rate		10 Per Cent Interest Rate	
	Per Cent of All Families in Age Group	Number of Families (Millions)	Per Cent of All Families in Age Group	Number of Families (Millions)	Per Cent of All Families in Age Group	Number of Families (Millions)
	(1)	(2)	(3)	(4)	(5)	(6)
Under 35	9	1.1	10	1.2	11	1.3
35–54	24	5.1	29	6.1	34	7.2
55–64	22	1.6	30	2.2	36	2.6
65 and over	9	0.6	16	1.0	21	1.4
All	18	8.3	23	10.5	27	12.5

Source: Hansen and Weisbrod.

Table 3

Table 6. Percent of Total Population Falling into or near Poverty by Various Poverty Standards
(Survey of Economic Opportunity)

SED Poverty Standard	0.00-0.20	0.21-0.40	0.41-0.60	0.61-0.80	0.81-1.00	Means/Needs Total in Poverty	1.01-1.20	1.21-1.40	1.41-1.60	1.61-1.80	1.81-2.00	Over 2.00
1	3.9	2.6	3.3	4.1	4.3	18.1	4.6	5.1	5.6	5.3	5.5	55.9
2	3.4	2.4	2.6	3.3	3.3	14.9	3.3	3.8	4.5	4.0	4.5	65.1
3	2.7	1.6	1.9	2.2	2.2	10.6	2.2	2.4	2.7	2.3	2.5	77.4
4	3.2	2.2	2.5	3.3	3.2	14.4	3.6	4.1	4.9	4.7	5.0	63.3
5	3.2	2.2	2.6	3.1	3.4	14.5	3.7	4.4	4.9	5.1	5.5	61.9

SED Poverty Standard Definitions (PSD):

1. 1966 SED Income/Needs less than 1.0
2. 1966 SED Income-Liquid Assets/Needs less than 1.0
3. 1965 SED Income-Net Worth/Needs less than 1.0
4. 1966 SED Income-Fraction of Net Worth less than 1.0
5. 1966 SED Income-Annuity less than 1.0

Source: Steurle and McClung "Wealth and the Accounting Period in the Measurement of Means" Technical Paper VI (February 1977) in HEW report The Measure of Poverty.

Table 4

Accounting Period Differences in Poverty and Crisis Measures: 1984 Longitudinal Sample from SIPP*

Reference Period	Poverty	Crisis
(1) Annual (months 1 to 12)	11.3	10.4
(2) 4 months (average)**	13.17	11.32
Differences from Annual	1.87	1.12
Differences as Percent of (1)	14.2	10.8
(3) 1 month (average)***	14.04	11.03
Difference from Annual	2.74	.63
Difference as Percent of (1)	24.2	6.06

*Poverty and Crisis Measures are weighted counts of persons. Unweighted sample size 44639.

**Average of periods 1, 2 and 3.

***Average of months 1, 5, and 9.

Table 5

One, Four and Twelve Month Poverty and Crisis Mesures Compared:
1984 Longitudinal Sample

Reference Period	Date	Poverty	Crisis	Difference in Level	Difference as Percent of Poor
1-Month	1	14.69	11.38	3.30	22.5
	5	13.89	11.15	2.74	19.7
	9	13.54	10.57	2.97	21.9
					(mean 21.4)
4-Months	1-4	13.86	11.83	2.03	14.6
	5-8	13.07	11.39	1.68	12.9
	9-12	12.59	10.73	1.86	14.8
					(mean 14.0)
Annual	1-12	11.3	10.4	0.9	7.96

Table 6

Poverty and Crisis Transitions:
1984 Longitudinal Sample

		One Month Transitions		Four Month Transitions*	
		Month 1 to 5	Month 5 to 9	Period 1 to 2	Period 2 to 3
Always Poor	Total N**	23444.1	21528.5	22914.4	20961.7
	% Always Crisis	82.7	82.0	88.0	88.5
	% Never Crisis	10.6	10.7	5.9	5.6
	% Enter or Exit Crisis	6.7	7.3	6.1	5.9
Enter Poverty	Total N	8276.5	9400.9	6945.6	7785.4
	% Enter Crisis	60.8	62.3	71.6	69.5
	% Never Crisis	39.2	37.7	28.4	30.5
Exit Poverty	Total N	10082.9	10192.2	8751.1	8898.3
	% Exit Crisis	60.4	67.5	72.7	76.3
	% Never Crisis	39.6	32.5	27.3	23.7
Never Poor	Total N	186608.0	187289.9	189800.5	190766.2
	% Never Crisis	100.	100.	100.	100.
Grand Sum (all columns)			228411.5		

*Period 1 is months 1 to 4,
 Period 2 is months 5 to 8,
 Period 3 is months 9 to 12.

**Weighted Counts in thousands of persons.

Table 6A

Percent of Individuals in Poverty and Crisis During 1984, by Accounting Period and History (Sub-Annual Detail)

	Poverty	Crisis	Difference as Percent of Poor
(1) Annual (no detail)	11.3	10.4	8.0
(2) Four-month (3 sub-annual periods) History: percent poor (crisis)			
(a) Always	7.92	7.0	11.6
(b) Sometimes, not always	11.33	9.14	19.3
(c) Never	80.75	83.86	(3.85)
(3) History as percent of annual			
(a) Always	70.1	67.3	
(a+b) Ever	170.3	155.2	

Table 7

Alternative Asset Measure by Crisis Status
1984 Longitudinal Sample

Distribution of the Capital Value of Property Less
Interest Income (called Other Assets)*

Population (4 month measure)	Other Assets at Beginning of Period Percent of Row Total					Total
	Negative	Zero	1 to 2000	2001 to 10000	10000 plus	
In Crisis Period 2**	.43	94.1	2.47	1.20	1.80	100%
In Crisis Period 3	.19	94.1	3.14	1.23	1.33	100%

*Includes stocks, rental property income, and all other noninterest bearing, property income assets. Owner occupied housing and consumer durables excluded.

**Data for the Period 1 calculation was inadvertently not extracted by us from SIPP.

Table 8

Poverty and Crisis Levels by Household Structure and Race:
Wave 3 Cross Section*

Household Structure at First Interview	Four Month Measures			Percent of Population	
	Poverty (1)	Crisis (2)	Diff. as % of Poor	White	Black

A. Panel A: Households of Related Individuals

A.1 White:

Single w/ kids	34.2	32.7	4.4	7	—
Single w/o kids	13.1	8.6	34.4	13	—
Married w/ kids	9.2	7.8	15.2	48	—
Married w/o kids	3.9	2.8	28.2	27	—

A.2 Nonwhite:

Single w/ kids	52.8	51.6	2.3	—	27
Single w/o kids	28.1	25.0	11.0	—	14
Married w/ kids	23.0	20.1	12.6	—	40
Married w/o kids	7.2	6.2	13.9	—	12

B. Panel B: Households Including Nonrelated Individuals

B.1 White:

Single w/ kids	20.1	19.4	3.5	1.4	—
Single w/o kids	6.9	5.1	26.1	3.1	—
Married w/ kids	7.2	6.4	11.1	0.66	—
Married w/o kids	4.8	4.8	0.	0.25	—

B.2 Nonwhite:

Single w/ kids	37.8	34.5	8.7	—	2.9
Single w/o kids	16.1	16.1	0.	—	2.7
Married w/ kids	30.8	30.8	0.	—	0.87
Married w/o kids	N.A.	N.A.	N.A.	—	0.19

C. All Households

C.1 White	10.2%	8.4%	17.6%	100%	—
C.2 Nonwhite	30.2	28.1	6.9	—	100

*Wave 3 of SIPP has unweighted sample size of 48357. This cross section includes more persons than the longitudinal sample (44639) since the longitudinal sample requires continuous sample inclusion for 3 periods.

Table 9

Poverty and Crisis by Age and Sex of Individuals:
Wave 3 Cross Section

Age and Sex		Four Month Measures		
		Poverty (1)	Crisis (2)	Diff. as % of poor
< 18	All	20.0%	18.5%	7.5
	Male	19.9	18.4	
	Female	20.0	18.6	
18-24	All	12.9	11.3	12.4
	Male	11.4	9.8	
	Female	14.2	12.7	
25-34	All	10.6	9.3	12.3
	Male	8.2	7.0	
	Female	12.8	11.4	
35-44	All	9.7	8.3	14.4
	Male	8.2	6.9	
	Female	11.0	9.6	
45-54	All	9.4	7.9	16.0
	Male	8.4	6.8	
	Female	10.4	8.8	
55-64	All	9.1	6.8	25.2
	Male	7.7	5.4	
	Female	10.4	8.0	
65+	All	11.4	7.5	34.2
	Male	6.8	5.0	
	Female	14.5	9.3	

Table 10

Poverty and Crisis by Race and Education: Wave 3 Cross Section

Race	Highest Grade Completed	Population (millions)	Four Month Measures		
			Poverty	Crisis	Diff. as % of poor
A. White:	<12	42.8	16.0%	13.3%	16.9
	=12	51.2	6.7	5.3	20.9
	>12	57.4	4.4	2.8	36.4
B. Nonwhite:	<12	9.64	37.0	34.7	6.2
	=12	6.97	19.4	17.2	11.3
	>12	7.02	14.3	11.8	17.5

*Table shows persons aged 16 or older.

Table 11

Four Month Poverty and Crisis Transitions by Demographic Groups: Period 1 to 2, Longitudinal Sample

	All	Nonwhites	Age ≥ 65	Households of Related Individuals			
				Single w/o Kid	Single w/ Kid	Married w/o Kid	Married w/ Kid
Always Poor							
Total N*	22914.4	8577.3	2221.0	3500.5	8809.1	1702.5	7495.2
% Always Crisis	88.0	93.3	66.7	69.5	95.9	79.1	88.8
% Never Crisis	5.9	1.7	24.9	20.4	1.7	12.8	3.4
% Enter or Exit Crisis	6.1	5.0	8.4	10.1	2.5	8.1	7.8
Enter Poverty							
Total N	6945.6	1531.2	593.5	1030.9	898.7	689.1	3846.2
% Enter Crisis	71.6	86.5	43.6	61.0	85.3	47.2	75.7
% Never Crisis	28.4	13.5	56.4	39.0	14.7	52.8	24.3
Exit Poverty							
Total N	8751.1	2216.7	686.5	1324.0	1521.2	960.6	4433.9
% Exit Crisis	72.7	74.3	52.0	59.5	88.4	53.4	76.0
% Never Crisis	27.3	25.7	48.0	40.5	11.6	46.6	24.0
Never Poor							
Total N	189800.5	21805.3	21028.8	23198.6	12108.1	52991.2	90710.6
% Never Crisis	100.	100.	100.	100.	100.	100.	100.
Column Total N	228411.5	34130.6	24529.7	29054.1	23337.2	56343.4	106486.0

*Weighted counts in thousands. Column may not add to total due to rounding.

Table 12

Target Efficiency of Cash and Non-Cash Means
Tested Programs Classified Pre-Welfare Poverty and
Crisis Measures
(Wave 3 Cross Section)

Efficiency Measures & Program	Target Population	Pre-Welfare Crisis Ratio					Mean	Percent
		0 to .5	.5 to 1.0	1.0 to 1.5	1.5 to 2.0	2.0 or More		
Cash transfers								
% receiving	A. crisis ≤1	73.6	30.1	—	—	—		
	B. poor, not A.			20.5	16.5	11.9	10.9	
	C. neither			14.3	8.8	3.3		
share of cash transfers								
	A. crisis ≤1	.585	.701	—	—	—		.701
	B. poor, not A.			.010	.012	.023		.023
	C. neither			.074	.117	.275		.275
	Total							1.000
Non cash transfers								
% receiving	A. crisis ≤1	81.3	47.4	—	—	—		
	B. poor, not A.			30.0	24.3	9.9	12.4	
	C. neither			24.6	12.1	2.1		
share of non-cash transfers								
	A. crisis ≤1	.617	.808	—	—	—		.808
	B. poor, not A.			.012	.014	.018		.018
	C. neither			.079	.116	.174		.174
	Total							1.000

Table 13

Mean Transfer Payments and Crisis Gap
for Different Target Populations
(Wave 3 Cross Section)

Pre-Welfare Crisis Measure, Target Population	Mean Tranfer		Mean Crisis Gap	Percent of Gap Unfilled	Percent of Population
	Cash	Non-Cash			
A. Crisis <1					
0 to .5	$1277	$ 661	+$3116	37.8%	6.73%
.5 to 1.0	304	245	+ 849	35.3	5.61
B. Poor, not crisis <1					
1.0 to 1.5	279	139	- 516	*	0.62
1.5 to 2.0	157	69.1	- 2009	*	.22
2.0 or more	158	28.2	-41089	*	1.04
C. Neither poor nor crisis <1					
1.0 to 1.5	171	89.9	- 906	*	6.32
1.5 to 2.0	83.0	34.9	- 2569	*	7.64
2.0 or more	32.4	5.77	-30336	*	71.8
Mean (Total)	146.8	72.0	- 2221	—	100.0

*Not meaningful since gap is negative.

Table 14

Spline Regression for Transfers* on Crisis Gap (4 Month)

A. Regression Coefficients:
   Sample of All Persons with Crisis Ratio < 3, N = 20237
   Dependent Variable: Relative Transfers = Transfers/Poverty Line
   Splined Independent Variable: Relative Crisis Gap = Crisis
      Gap/Poverty Line

Coefficient	Range of Spline	Estimate	Standard Error
b_0	constant	.0274	.000149
b_1	.75 to 1.	1.25	.0480
b_2	.5 to .75	.0507	.0185
b_3	.27 to .5	.316	.0180
b_4	0 to .25	.351	.0332
b_5	-.25 to 0	.165	.0432
b_6	-.5 to -.25	-.0160	.0183
b_7	-.5 to -1.	-.0321	.00549
b_8	- 1 to -2.	-.0130	.00185

B. Summary Statistics for Spline Transfer Regressions:
   By Household Structure
   Samples Include Persons with Crisis Ratio < 3.

	Sample:	N	R^2	σ^2
1.	All** Household Structure:	20237	.552	.0282
2.	Only related persons present	19140	.572	.0268
	Single w/o kids	2343	.593	.0389
	Single w/ kids	3816	.664	.0346
	Married w/o kids	2323	.278	.0282
	Married w/ kids	10658	.494	.0196

*Transfers include both means tested cash transfers, and noncash transfers.

**Includes households with unrelated persons present.

Table A-1

Distribution of Crisis Within Official
Poverty—12-Month Measures

Poverty ratio	Crisis Ratio					
	<.5*	<1	<1.5	<2.0	2.0+	
A. Percent of Row Total						
< .5*	94.0	4.0	0.6	0.5	0.0	100.0
< 1	0.0	90.6	5.1	1.1	3.2	100.0
< 1.5	0.0	0.0	78.0	9.2	·12.8	100.0
< 2.0	0.0	0.0	0.0	69.5	30.5	100.0
< 2.0+	0.0	0.0	0.0	0.0	100.0	100.0
Totals	3.0	7.4	7.8	8.7	73.1	100.0
B. Means of Assets at Beginning of the Period						
< .5	58	2260	4730	9980	92900	1050
< 1	0	78	2480	5630	57700	2100
< 1.5	0	0	209	2850	27500	3940
< 2.0	0	0	0	295	19800	6240
< 2.0+	0	0	0	0	19000	19000
Totals	58	116	339	625	19400	14230
Population represented by weights (millions) annual	6.8	17.0	17.8	19.8	166.9	228.4

*0.1% of the population reports negative income.

Table A-2

Transfer Means and Percent Receiving by Household Structure, Wave 3 Cross Section

Relative Crisis Gap (=Crisis Gap/Pov. Line)	All	Households of Relatives			
		Single w/o kids	Single w/ kids	Married w/o kids	Married w/ kids
A. Percent Receiving Means Tested Cash or Noncash Transfer					
-2 and below	.0361	.0408	.0845	.0295	.0311
-2 to -1	.0960	.103	.214	.0712	.0635
-1 to -.5	.171	.157	.261	.178	.142
-.5 to -.25	.268	.174	.355	.277	.244
-.25 to 0	.382	.364	.560	.377	.303
0 to .25	.516	.481	.637	.518	.478
.25 to .5	.615	.620	.827	.609	.513
.5 to .75	.798	.742	.905	.598	.764
.75 to 1.	.870	.734	.967	.669	.812
B. Mean Relative Transfer (=Transfer/Pov. Line) for Those Receiving Transfers					
-2 and below	.262	.343	.249	.286	.192
-2 to -1	.208	.266	.174	.278	.159
-1 to -.5	.200	.165	.243	.309	.150
-.5 to -.25	.240	.181	.232	.264	.229
-.25 to 0	.202	.191	.197	.290	.164
0 to .25	.242	.237	.256	.262	.228
.25 to .5	.294	.385	.263	.341	.242
.5 to .75	.403	.451	.429	.295	.373
.75 to 1	.688	.712	.673	.668	.714

Table A-3

Pre- and Post-Welfare Four Month Poverty and Crisis Measures

		Post-Welfare Crisis Ratio					
		0 to .5	.5 to 1	1 to 1.5	1.5 to 2	2+	Total

A. Pre-Welfare Versus Post Welfare* Crisis (4 Month)
     (Percent of Row Totals)

		0 to .5	.5 to 1	1 to 1.5	1.5 to 2	2+	Total
Pre-Welfare	0 to .5	26.5	63.8	8.84	.846	.053	100
Crisis	.5 to 1		74.3	23.7	1.73	.243	100
Ratio	1 to 1.5			90.5	7.94	1.55	100
	1.5 to 2				94.1	5.89	100
	2+					100	100
	Total	1.79	8.46	8.20	8.11	73.4	100

		Post-Welfare Poverty Ratio				.	
		0 to .5	.5 to 1	1 to 1.5	1.5 to 2	2+	Total

B. Pre-Welfare Versus Post Welfare* Poverty (4 Month)
     (Percent of Row Totals)

		0 to .5	.5 to 1	1 to 1.5	1.5 to 2	2+	Total
Pre-Welfare	0 to .5	32.3	58.4	8.49	.751	0	100
Poverty	.5 to 1		78.4	19.9	1.45	.271	100
Ratio	1 to 1.5			92.0	6.55	1.58	100
	1.5 to 2				95.8	4.2	100
	2+					100	100
	Total	2.4	9.63	10.5	11.5	65.9	100

*Post-Welfare includes both cash and noncash transfers; tabulations for persons, weighted.

Figure 1
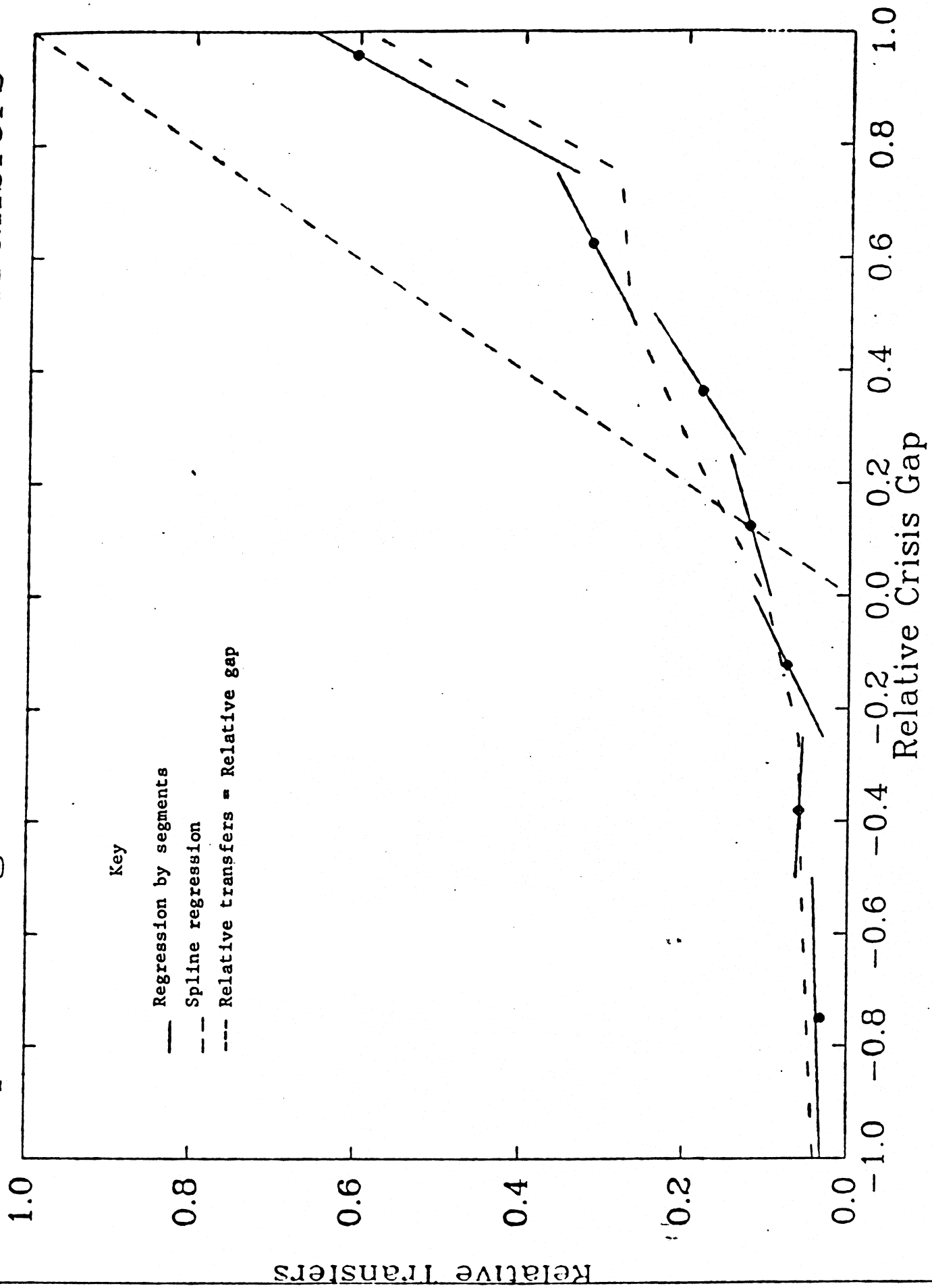# Spline Regression for Relative Transfers

Key

— Regression by segments
-- Spline regression
--- Relative transfers = Relative gap

Relative Transfers

Relative Crisis Gap

Figure 2

Spline Regression for Transfers: by Household Structure

Legend:
- ● Single w/o kids
- − Single w/ kids
- * Married w/o kids
- ○ Married w/ kids

Relative Crisis Gap
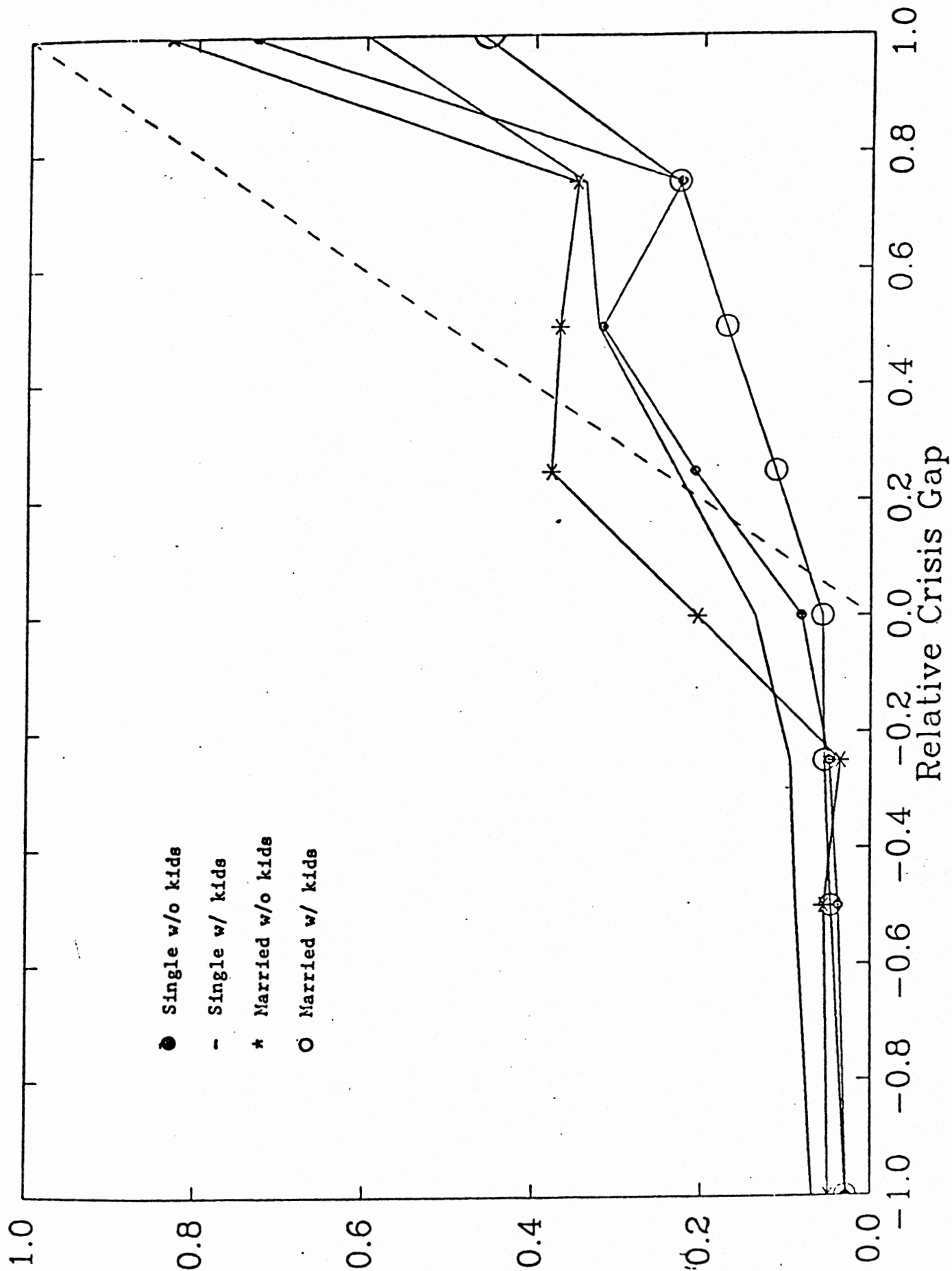
Figure 3
Proportion Receiving Transfers and Proportion with Assets

Key

— Proportion Receiving Means Tested Transfers

• Proportion with Positive Assets

Proportion (vertical axis): 0.0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9

Relative Crisis Gap (horizontal axis): -0.8, -0.6, -0.4, -0.2, 0.0, 0.2, 0.4, 0.6, 0.8, 1.0
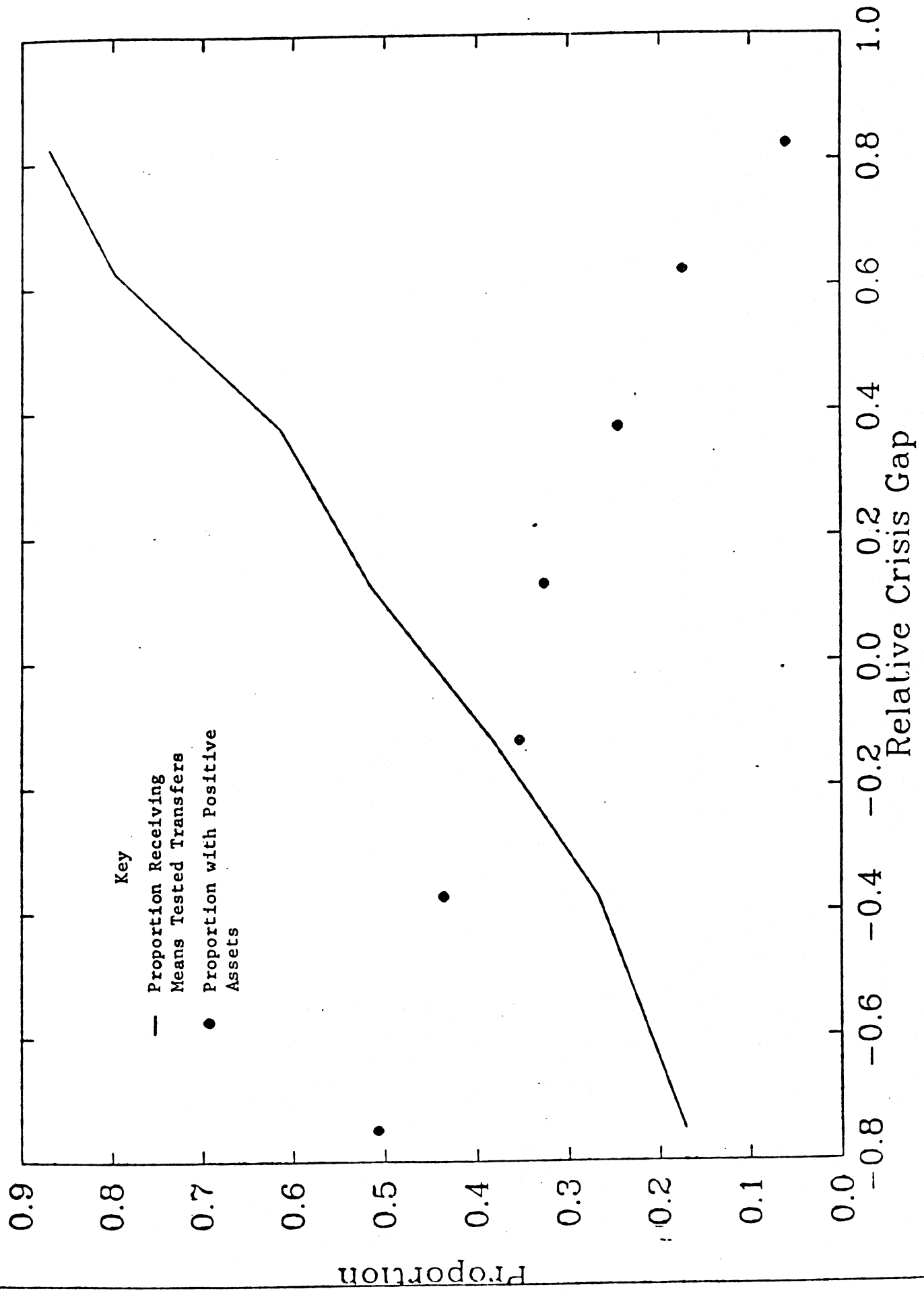
Figure 4
Spline Regression for Transfers, Persons Aged 61 or Less:
by Household Structure
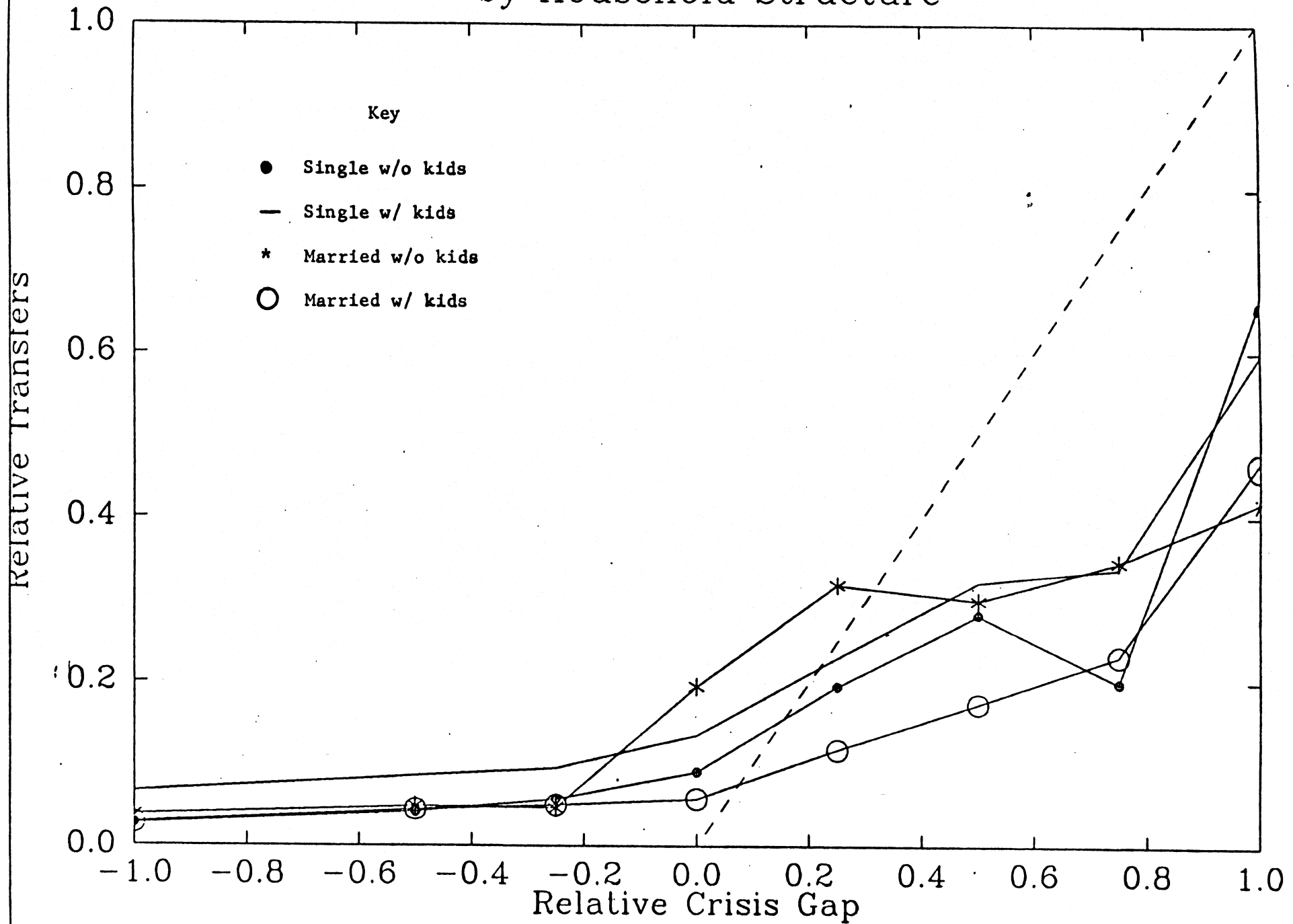
Appendix: Target Efficiency Measures

A. Target Efficiency and the Accounting Period

The original definition of target efficiency (Weisbrod 1969) was the proportion of transfer benefits which go to the poor. Such a definition is obviously dependent on the accounting period used to define the target group, the poor. For example, if those poor in one month are assumed to be the relevant target group, and transfers are perfectly targetted to that group, then it should not surprise us that target efficiency measured on some other accounting period will be less than 100 percent--those poor in one month and receiving a transfer may not be poor on an annual basis. Short accounting periods open the possibility of another target efficiency measurement problem: lags in benefit receipt. For example, a person may receive a benefit payment for previous unemployment in the next month when the person has a job and other income. The severity of this problem is an empirical issue.

B. Criteria for Transfer Effectiveness Measures and Weaknesses of Traditional Measures

Several measures of transfer efficiency have appeared in the literature ranging in time from Weisbrod (1969) to Weinberg (1986)).

1. The proportion of transfer benefits which go to those in households with income below the poverty line.

2. The proportion of transfer recipients who live in such poor households.

3. The proportion of transfer benefits used to alleviate poverty (counts benefits only up to poverty line). (Weinberg 1985)

4. The (mean) proportion of the poverty gap filled, where the gap is the difference between pre-transfer income and the poverty line.

5. The proportion of households who are below the poverty line after transfers.

These traditional target efficiency measures are not ideal. We propose four criteria for good measures of transfer effectiveness. The list is not exhaustive. (I) If more real dollars are transferred to the poor, the measure should rise, other things equal. Total dollars transferred is clearly a relevant measure of how pro-poor transfers are. (II) The measure should complement the concept of economic efficiency. Economic efficiency is meant in the usual way: delivery of the same level of benefits at lower cost. (III) Dalton's Principle of Transfers: redistributions from the less needy to the more needy within the target population should raise measured effectiveness. (IV) The measure should not be sensitive to the exact way we measure the low income target population.

Consider the first two criteria. Measures based on the proportion of benefits which go to those in the target group (measure 1) will not satisfy criteria 1. For example, a doubling of the transfer payments to each recipient increases well being but will not increase this measure. Measures which use the poverty gap, like measures 3 and 4, will meet it. While this criterion has some conceptual appeal, it assumes that we can choose any level of funding. In these times of tight budgets, it is perhaps more reasonable to assume a transfer budget

In this model it is straightforward to show that the net poverty gap after transfers should be equalized for those with $W=1$, and transfers set to zero for the others. Define the pre-transfer poverty gap G as $G_i = PL_i - Y_i$. This says that all households with $W=1$ should have after transfer income of $YE = G_i + T_i$, equal for all households. We can solve for YE as a function of T, the aggregate poverty gap, and the number of positively weighted households.

Thus transfers should correlate exactly with the poverty gap, that is, the proportion of the poverty gap filled must be the same for all. Of course, other weighting schemes would allow higher after transfer gaps for those with lower weights. We suggest a method based on regression to measure departures from this welfare optimum.

Measuring Transfer Effectiveness

The idea of equalizing net gaps at YE has a graphical interpretation:

Poverty Gap=PL-Y
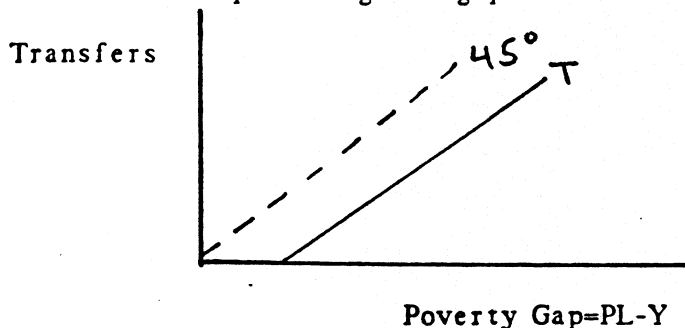
The social welfare optimum requires that all post-transfer incomes lie along a line of slope one and intercept YE in the above picture. That is, all households should be left the same distance below, or above, the poverty line. The distance between the 45 degree line and the transfer regression line is the after-transfer gap. Increases in the poverty threshold would be represented by shifting up this 45 degree line. One measure of effectiveness would be the correlation between transfers and the poverty gap--less correlation lowers social welfare--but the picture has further implications.

We can run a simple regression of transfers on the poverty gap, $T = a + b*G$ for a particular population of interest, or we can allow a flexible shape for the regression function as is done in the text. Two attributes are of particular interest:

1. The larger the variance about the regression line, the lower is social welfare. This can be measured by the standard error of the regression, or by the R which is unit free but does depend upon b. If the transfer system pays differing amounts to those with the same need, as measured by the poverty gap, social welfare is lowered.

2. The slope of the line should be one for the simple weighting scheme above. If we use a different weighting scheme that weights the poorer more heavily, the after transfer gap should be less for this group. The slope tells us how the transfer system treats those with greater need relative the those with less need.

We emphasize that these two attributes are not sensitive to the exact definition of the low income population or to the definition of the gap. An effective transfer system should provide more

of fixed size, and proceed to analyze how effectively it is used.

As for criteria II, transfer programs that are measured as more target efficient may be less economically efficient if the taxes implicit in financing the target efficient transfer program cause more inefficiency (deadweight loss). It is very difficult to deal with behavioral incentive effects of taxes in our context in any simple way. (See Garfinkel (1982) chapters 6 and 8 for example.) As others have done, we ignore incentive effects.

Next consider criteria III, the transfer principle. If we take a dollar from a less needy post-transfer household and give it to a more needy post-transfer household, measures 1 and 2 will not change, violating this criterion. Measures 3, 4 and 5 will not change if both households end up above, or both below, the poverty line. But these measures will change if the less needy household ended up above the poverty line, while the more needy household ended up below it. Thus these measures are somewhat sensitive to redistributions.

To evaluate the measures by criterion IV, lack of sensitivity to the exact definition of the target group, consider raising the poverty line by some proportion. Measures 1, 2 and 3 immediately rise, suggesting better targeting. Measure 4 will fall and measure 5 will rise. Below we propose measures less sensitive to this definition.

C. Alternative Measures of Transfer Effectiveness

In this section we propose measures of transfer effectiveness based on a social welfare function approach. Measures developed in this way will generally meet criteria III since the social welfare function explicitly values redistributions from better to worse off. Further, we can derive implications from the approach that are not sensitive to the definition of the target group. We develop a descriptive approach that directly addresses the relationship between transfers and the poverty gap for the low income population.

A Social Welfare Problem

Assume that we want to maximize an individualistic social welfare function by choosing transfer levels for each household, given a fixed transfer budget of T (net of administrative costs). We assume that household utility is a function of post-transfer income $Y_i + T_i$ minus the poverty line consumption level for that household PL_i. (Subtracting the poverty line consumption levels adjusts utility for household size, ie. with equal incomes a smaller household is better off.) The problem is then:

$$\text{Max} \sum W_i \, U(Y_i + T_i - PL_i)$$
$$\text{s.t.} \; \sum T_i = T, \quad T_i > 0.$$

where W is a social welfare weight, which could be allowed to be larger for those with lower incomes, or could be 1 for those in the population of concern and 0 for others.

To illustrate our point in the simplest way, assume we are only interested in the welfare of the broadly defined low income population, say households in the bottom quartile of the income distribution. For these households we set $W_i = 1$, and $W_i = 0$ for others.

transfers to those with greater need, defined in any reasonable way, and should have little variance across those of equal These are the points stated in the text.