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THE ISO-PROP INDEX--AN APPROACH TO THE DETERMINATION OF DIFFERENTIAL POVERTY INCOME THRESHOLDS.

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PUB DATE 67

EDRS PRICE MF-$0.25 HC-$0.84 19P.

DESCRIPTORS- *ECONOMIC DISADVANTAGEMENT, *CLASSIFICATION, *RATING SCALES, ECONOMIC FACTORS, INCOME, SOCIOECONOMIC STATUS, DATA ANALYSIS, ISOPROP INDEX

OUTLINED IN THIS ARTICLE IS AN APPROACH FOR DETERMINING LEVELS OF INCOME WHICH TYPIFY EQUIVALENT LEVELS OF POVERTY FOR FAMILIES IN DIFFERENT CIRCUMSTANCES. THE INDEX IS CONSTRUCTED WITH DESCRIPTIONS OF SUCH FAMILY CIRCUMSTANCES AS NUMBER AND AGE OF PERSONS AND GEOGRAPHICAL LOCATION. THE INDEX CAN BE USED TO DEFLATE FAMILY INCOME SO THAT IT IS COMPARABLE FOR ALL FAMILIES AND ALSO TO ADJUST THE OFTEN CITED $3,000 PER FAMILY POVERTY LINE TO LOCAL AND FAMILY CIRCUMSTANCES. THE INDEX USES AS ITS MEASURE OF EQUIVALENCE THE SHARE OF FAMILY INCOME DEVOTED TO PARTICULAR CATEGORIES OF CONSUMPTION. THUS, FAMILIES THAT SPEND AN EQUAL FRACTION ON NECESSITIES ARE TAKEN TO BE EQUALLY POOR. BASED ON THIS ASSUMPTION, DIFFERENT FORMS OF THE ENGEL CURVES ARE INVESTIGATED, AND THE METHOD IS APPLIED TO DATA FROM THE 1960 SURVEY OF CONSUMER EXPENDITURES. THE DETAILS OF THE THEORETICAL DEVELOPMENT OF THIS SCALE AND PERTINENT FORMULAS ARE ALSO INCLUDED. THIS ARTICLE IS A REPRINT FROM "THE JOURNAL OF HUMAN RESOURCES," VOLUME 2, NUMBER 1, WINTER 1967. (DK)

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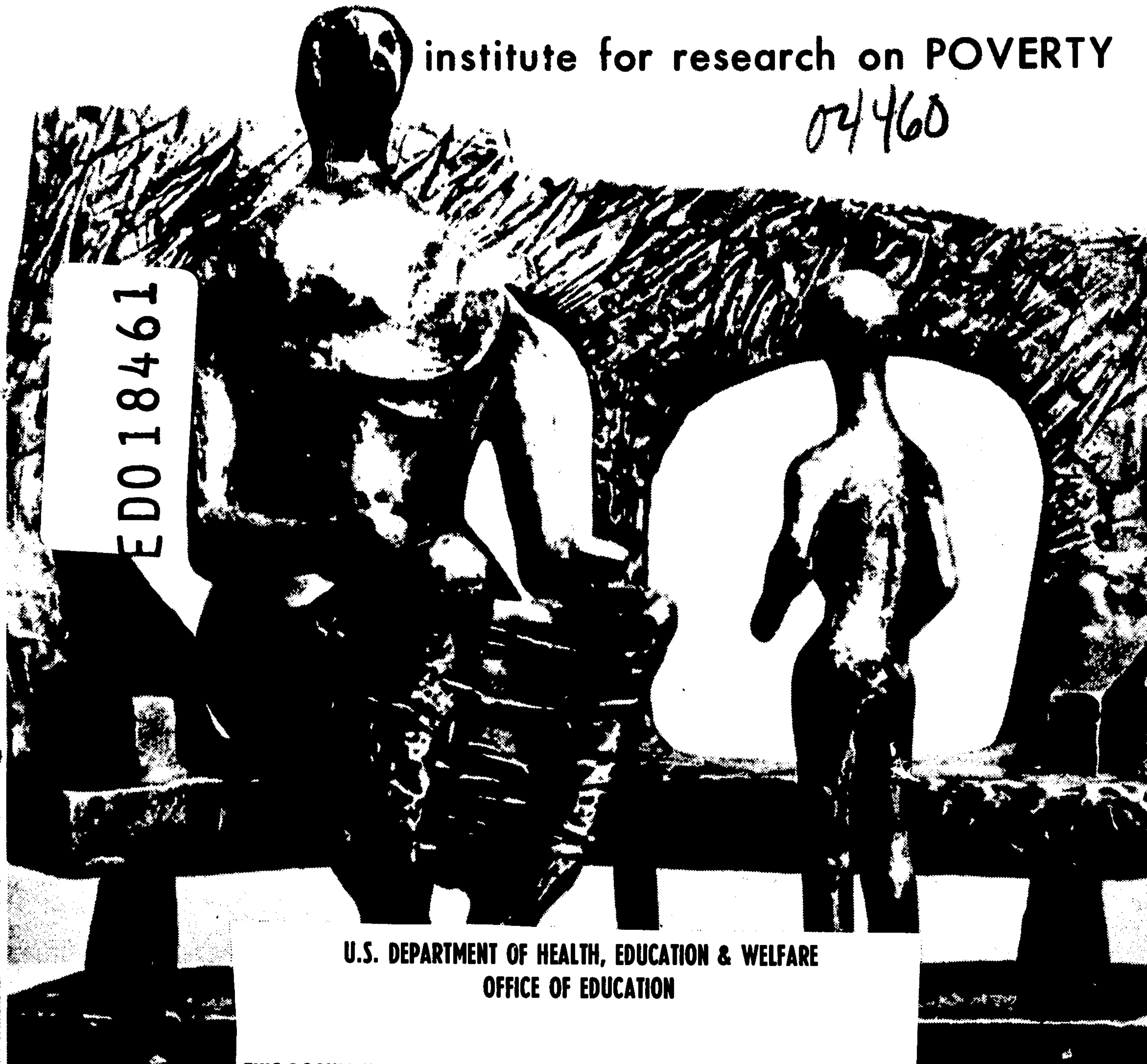

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Harold W. Watts

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THE ISO-PROP INDEX: AN APPROACH TO THE DETERMINATION OF DIFFERENTIAL POVERTY INCOME THRESHOLDS*

HAROLD W. WATTS

ABSTRACT

The problem addressed in this article is that of finding levels of income which typify equivalent levels of poverty for families in different circumstances. An index is constructed which has, as components, descriptions of family circumstances—such as number of persons and geographical location. This index can be used to deflate family income so that it is comparable for all families. It can also be used to provide appropriately differentiated threshold values or "poverty lines" from an initial undifferentiated value, such as the often-cited $3,000 per family used by the Council of Economic Advisers.

The solution tentatively proposed uses the share of income devoted to particular categories of consumption as the basis for defining equivalence; e.g., families that, on average, spend an equal fraction on necessities are taken to be equally poor. Given this proposition, one can derive the index from estimated Engel curves.

The properties and suitability of alternative forms of the Engel curves are investigated, and the method is applied to data from the 1960 Survey of Consumer Expenditures.

INTRODUCTION

Given an initial, essentially arbitrary specification of a poverty income threshold which is intended for a particular family situation, we almost

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* The name Iso-Prop is an abbreviation for iso-proportional, suggested from the general category of index numbers based on equivalence in terms of the fraction of income (or some other total available for disposition) allocated to a class of expenditures (or subset of possible dispositions). The author would like to acknowledge here the assistance and support of Mr. David Horner who has been in charge of the statistical processing.

immediately face the problem of determining "equivalent" thresholds for families in different situations. The original $3,000 threshold used for the initial, admittedly crude, inventory of poverty was roughly intended to be applied to a non-farm family of four persons. The $1,500 threshold for an individual living alone was the first attempt at a differential threshold for a contrasting situation. The intent, in rather vague terms, was to determine the level of income which would allow a single individual to live no better than the average person in a four-person family receiving $3,000.

The next level of refinement, carried out by Mollie Orshansky, provided a more complete set of family size differentials and an adjustment for the particular situation faced by farm families.[1] The family size differentials were essentially based on food budgets providing adequate nutrition for use on an "emergency" basis which had been proposed for alternative family sizes (and composition). These budgets were priced out and multiplied by three, on the grounds that a poor family typically must spend as much as a third of its income on food. This latter assumption implies that the other components of a minimum standard follow the same scale economies as does food, a proposition that has little theoretical or empirical support.

A paper by Elliot Wetzler of the Institute for Defense Analysis explored a slightly different approach to the determination of family size differentials.[2] His index was based on the notion that families spending equal fractions of their income on food are, on the average, equally poor. This approach follows the general line of reasoning used by the Bureau of Labor Statistics in establishing equivalence scales for family size classes.[3] It is also a special case of a procedure considered by Milton Friedman in 1935.[4] Given this proposition, Wetzler is able to infer equivalent income levels from Engel curves estimated for different family sizes. The basic rationale can be illustrated as follows. In Figure 1, hypothetical Engel curves for four-person families and five-person families are drawn along with a line through the origin corresponding to, say, 30 percent of income.

1 Mollie Orshansky, "Counting the Poor: Another Look at the Poverty Profile," *Social Security Bulletin* (January 1965), pp. 3–29.

2 Elliot Wetzler, "Determination of Poverty Cut-Off Levels," Institute for Defense Analysis, Poverty Research Project, Working Paper #6, (October 1, 1965). Forthcoming in *IDA Studies.*

3 Marsha Froeder, "Technical Note: Estimating Equivalent Incomes or Budget Costs by Family Type," *Monthly Labor Review* (November 1960), pp. 1197–1200.

4 Milton Friedman, "A Method of Comparing Incomes of Families Differing in Composition," *Studies in Income and Wealth,* Vol. 15 (New York: National Bureau of Economic Research, 1952), pp. 9–24. A more recent investigation of equivalence scales is found in S. J. Prais and H. S. Houthakker, *The Analysis of Family Budgets* (New York: Cambridge University Press, 1955).

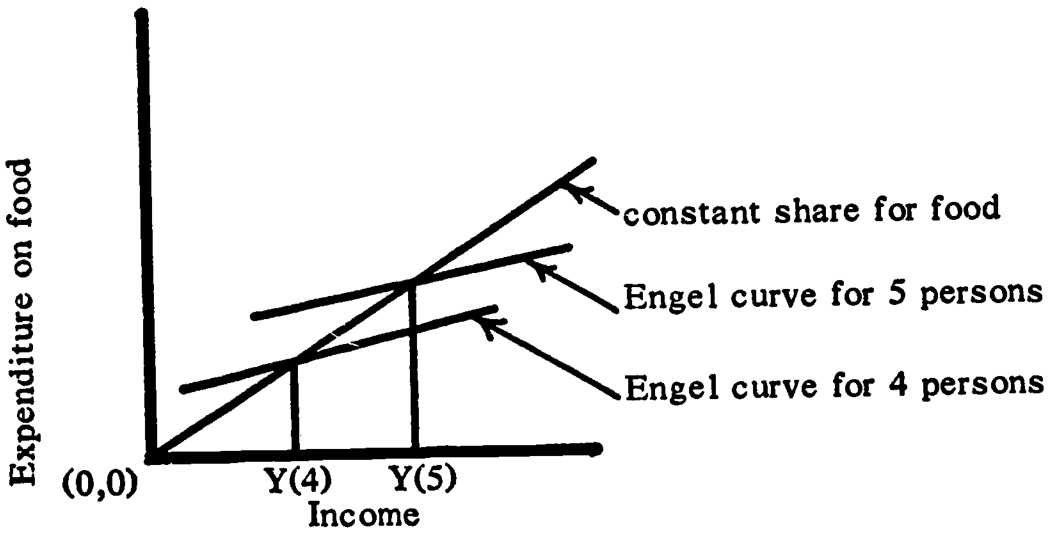


FIGURE 1

According to the Engel curves, four-person families spend 30 percent of their income on food when their income is Y(4). Similarly, five-person families with an income of Y(5) spend 30 percent of it on food. We infer, then, that Y(5)/Y(4) is an appropriate index for changing a given four-person threshold into an equivalent threshold for a five-person family. Wetzler's application of this method resulted in family size differentials which were roughly consistent with those provided by Orshansky. This is not surprising, in one sense, because they are both based on food expenditures and on constant expenditure shares across family sizes. On the other hand, the two methods do not combine the ingredients in the same manner, and they could have produced quite different results.

A current need for guidance in establishing poverty threshold differentials for regions and for the urban and rural segments of the non-farm population has motivated further research along these lines. On an intuitive basis, it seems obvious that a family of four living on $3,000 in Harlem is poorer than a family of four with the same money income living near Canton, Mississippi. This does not imply that the Southern rural family is affluent or even comfortable, but it does imply that a flat nationwide poverty threshold will include some rural Southern "near-poor," while excluding some urban Northern families who are relatively much worse off. In order to obtain a more accurate assessment of the location and other characteristics of the poverty population, it is necessary to seek differential thresholds which correspond more closely to "equivalent" levels of welfare.

Price discrepancies are an important component of the geographical differentials, but it should not be assumed that they are the only reason for distinguishing poverty thresholds by location. Other features of the environment, such as climate, predominant patterns of product distribution, availability and quality of publicly provided goods and services, transportation facilities, etc., all bear upon the quality of life at the $3,000 level. A differential that allowed only for price deviations would probably be an improvement over the flat nationwide standard, but it would leave out a large category of important, possibly offsetting, determinants of the "welfare value" of a given money income.

In the theoretical and empirical analysis which follows, the Wetzler–BLS–Friedman approach is examined as a method for arriving at geographic differentials. It is probably impossible to give an entirely rigorous or even convincing argument that this procedure adequately reflects all the factors which relate to locational differentials. The method proceeds from the proposition that expenditure fractions change as the "level of life" changes, advanced by Engel himself, to the use of such fractions as indicators of living levels. To the extent that the expenditure category covers a fairly broad range of goods and services, allowance is made for substitution according to local variation in taste, need, and relative prices. Moreover, as will be seen below, the procedure does yield results that are stable and in accord with one's *a priori* notion.

The procedure's most certain advantage lies in its objectivity—it can be calculated directly from measures of observable household behavior as reflected in available data. Its most serious deficiency, in the view of those who prefer to base equivalence on technically prescribed levels of minimum adequacy (e.g., for nutritional intake), is that it may not produce threshold levels which admit the possibility of attaining all such minimum levels.

THEORETICAL DEVELOPMENT

Stated in general terms, we wish to construct an index, I (family size, location, . . .), which can be multiplied into a basic poverty threshold, Y_o, defined for a particular (roughly typical) family situation, in order to obtain "equivalent" poverty thresholds for a wide range of situations. The arguments of I can include any number of descriptors of a family situation, but availability of data, both for estimation and application, provides practical limitations, and there are probably a fairly limited number of variables which make a noticeable difference in the poverty levels.

Symbolically, let N and L denote family size and location, respectively. Then

$$Y(N,L) = I(N,L) \cdot Y_o$$

where

$$I(N_o,L_o) = 1.0$$

and Y_o is the basic threshold for location L_o and family size N_o. We will further seek an index $I(N,L)$ that can be factored into two indices; i.e.,

$$I(N,L) = I(N) \cdot I_2(L),$$

and further, an index I_2 that can be factored into a regional index and a rural–urban component; i.e.,

$$I_2(L) = I_3(R) \cdot I_4(r)$$

In other words, the adjustment factor for a rural resident is constant, regardless of region or family size. The family size and region indices are similarly independent of other circumstances.

Consider now a general category of Engel curves:

$$E = E(Y,N,L)$$

where E is expenditure on some group of goods and services, Y is total income, N is family size, and L is location (perhaps represented by binary variables). The proportion of Y spent on E can easily be obtained from such a function and can be written as:

$$\lambda = E/Y = P(Y,N,L)$$

Assuming that P is monotonic in Y (decreasing if the goods are necessities), this function can be "solved" to yield Y explicitly as a function of λ, N, and L. This form of the relation can be written:

$$Y = Y(\lambda,N,L)$$

The Iso-Prop Index can now be defined very easily as the ratio of the relation above to the same function evaluated for a base family size and location, where both functions use the same expenditure proportion.

$$I(\lambda^*,N,L) = \frac{Y(\lambda^*,N,L)}{Y(\lambda^*,N_o,L_o)}$$

A commonly encountered family of Engel curves is characterized by constant income elasticities. Such curves are usually estimated by "double-log" linear regressions. With allowance for variation according to family size and location, this family can be expressed as:

$$E = Y^b \cdot f(N,L)$$

where b = the income elasticity of expenditures. The corresponding P-function is:

$$\lambda = E/Y = Y^{(b-1)} f(N,L)$$

Solving for Y produces:

$$Y(\lambda,N,L) = \left[\frac{f(N,L)}{\lambda}\right]^{\frac{1}{1-b}}$$

The Iso-Prop Index is simply:

$$I(\lambda^*,N,L) = I(N,L) = \left[\frac{f(N,L)}{f(N_o,L_o)}\right]^{\frac{1}{1-b}}$$

In this case the index is independent of the choice of λ. This is a consequence of the constant elasticity property and does not hold in general. The independence implies that the index would be equally valid for poverty thresholds or affluence thresholds. In the empirical analysis which follows, constant elasticity functions will be used, but some attention will be given to evaluating their suitability and to avoiding the consequences of incorrectly assuming constancy.

If $I(N,L)$ is to be factorable into family size and location components, then the logarithm of $f(N,L)$ above must be composed of additive parts. That is:

$$\ln\left[f(N,L) \right] = g_1(N) + g_2(L), \text{ etc.}$$

The index for family size will then be simply:

$$I(N) = \exp\left[\frac{g_1(N) - g_1(N_o)}{1-b}\right]$$

and for location:

$$I(L) = \exp\left[\frac{g_2(L) - g_2(L_o)}{1-b}\right]$$

As with the income part of the Engel curve, the empirical analysis will use very simple forms for the g functions. For $g_1(N)$ a simple log-linear form is used, i.e., $g_1(N) = \rho \ln N$. This implies a constant elasticity of expenditure with respect to variations in family size. Some tests of this restriction are made. For $g_2(L)$ a binary-coded representation of region and urbanization is introduced.

ESTIMATION PROCEDURES AND DATA

Application of the ideas described above has been carried out for two categories of expenditure: for food and for a group of expenditures roughly corresponding to necessities—food, housing, clothing, and transportation. Preliminary regressions were carried out using income before tax and income after tax as alternative income measures. Because the results were quite similar in qualitative terms for both measures, and because the officially recognized Orshansky thresholds are in terms of total money income before tax, only the pre-tax income regressions are reported here.

In addition to the variables already mentioned, the age of the household head and a binary variable for homeowners were introduced into the expenditure function. The intent, at present, is only to provide an appropriate control for these variables. In principle, such variables could also be used as further arguments of a more detailed Iso-Prop Index, but that would require more careful consideration of the appropriate form for the age function.

The basic regression function can be written:

$$\ln E = a + b \ln Y + c \ln N + d_1R_1 + d_2R_2 + d_3R_3 + d_4r + fA + gH + U$$

where $E =$ expenditure on food or necessities

$Y =$ income before tax

$N =$ family size (number of persons)

$$R_1 = \begin{cases} 1 \text{ for North Central Region} \\ 0 \text{ for other regions} \end{cases}$$

$$R_2 = \begin{cases} 1 \text{ for South Central Region} \\ 0 \text{ for other regions} \end{cases}$$

$$R_3 = \begin{cases} 1 \text{ for West Central Regions} \\ 0 \text{ for other regions} \end{cases}$$

$$r = \begin{cases} 1 \text{ for rural (non-farm)} \\ 0 \text{ for urban} \end{cases}$$

$A =$ age of household head in years

$$H = \begin{cases} 1 \text{ for homeowners} \\ 0 \text{ for others} \end{cases}$$

$U =$ error term

The data were taken from the tabulated summaries of the 1960 Survey of Consumer Expenditures. Mean values of the variables listed above were available for households jointly classified by income (intervals), family size, region, and urban–rural. Each set of mean values was weighted by the sample frequency in the corresponding cell; then the regression was carried out according to the usual procedure for fitting by least-squares to grouped data.

The use of grouped data leads to a minor loss of efficiency for coefficients of the variables defining the groups. Since non-linear transformations have been used on linear aggregations of the expenditure, income, and family size variables, some biases should be expected relative to the ungrouped data. For variables such as age and home ownership, the grouped data is likely to obliterate a major part of the basic variation.

Two kinds of variations on the basic regression have been tried. First, the regression has been fitted to different sub-sets of the data, on the grounds that constant elasticity restriction will introduce less distortion over limited ranges. Second, additional terms were introduced to measure and test for departures from constant elasticity. These variations will be specified in detail as the results are discussed below.

THE EMPIRICAL RESULTS

The regression coefficients obtained by fitting the basic equation above to alternative sets of observations are displayed in Table 1. The three upper rows pertain to the "basic necessities"—food, housing, clothing, and transportation. The lower three are for food alone. In all cases, the income elasticities are well below unity, being somewhat lower for food than for the more inclusive expenditure category.[5] The family size elasticity is also substantially less than one, but shows a larger elasticity for food than for all necessities.

The regressions denoted by I used the full range of the data. More than 95 percent of the variance of expenditures in the grouped data was accounted for by the regression. The average deviation from the regressions was around 5 percent in both cases. The II regressions were limited to the income classes between $1,000 and $5,000 and family size classes from 3.0 to 5.9 persons. With the more limited range, the multiple R^2 dropped to .88 for basic necessities and .83 for food, but the average deviation also fell to 4.5 percent, indicating some improvement in fit for the narrower range. The regressions in case III attempt a compromise. A

5 The excluded uses of income are saving and expenditures on personal care, recreation, reading, education, medical care, and other items totaling less than 2 percent of the budget.

TABLE I

REGRESSION COEFFICIENTS FOR ALTERNATIVE ESTIMATES OF ENGEL CURVES

		Variable (Estimated Error in Parenthesis)								
					Locational Binaries					
		Constant term	Income (log)	Family size (log)	North Central	South	West	Rural	Age	Home ownership
Expenditure	I[a]	.201	.595	.186	−.083	−.131	−.043	−.077	−.041	.103
		(.057)	(.010)	(.013)	(.012)	(.013)	(.014)	(.012)	(.009)	(.033)
on necessities	II	.018	.652	.238	−.067	−.078	−.035	−.030	−.028	.018
		(.187)	(.038)	(.063)	(.031)	(.029)	(.038)	(.032)	(.028)	(.096)
(log scale)	III	.252	.522	.230	−.072	−.172	−.058	−.058	−.042	.069
		(.102)	(.030)	(.029)	(.023)	(.022)	(.027)	(.021)	(.016)	(.061)
Expenditure	I	−1.044	.458	.412	−.131	−.190	−.073	−.090	.024	.033
		(.062)	(.011)	(.014)	(.014)	(.014)	(.015)	(.014)	(.010)	(.037)
on food only	II	−1.187	.489	.472	−.134	−.162	−.136	−.050	.031	.010
		(.196)	(.040)	(.066)	(.032)	(.030)	(.040)	(.034)	(.029)	(.101)
(log scale)	III	−1.029	.376	.466	−.109	−.192	−.080	−.082	.018	.107
		(.127)	(.037)	(.036)	(.028)	(.028)	(.033)	(.026)	(.019)	(.076)

[a] I: regression carried out for all income and family size classes.
II: regression carried out for income class $1,000–5,000 (four classes); and family sizes 3–5 (three classes).
III: regression carried out for selected income classes in proximity to poverty threshold for each family size class (see footnote 6).

different range of income classes was selected for each family size, so as to include only income classes in the "neighborhood" of the current poverty thresholds.[6] The reasoning behind this tactic was that the constant elasticity assumption is more defensible at and around a given level of welfare. Here the R^2's are around .95, and the average deviations are 5 and 6 percent for basic necessities and food, respectively. In general, the relations fit quite closely and seem to be reasonably stable.

Iso-Prop Indices for region based on the North East (i.e., $I(\text{NE}) = 100$) can be computed quite readily from the regression results. According to the theory developed above, the index for the North Central region derived from the first row in Table 1 is:

$$
\begin{aligned}
I(\text{NC}) &= \exp(-.083/.405) \\
&= \exp(-.205) \\
&= .815
\end{aligned}
$$

or 81.5 (on a scale with base 100). Similarly, the index for rural areas is 82.7 relative to urban areas at 100. According to the logic by which the index was constructed, the index for North Central rural areas relative to North East urban areas would be:

$$\frac{81.5 \times 82.7}{100} \text{ or } 67.3$$

One further step is needed to eliminate the arbitrary choice of North East urban areas as the basis of comparison. Clearly, the index could be based on any other choice of location by a simple process of re-normalization. It is also possible to obtain an "average" location which can be defined as base and assigned an index value of 100. Such a procedure is adopted here. We will want to apply the index to prevailing national threshold levels, and these presumably represent some base considered to be an "average" location. Consequently, the choice of base determines the average level of the resulting thresholds and ultimately affects the number of persons below the poverty line. While it is impossible to infer from available data just how the index should be normalized to maintain

6 Selected income classes are as follows for respective family sizes:

1 person	$ 0–2,000
2 persons	1,000–3,000
3 persons	1,000–4,000
4 persons	1,000–5,000
5 persons	2,000–6,000
6 persons or more	2,000–7,500

a constant total number in poverty, it is clear that some weighted (geometric) average of the index values must equal 100. The following weights have been used to provide an approximate normalization base:

North East	20%
North Central	25%
South	40%
West	15%
Urban	75%
Rural	25%

These weights were chosen on the basis of the current distribution of the poverty population and notions as to how it would shift if a locational index were to be applied.

Tables 2 and 3 contain normalized index values for the regressions in Table 1, as well as for several others not reported in regression form. The index values corresponding to I, II, and III are shown in lines 1, 4, and 6, respectively. Lines 2, 3, and 5 are all from similar regression equations fitted to different truncations of the data base, as explained in the stub headings.

The index values in line 7 were derived from a regression which allowed for different family size elasticities for the range below 2.5 persons, between 2.5 and 5 persons, and more than 5 persons. For both food and basic necessities, the elasticity tended to increase in the midrange and decrease for larger families (for given income levels). Only in the case of necessities did these variations in slope or "kinks" prove to be statistically significant. The locational index values were only slightly affected by this modification, as can be seen comparing lines 6 and 7 in the two tables.

Comparisons among the lines in Table 2 and 3 show substantial variation in the index, depending on which sub-set of data was used for estimation. To the extent that the all-inclusive regressions were influenced by the behavior of the affluent part of the sample, we would prefer the more limited regressions based on behavior at and around the poverty line. Tests, carried out by introducing "kinks" into the log-linear regression, rejected the hypothesis that income elasticity is constant. This further supports the notion that the more limited data base may provide results that are more appropriate for the poverty population.

Figure 3 represents graphically the values of the index in line 7 for the "selected income classes" with "kinks" in the family size relation. The lefthand bars are based on basic necessities; the righthand on food. The dollar scale shows the levels that are equivalent to $3,000 for an "average" family of four. At these income levels, such a family with a 40-year-old head and renting its dwelling would spend approximately 80 percent of its income before taxes on the four components of basic necessities.

TABLE 2

ISO-PROP INDICES BASED ON CONSTANT RATIO OF EXPENDITURE ON "NECESSITIES" TO PRE-TAX INCOME, NORMALIZED INDICES[a]

Data Base for Estimation	North East		North Central		South		West	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
1. All income classes, all family sizes	1.277	1.055	1.039	0.959	1.020	0.843	1.148	0.948
2. Income classes 1–4,[b] all family sizes	1.305	1.094	1.077	0.903	0.870	0.730	1.210	1.014
3. All income classes, family sizes 3–5	1.206	1.079	0.995	0.890	0.958	0.857	1.066	0.954
4. Income classes 1–4, family sizes 3–5	1.192	1.094	0.982	0.901	0.951	0.873	1.078	0.989
5. Income classes 0–6,[c] all family sizes	1.326	1.097	1.078	0.892	0.876	0.725	1.188	0.983
6. Selected data regression without kinks	1.259	1.115	1.081	0.958	0.878	0.777	1.115	0.988
7. Selected data regression with kinks	1.253	1.096	1.086	0.950	0.885	0.774	1.114	0.974

[a] Based on the following arbitrary distribution of poor by region: North East 20%, North Central 25%, South 40%, West 15%; Urban 75%, Rural non-farm 25%.

[b] Income classes 1–4 ranges from $1,000–5,000 per year family income.

[c] Income classes 0–6 ranges from $0–7,500 per year family income.

TABLE 3

ISO-PROP INDICES BASED ON CONSTANT RATIO OF EXPENDITURE ON FOOD TO PRE-TAX INCOME, NORMALIZED INDICES[a]

Data Base for Estimation	North East		North Central		South		West	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
1. All income classes, all family sizes	1.300	1.101	1.021	0.864	0.917	0.776	1.130	0.962
2. Income classes 1–4,[b] all family sizes	1.307	1.196	1.042	0.953	0.857	0.785	1.136	1.039
3. All income classes, family sizes 3–5	1.285	1.099	0.983	0.841	0.959	0.820	1.069	0.914
4. Income classes 1–4, family sizes 3–5	1.294	1.172	0.995	0.901	0.942	0.853	0.991	0.898
5. Income classes 0–6,[c] all family sizes	1.323	1.093	1.058	0.874	0.897	0.741	1.151	0.951
6. Selected data regression without kinks	1.245	1.091	1.045	0.915	0.915	0.802	1.096	0.960
7. Selected data regression with kinks	1.242	1.082	1.047	0.912	0.918	0.800	1.095	0.954

[a] Based on the following arbitrary distribution of poor by region: North East 20%, North Central 25%, South 40%, West 15%; Urban 75%, Rural non-farm 25%.

[b] Income classes 1–4 ranges from $1,000–5,000 per year family income.

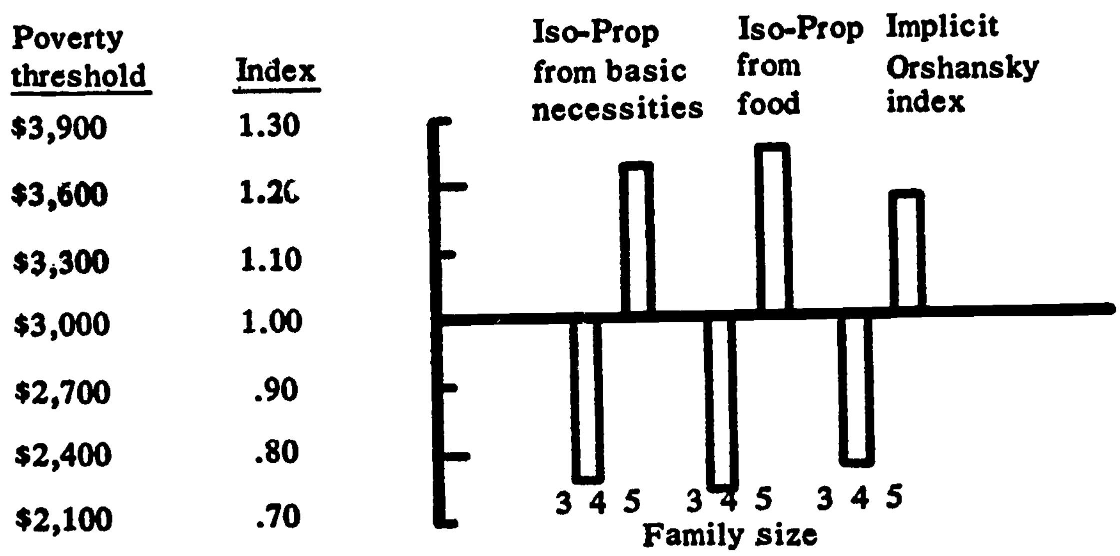
[c] Income classes 0–6 ranges from $0–7,500 per year family income.

Close to 32 percent of total income would be spent for food alone, according to the estimates of the food relation. At the same income, the expenditure fractions would be about 10 percent higher for homeowners, i.e., 88 and 35 percent, respectively.

The same regressions provide family size adjustments based on the same rationale as the regional differentials. Although the emphasis here has been on the regional analysis, it may be of some interest to examine the Iso-Prop Index for family size. Figure 2 displays the index values of family sizes 3, 4, and 5 for the "central" segment of the regressions, which included the variable slopes for family sizes. For comparison, the index implied by the Orshansky thresholds is also presented. An adjacent scale indicates the threshold levels based on $3,000 for a family of four.

CONCLUDING REMARKS

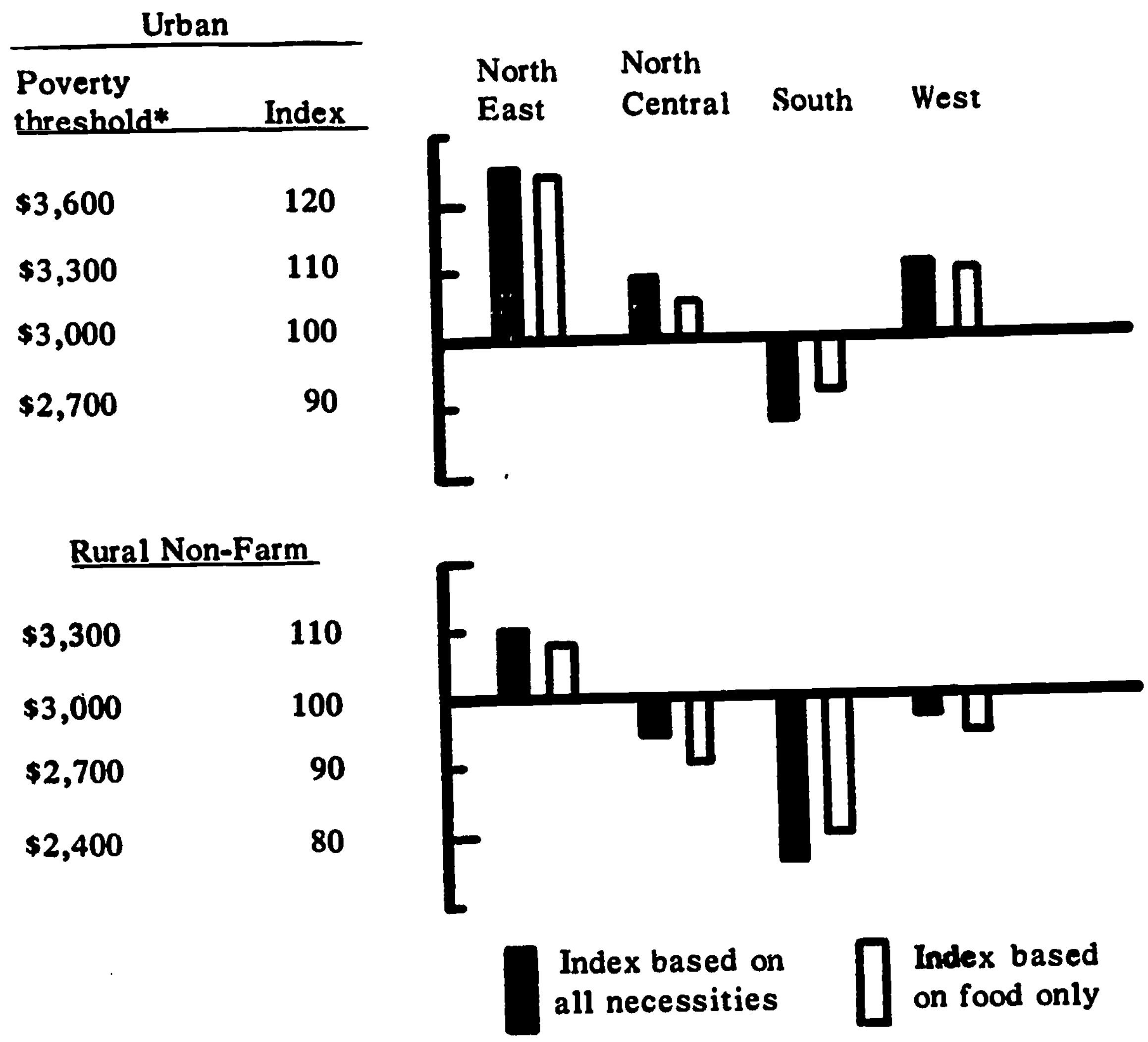
On the basis of the analysis above, the Iso-Prop Index appears to be a promising approach to the problem of equivalent income levels. It is based on observable behavior; it does not limit itself to price variations alone; and it produces results which are both consistent with *a priori* notions and, in the case of family size, similar to the equivalence scales estimated by others.



*Family of 4 = 100

FIGURE 2

ISO-PROP INDEX VALUES FOR ADJUSTING POVERTY THRESHOLDS BY REGION AND URBANIZATION



*based on $3,000 for a non-farm family of four persons

FIGURE 3

INDEX FOR FAMILY SIZE DIFFERENTIALS*

The locational differences appear to be reasonably well estimated in the various regressions. The resulting index values can be taken as a reasonable approximation to the "true" ratios of incomes that equalize expenditure shares. However, the index, even if it is approximate for the adjustment of poverty lines, does not provide a complete solution to the problem of localized poverty thresholds. In particular, the border between the North East and the South separates the highest and the lowest areas. Probably no one would assert that crossing the Mason–Dixon line implies an abrupt change of $1,000 in equivalent levels of poverty. As an average, and for making general inter-area comparisons, the index would be appropriate. For purposes of detailed local administration, e.g., eligibility tests, it would perhaps lead to improvements, on the average, but would produce individual injustices as well.

Further empirical work is needed to explore the Iso-Prop Index for inter-city variations. This would provide a more convenient way of graduating the equivalence scales at the borders. For this it would be desirable to use the individual observations from the Consumer Expenditure Survey, instead of the grouped data used here. The city tabulations provide means for income classes *or* family size classes, but they are not cross-classified.

In view of the non-constancy of income elasticities, it would also be useful to carry out further research on other forms of the Engel curve. When the elasticity is not constant, the income and expenditure data should be deflated by an equivalence index before the relation is estimated. Perhaps an iterative scheme could be used here to obtain successive approximations to an appropriate index.

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