"Some Poverty Lines Are More Equal Than Others"
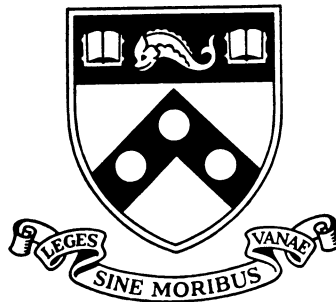
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Abstract

The official poverty measure in the United States, originally developed by Orshansky in the mid-1960s (Orshansky 1963, 1965), is based on estimates of the minimum level of subsistence needed for households of varying age and sex composition. The subsistence level consists of a food budget multiplied by a factor to account for other expenditures, such as transport, housing, health and education. Although the methodology has been criticized on many fronts, it remains the most broadly used, and misused, measure of economic distress for public policy purposes. This paper focuses on one particular aspect of the present conceptual approach to measuring poverty, namely, regional adjustments for differences in geographic location. Indeed, this is a major source of possible differences in poverty thresholds other than differences in household type and size (Ruggles 1990, pps.82-86). Since price levels vary across regions, as they do across countries, a single national poverty threshold overstates the number of poor households in regions with low prices and understates the poverty line in areas with higher prices relative to the national average. However, price level adjustments across U.S. cities, except for food, have not been officially estimated since 1968[1]. This study uses recent Bureau of Labor Statistics price comparisons to estiate area-wide poverty threshold adjustments for a limited set of metropolitan areas in the United States and discusses the sensitivity of the current poverty counts to the estimated regional thresholds.

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1. Introduction

Official estimates of poverty in the United States are based on an income figure which is constant across geographic regions. For example, the official poverty threshold for a family of four in 1990 was $13,359 (Bureau of the Census [1], 1994). Based on this figure, approximately 13.5% of the population was below the poverty line in 1990. This threshold is termed an absolute poverty measure as it is based on an estimate of minimum 'needs', and adjusted for family size and composition by price increases over time.

Relative poverty measures are also adjusted for family size and composition, but rely instead on setting the poverty level at one point in time as a proportion of median incomes, usually 50%. This relative measure is then indexed by the growth in median incomes over time. The main disadvantage of counts based on relative thresholds is that they change as the distribution of income changes. Of course, the two need not be incompatible, and for 1959, the first Orshansky-based threshold for a family of four was at 49% of the median family income. But by 1987 this figure had declined to 37% of the median income (Ruggles 1990, p.45). If we use the median income or relative threshold, 19.7% of the population was below poverty, compared with 13.5% using the absolute threshold. In both cases, relative or absolute poverty lines, the incomes are not adjusted for geographic differences. Although this paper focuses on adjusting absolute poverty measures for the cost-of-living differences, relative measures, that is the value of median household incomes, should also be adjusted.

In the measures discussed above, the poverty thresholds are adjusted over time based either on price increases from one year to the next (the Consumer Price Index (CPI) is the official inflation rate adjustor) or on changes in median incomes (in the case of relative poverty measures). Also, absolute measures may be adjusted by changing incomes instead of prices, or by a combination of the two[2]. The other major factor in calculating adjustments over time is how to account for changing

2

consumption patterns as well as changing prices and incomes. For a comprehensive discussion on the effects of these alternative adjustments, see Ruggles (1990, 39:54). Here we restrict the problem of adjustments to one point in time, but across space.

Section 2 discusses how cost-of-living indexes, or interarea price levels[3], are estimated and Section 3 focuses on differences in the real poverty thresholds across regions using the 1990 Census data and Bureau price statistics as an example. Section 4 discusses the sensitivity of these estimates to changing consumption patterns and Section 5 concludes.

2. Regional Price Levels

The Consumer Price Index (CPI) measures the differences in the rate of change of prices across metropolitan areas, but does not permit us to compare differences in prices in one point in time. For example, in 1989, the average urban CPI for the Northeast was 130.6 while that for the Midwest was 123.0 (the reference period is 1982-84). This means that prices in the Northeast region have risen faster than in the Midwest but does not tell us which of the two regions had higher prices to begin with, and consequently, neither does it tell us whether price levels in 1989 are higher in one region or another.

The CPI is also not suitable for interarea comparisons because it does not directly compare the same goods and services in different areas or regions of the United States. Instead, it relies on pricing a market basket chosen on the basis of probability samples. This implies that, for example, the price of pretzels in the Northeast may be based on the large, soft Philadelphia-style pretzel sold by street vendors, while in the West it may be based on a 12 oz. bag of hard, salt-free, organic pretzels sold in a grocery store (BLS, 1994).

However, it is possible to adjust the item prices in each area to account for such differences. The resulting cost-of-living indexes were first published by the Bureau of Labor Statistics in 1968 and more recently for 24 MSAs in 1981 (BLS,1982). A number of subsequent studies sought to expand the 1981 BLS results, for example, by using differences in climate, in nominal incomes and in housing values (McMahon and Chang ,1991) to predict the cost-of-living in areas not covered by the BLS. Recent work by Shaw (1995) examines the spatial distribution of incomes, also adjusting for

3

differences in housing costs, but not for difference in other consumption goods or services. One of the difficulties of such models is their inherent circularity: differences in nominal levels of incomes often reflect cost-of-living differences, rather than the reverse. For example, preliminary estimates for 10 different areas in Brazil suggest that the poorer regions (in both nominal and adjusted incomes) have higher than average price levels (Aten, 1996), so that nominal incomes are in fact lower than they appear and the gap between rich and poor is greater.

Actual estimation of cost-of-living indexes involves creating a set of multilateral indexes which reflect all the relative prices (and quantities) in each region or area. The most recent and comprehensive, albeit preliminary BLS results, include housing costs in their cost-of-living estimates. These preliminary results use 1988 budget surveys and price surveys to estimate a set indexes through an hedonic approach known as the country-product-dummy or CPD model proposed by Summers (1973) and the generalized EKS method for multilateral comparisons proposed by Caves, Christiansen and Diewert (1982) (BLS, 1994).

In the recent BLS interarea price study, there are 44 geographic areas, consisting of 'self-representing' Primary Sampling Units (PSUs) and 'non-self-representing' PSUs. The former correspond to the Census Bureau's definitions of Metropolitan Statistical Areas (MSAs) , Consolidaded Metropolitan Statistical Areas (CMSAs) or Primary Metropolitan Statistical Areas (PMSAs). The non-self-representing PSUs are made up of cities grouped by size and Census region. For example, Western Region D (nonmetropolitan urban) includes Alamogordo, NM and Yuma, AZ, while Western Region B (medium size urban) is made up of Sacramento, CA, Salt Lake City-Ogden, UT, Tucson, AZ and Fresno, CA.

The multilateral price indexes represent headings which account for roughly 85% of the expenditure categories in the average household's budget in 1988. The indexes are based on monthly and bimonthly price quotes from the Consumer Price Index databases for the period from July 1988 to June 1989. The expenditure categories range from shelter to food to household goods to transportation and medical expenses. Each category is made up of a number of items, for example, vegetables, cereals, meat products, dairy products, coffee, spices and so forth, in the case of food. A selection of estimated interarea indexes for food-at-home are listed below in Table 1.

4

Table 1. Food-at-Home Indexes

Rank	Area	Index
1	Honolulu	139.0
2	Anchorage	125.7
4	New York City	106.7
14	San Francisco-Oakland-San Jose	102.4
25	Seattle-Tacoma	98.6
42	Portland-Vancouver	94.1
43	Minneapolis-St.Paul	93.4
44	Pittsburgh-Beaver Valley	93.3

Source: BLS (1994)

Honolulu and Anchorage are the two highest in this category, at 139 and 126 respectively, possibly reflecting the high cost of transport for fresh produce. Minneapolis and Pittsburgh were among the lowest, at 93.4 and 93.3, respectively. In Minneapolis, the relative price of cereals was low compared to the other areas, and Minneapolis as well as Pittsburgh had the lowest relative prices for dairy products, bringing down their overall food price index. These estimates provide a measure of the range of prices in each area and suggest that food can be nearly 50% more expensive in some cities, a factor which is clearly critical when comparing household incomes across the United States.

3. Adjusting Poverty Levels

Adjustments to the absolute poverty threshold, in dollars, are found by multiplying the dollar amount in each consumption category by the intearea index. For example, the official 1987 poverty line for one person was $5,778. If rents take up 25% of the average househould budget, $1,445, and the New York city rent index is 140, the adjusted amount for rent in New York is $2,023. If no other consumption category is adjusted, the poverty threshold for New York will now be $6,356, an overall increase of 10%.

One of the strongest assumptions that is implicit in the above example is that the proportion of the budget which is spent on rents, as well as on other goods and services is constant for all households. Originally, the official poverty threshold was based on a consumption pattern which provided minimum food standards. This minimum was priced,

and the resulting expenditures were multiplied by a factor of three to account for expenditures other than food expenditures. One third of the budget is thus allocated to food, a figure which is too low according to those who argue that low-income households are likely to spend up to 60% on food, while others indicate how rising incomes and federal aid programs lower the typical food expenditure proportion, from one third to one quarter of total budgets. It has also been shown (Ruggles 1990:70) that the share of food consumption changes as the average age in the household changes[4].

The adjustments presented here use the 1988 average budget allocation of a typical consumer: approximately 20% for food and beverages, 33% for rents and utilities and the remainder divided between transport, clothing and medical expenditures[5]. The breakdown is shown in Table 2.

Table 2: Initial Budget Allocation

Consumption Category	Initial Budget Allocation (%)
Rent	25.0
Fuels and Utilities	7.6
Food at home	9.7
Food away from home	6.2
Alcohol and Tobacco	2.9
Household goods	6.9
Clothing	5.8
Transport	15.8
Medical expenses	3.0
Personal expenses	4.4
Other	12.7
Total	100.0

Source: BLS (1994).

Each consumption category is allocated a proportion of the poverty threshold and the cities or metropolitan areas are adjusted by their corresponding indexes. The resulting values are then added to obtain the new poverty threshold, one for each area. Table 3 shows the adjusted poverty lines based on this consumption pattern. The areas are listed in increasing order or poverty as a proportion of income in nominal or unadjusted terms. For example, the average per capita income in nominal (unadjusted) terms for the New York - Connecticut Suburbs (part of the MSA of New York) was $21,207 and the unadjusted poverty line per person is $5,778. The ratio of poverty to income is therefore 0.27. The corresponding ratio of poverty to income in Anchorage (ranked 39 in the table) is 0.51 ($5,778/$11,233). [6]

Table 3. Adjusted Poverty Lines and Poverty to Income Ratios

	Area	Adj ($)	P/Y Ratio		Area	Adj ($)	P/Y Ratio
1	New York-Conn. Suburbs	6971	0.27	23	Northeast Region: B	5648	0.39
2	Washington DC	6417	0.28	24	Portland-Vancouver	5493	0.40
3	San Francisco-Oakland-San	6973	0.29	25	Cleveland-Akron-Lorain	5516	0.40
4	New Jersey - NY Suburbs	6672	0.31	26	Milwaukee	5738	0.40
5	Boston-Lawrence-Salem	6835	0.32	27	Tampa-St.Petersburg	5501	0.40
6	New York City	6955	0.33	28	Cincinnati-Hamilton	5753	0.40
7	Minneapolis-St.Paul	5980	0.35	29	South Region: B	5379	0.41
8	Baltimore	5959	0.35	30	Pittsburgh-Beaver Valley	5591	0.42
9	Seattle-Tacoma	6202	0.35	31	North Central Region: B	5344	0.42
10	Los Angeles County	6728	0.35	32	Buffalo-Niagara	5689	0.43
11	Chicago-Gary-Lake County	6318	0.35	33	West Region: B	5425	0.44
12	Phila-Wilmington-Trenton	6152	0.35	34	Northeast Region: C	5840	0.48
13	Denver-Boulder	5606	0.35	35	New Orleans	6040	0.48
14	Honolulu	6357	0.35	36	Atlanta	5939	0.48
15	San Diego	6176	0.36	37	North Central Region: C	5332	0.49
16	Greater Los Angeles	6853	0.36	38	West Region: C	5280	0.50
17	Dallas-Fort Worth	5552	0.37	39	Anchorage	6289	0.51
18	Detroit-Ann Arbor	5765	0.37	40	South Region: C	5123	0.52
19	Kansas City MO,KS	5421	0.38	41	West Region: D	5258	0.55
20	Miami-Fort Lauderdale	5835	0.39	42	South Region: D	4896	
21	Houston-Galveston-Brazoria	5576	0.39	43	North Central Region: D	4867	
22	St.Louis-East St.Louis	5412	0.39	44	Northeast Region: D	5589	

Source: Author's estimates based on USBC (1994) and BLS (1994).
Note: Income estimates were not obtained for the three areas ranked 42-44. Consequently their rank does not indicate a high poverty to income ratio, simply a missing value.

Table 3 is plotted on Graph 1. The x-axis is the ratio of poverty to income in each area, in decreasing order, with the last three areas (Ranks 42-44) removed. That is, it is in

the order of Table 3. On the *y*-axis are the ratios of the adjusted poverty line to the official line, the cost-of-living index or price level. For example, New York-Connecticut Suburbs' price level is $6,971/$5,778 = 1.21 (*x*-axis) while its rank is 1 (the lowest poverty to income ratio of 0.27). Areas which are relatively expensive will have adjusted-to-official ratios above one, while areas where the cost-of-living is relatively low compared to the average will have ratios below one.

The points indicate a decreasing adjusted-to-official ratio as we increase the poverty/income proportion. In other words, the price level tends to be above one for areas near the left-sde of the graph and below one as we move to the right of the graph. Thus, the high cost-of-living in areas such as New York implies that poverty lines should be adjusted upward, as it should be adjusted downward for areas with low cost-of-living indexes, and generally higher poverty to income ratios. Clearly this implies that poverty counts based on the official line ($5,778) undercount the *number* of people in poverty in New York and overestimate the number in poverty in Yuma, AZ (West Region D). There are a couple of exceptions. On the low income end, Anchorage, has a high poverty to income ratio of 0.51 (Table 3), but a price level which is also above the average (1.09). This implies that relative prices are higher, by about 9%, than in the rest of the U.S., and the official poverty line should be adjusted upwards, increasing the number of people which should be counted as poor. Similarly, New Orleans has a high poverty to income ratio (0.48) and a high price level (1.05). Poverty counts in both places based on the official line are therefore likely to be understated. The reverse is true for Washington D.C. Although it ranks high in average incomes (poverty/income ratio of only 0.28), the price level is only 1.11, low compared to areas such as New York, Boston and San Francisco with price levels close to 1.20. Here the adjustment is less than expected, although still higher than what the official count would suggest.

For illustration purposes these results are formalized in a regression model estimated below . The natural logarithm of the dependent variable - adjusted to official poverty or *price level*, is regressed on the natural logarithm of the ratio of poverty to incomes in the sampled

8

areas. A total of 41 observations were used. The estimated coefficients and their *t*-values (in parentheses) are given below.

$$\ln(price\ level_i) = -0.326 - 0.367\ \ln(\frac{poverty_i}{income_i})$$
$$(-5.55)\ (-5.99)$$

(adj. R^2 = 0.466, F=35.933, obs=41)

The negative coefficients are as expected, implying that higher poverty to income ratios generally imply lower price levels. The model and the parameter estimates are significant at the 1% level. In the cities where incomes are relatively high (the leftmost points on Graph 1), and the poverty line is about 0.27 or 27% of the mean income, the predicted price level is 1.17, or 117%. This implies that in real terms, a minimum age of $5.50 an hour nationally, is worth only $4.71 in the high income city. Similarly, if we take the low income cities, where the official poverty line is 55% of mean incomes, their predicted price level is approximately 90% of the average, and the minimum wage is worth $6.12 in real terms, or nearly 30% more than in high income areas.

4. Sensitivity of Adjustments

The adjustments above are weighted by the average household budget, as of the latest Consumer Expenditure Survey, for 1988. The original poverty measure was based on a fixed food budget allocation of one third of the total, with the estimated food costs multiplied by three to account for expenditures on other goods and services. As a comparison, we apply the same idea to the official rate of $5,778, that is, adjust only one third of it, or $1,924, by the food indexes in each city, and then multiply the result to account for other expenditures.

Graph 2 shows the results. The variation reflects only differences in food costs,

whereas in the previous section, rents and transport costs, for example, may mitigate or exacerbate some of the differences among cities. New Orleans' price levels rise above Anchorage's, with food costs higher than most other areas excepting the New York - New Jersey suburbs. On the other hand, many of the higher income areas are more dispersed relative to the previous graph, reflecting greater variation in food prices than in the relative prices of all other goods taken together.

A regression model agains shows a downward sloping trend with increasing poverty to income ratios, but a much greater variance. The model and parameter estimates (*t*-values in parentheses) are given below.

$$\ln(food\ level_i) = -0.166 - 0.179 \ln(\frac{poverty_i}{income_i})$$
$$(-2.16)\ (-2.71)$$

(adj. R^2 = 0.137, F=7.37, obs=41)

Using only food consumption weights, the predicted range is much less than the previous model. A price level of 107% is predicted on the high income end (where poverty to income ratios are 0.27) and a 94% price level for ratios of 0.55. This suggests a spread of only 13% compared to the 30% in the previous model. The actual range of price levels in the sample when only food price differences are accounted for is 32.6%: the highest observed price level was 1.22 in New Jersey -New York suburbs and the lowest in the Pittsburgh-Beaver Valley region with 0.89. The latter primarily due to very low dairy product prices relative to the rest of the areas in the sample, as discussed in Section 1. Using all categories, as in Graph 1, the highest price level was found in San Francisco (1.21) versus 0.89 in the South Region C, which includes Corpus Christi, TX, Gainesvill, FL, and Fort Smith, AR-OK, a range of 32% as well.

5. Conclusion

The results are consistent with the notion that earning a minimum (unadjusted) wage in a low income area is likely to take you further than in a high income area, since the latter is also likely to have higher overall price levels. Some exceptions were Anchorage and New Orleans, with both low average incomes and high price levels. Other such as Denver-Boulder are mid to high income (poverty income ratio of 0.35) but have below average price levels (0.97 overall and 0.95 food only). This is of course why proponents of relative poverty lines argue against the use the official, absolute thresholds. However, relative counts, for example, based on the number of people earning less than 50% of the median income should also be adjusted for differences in the cost-of-living or the price level in each area. This is illustrated in Graph 3 which plots the real and nominal poverty lines as 50% of the mean per capita incomes for 1989.

The absolute poverty line would be a straight line on this graph. The differences in the actual population counts based on adjusted absolute poverty thresholds and on real relative thresholds have not been analysed here, but will be in the future, and are likely to vary substantially from current unadjusted values. How much of a difference will these adjustments make? Are the high income areas with understated poverty rates predominantly populated by minorities, or by the very young or the very old? Are poverty counts increasing or decreasing differentially among areas with similar price levels ?

Absolute poverty lines are by definition, subjective in terms of defining what is the 'minimum level' of income needed for subsistence or to satisfy basic needs. In spite of the difficulty in assessing what we mean by poverty or minimum needs, there are a number of other issues related to their measurement which should be taken into account if they are to be used for policy purposes. For example, incomes are currently pre-tax income measures and do not include cash and non-cash transfers or tax credits, nor home equity. Some of these related issues have been addressed in the past , such as adjustments for family size and household composition, but currently, there are no adjustments in poverty rates for differences in the cost of living across cities and geographic areas in the country. For a comprehensive discussion of different measures of income and its distribution, including

11

household wealth, see Wolff (1994).

This paper illustrates the importance of one type of adjustment, showing how price levels may vary by as much as 30% in the United States when geographic differences in the relative prices of food, transport, rents and clothing, as well as other goods and services, are taken into account. The results suggest that there is a systematic over-count of poverty in regions with low incomes, and an under-count in higher income areas. Similarly, the minimum wage goes further in low income than in high income regions of the country. One of the implications of geographic cost-of-living indexes is that attempts to move from absolute to regionally adjusted standards for poverty measures or the minimum wage would very likely induce responses by the poor and by employers in the direction of reducing existing differences. However, given present trends towards local standards for policies affecting those in poverty, the direction of the response is much less certain.
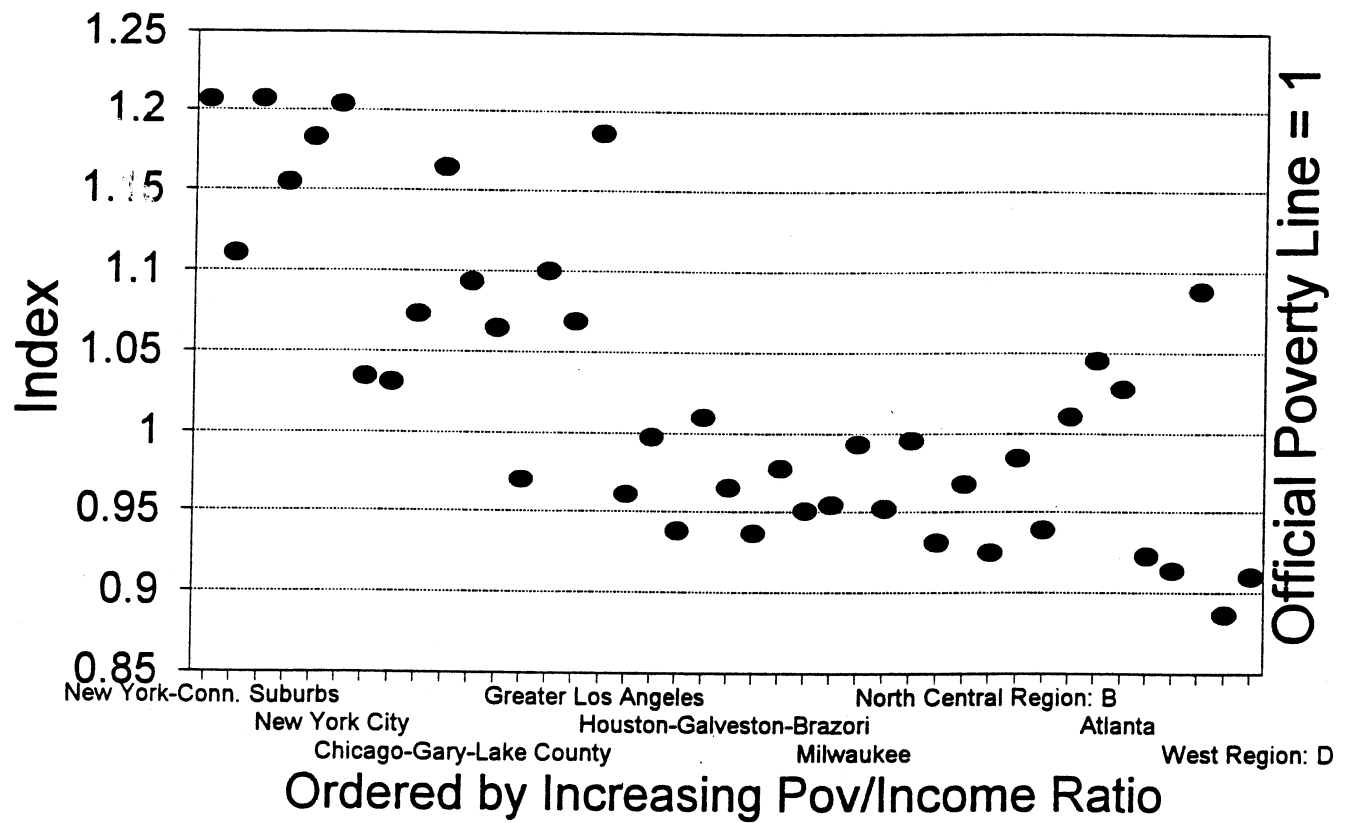
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ENDNOTES

1. Time to time price indexes are, of course, prepared for U.S. metropolitan areas, as discussed below, but they do not tell us the level of prices, only the changes relative to a base year.

2. Table 3.2 in Ruggles (1990) p.43 shows 1987 poverty thresholds under alternative methods of adjusting the threshold over time.

3. The distinction between cost-of-living indexes and price levels in this paper is the following: indexes are _multiplied_ by nominal values to produce an *adjusted* value. Nominal values are _divided_ by price levels to obtain a *real value*. For example, $5,000 in nominal terms is $5,500 in adjusted terms (index = 110), and worth only $4545 in real terms.

4. Until 1981 the BLS published family budgets at 3 levels: lower, medium and high, all based on Consumer Expenditure Survey (CES) data from 1960-61. It was not able to update the CES, however, and was forced to abandon the series (Ruggles 1990, p. 49).

5. In Ruggles (1990, Table 3.2, p.43), an absolute poverty threshold was calculated using a similar budget allocation. It is termed 'Updated Multiplier Standard', and is 1.68 times the official measure. In this exercise, it makes no difference whether we use the official ($ 5,778) or the Updated ($ 9,695) since they are both constant across cities.

6. The nominal per capita incomes for each of the areas in the sample are from the 'Statistical Abstract of the U.S, 1994' (U.S. Bureau of the Census, 1994). If we adjusted the nominal incomes and the adjusted poverty lines, their ratio would be the same as the non-adjusted ratio, since we are assuming the same cost-of-living index for different levels of income.
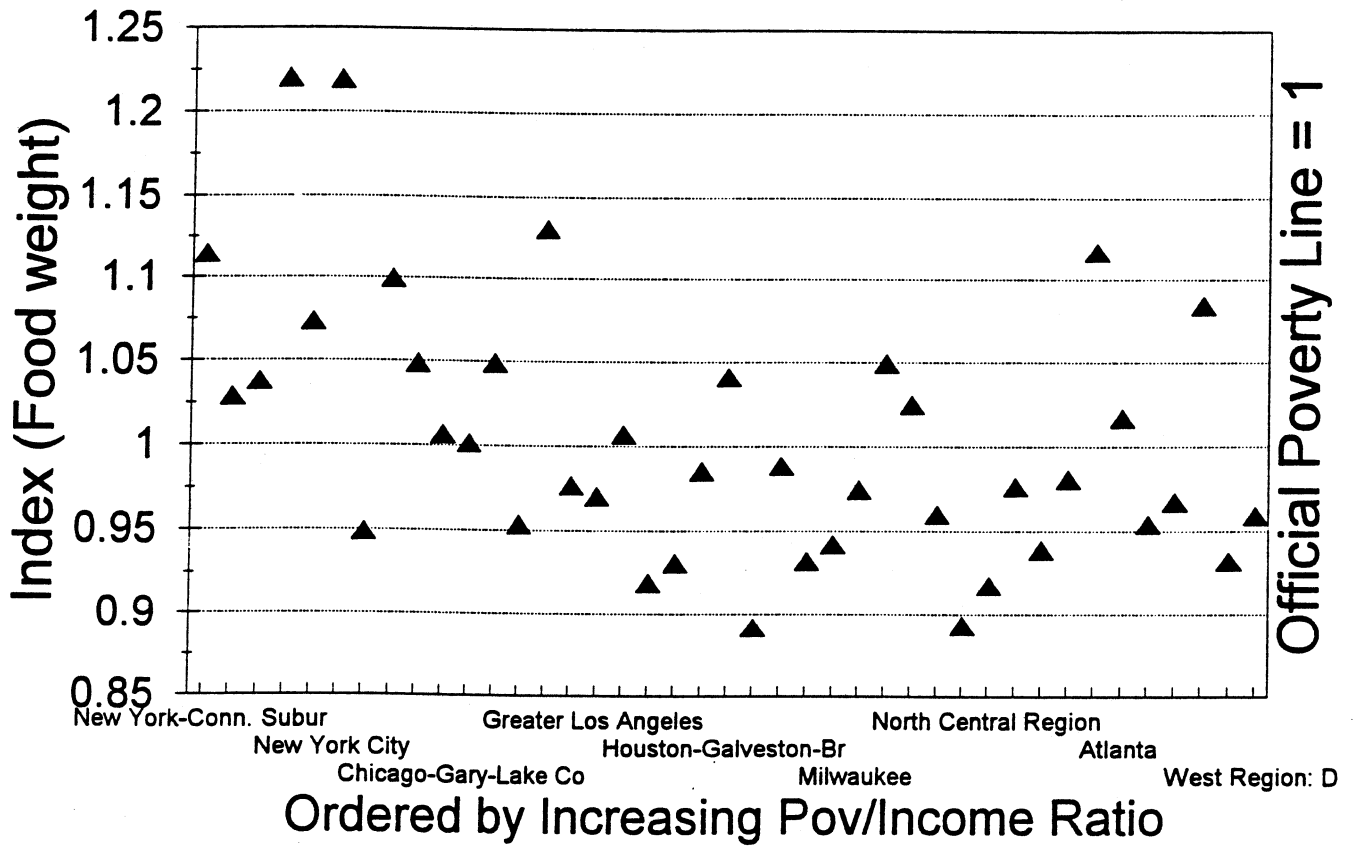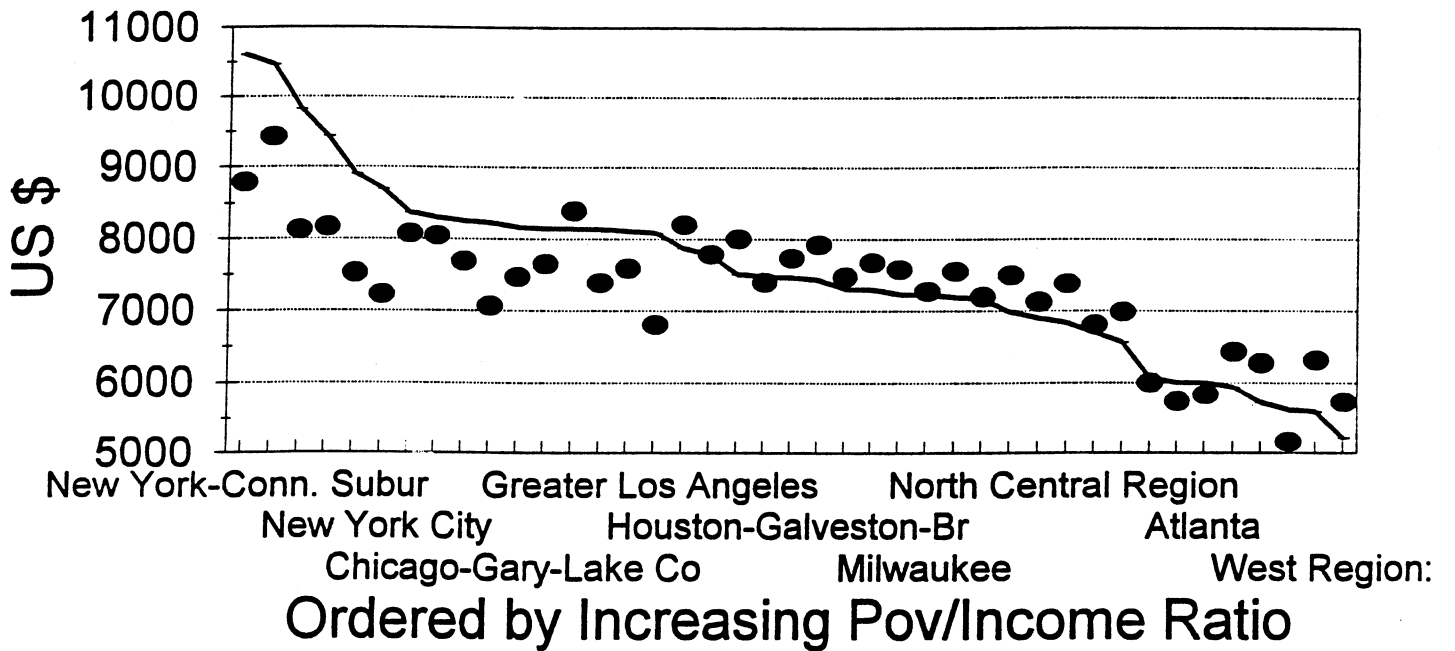
Cost-of-Living Adjustment
Graph 1

Index

Official Poverty Line = 1

1.25
1.2
1.15
1.1
1.05
1
0.95
0.9
0.85

New York-Conn. Suburbs
New York City
Chicago-Gary-Lake County
Greater Los Angeles
Houston-Galveston-Brazori
Milwaukee
North Central Region: B
Atlanta
West Region: D

Ordered by Increasing Pov/Income Ratio

Cost-of-Living Adjustment (Food)
Graph 2

Relative Poverty Lines
Graph 3