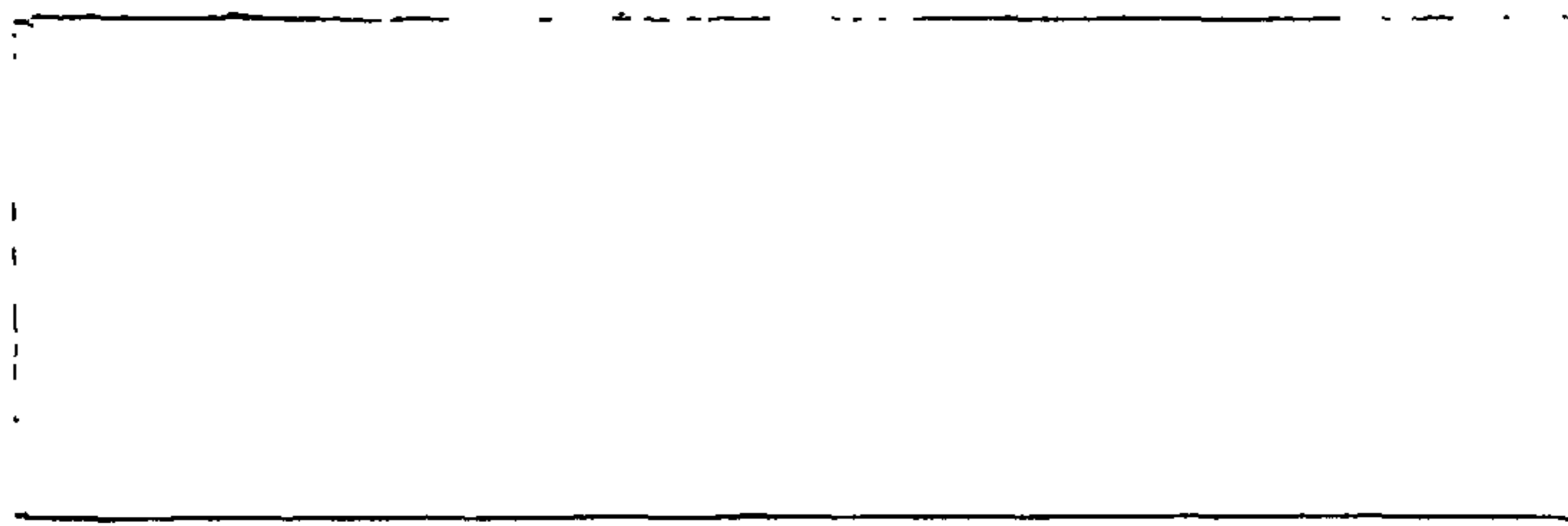


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**THE ANATOMY OF CHANGES IN POVERTY
AND INCOME INEQUALITY UNDER RAPID INFLATION:
ISRAEL 1979 - 1984***

by

Lea Achdut and David Bigman**

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** Bureau of Research and Planning, National Insurance Institute and Faculty of Agriculture, The Hebrew University of Jerusalem, respectively.

THE ANATOMY OF CHANGES IN POVERTY AND INCOME INEQUALITY

UNDER RAPID INFLATION: ISRAEL 1979-1984

Economic theory emphasizes the distributional effects of inflation and its potentially devastating impact on the poor. Unanticipated inflation, so the argument goes, acts mainly to redistribute wealth between debtors and creditors and thus, possibly, between the young and old;¹ a failure to properly adjust the tax structure drives nominal incomes into higher tax brackets and thus raises the real tax burden and further erodes real incomes. The elderly, whose main source of income is pensions and old-age benefits, are particularly vulnerable to the tides of inflation because adjustments in their pensions often lag behind the rise in prices.

The distributional costs of inflation and the negative effects on the weaker segments of the population are somewhat moderated when the government steps up or indexes the social security benefits. The effects of inflation on the distribution of net income - after all the transfer payments are included - may therefore be less acute. Indeed, there appears to be little empirical evidence supporting the view that the poor suffer unduly or that the income disparities between the poor and the rich tend to grow in times of rapid inflation.² These questions, like many others related to inflation, are still the subject of ongoing research, both theoretical and empirical.

The purpose of this paper is to analyze these questions with respect to the Israeli experience from 1979 through 1984. During this period Israel experienced one of the highest rates of inflation in the world which peaked to more than 450 percent annually in 1984. The inflationary wave progressed in three phases: In the five-year period until mid-1979, inflation was relatively low and rather steady, at an annual rate of 35 to 45 percent. In mid-1979 inflation rose rather sharply to an annual rate of 130 percent and remained at that average level until the end of 1983. In 1984 and until June of 1985 inflation jumped to a level of 400 to 500 percent annually and even more. In July 1985 the government of Israel introduced a sweeping package of policies which rolled the inflationary tide back to the level of less than 30 percent annually. These trends are illustrated in Figure A.1 in the Appendix. All these jumps were induced by government policies and thus were largely unanticipated by the public. Wages and most financial assets were, however, protected from the bites of inflation by an elaborate and widespread system of indexation. The more vulnerable sections of the population were cared for by an indexation of all the social security benefits.

Against this background we analyze in this paper the basic trends and the year-to-year changes in poverty and in the income distribution. Our results indicate that over the period 1979 through 1984 as a whole there have been surprisingly small changes in the levels of income inequality and poverty: The Gini coefficient of

income inequality during this 5-year period rose by mere 3.3 percent and the poverty gap rose by 13.8 percent. A careful analysis of the year-to-year changes shows, however, very large differences between the developments in the two years 1980 and 1984 - in which the rate of inflation jumped to higher levels - and the developments in the years 1981 through 1983 - in which inflation was high but relatively steady. Thus, for example, in the three year period from 1981 to 1983, income inequality (measured by the Gini coefficient) has declined by 4.8 percent, and the poverty gap has decreased by 9.6 percent. In 1984, however, as the inflation rate doubled, income inequality rose by 8.8 percent and the poverty gap rose by 19.4 percent.

The primary reason for these striking differences is the effects of government welfare programs on the one hand and of the extensive wage indexation on the other hand. With the rise in inflation, the social security benefits were almost automatically jacked up, the income tax structure was adjusted, and other direct assistance programs were shielded or even stepped up. At the same time the degree of wage indexation was raised and the time interval between consecutive wage adjustments was shortened from one year in the mid-1970's to six, three and finally one month only in the second half of 1984. All these adjustments were introduced, however, only after some lag, since it took time for the policy makers and the labor unions to fully grasp the changes and complete all the necessary administrative and legal arrangements. These lags were the reason for the sharp rise

in poverty and inequality in years of unanticipated jumps in the rate of inflation.

When the welfare programs and the indexation agreements were adjusted, however, these trends were reversed. Paradoxically, though, these adjustments worked to undo any achievement that the government may have hoped to have with the inflationary policies and thus planted the seeds of the next inflationary wave.

I. The Functional Form of Aggregate Poverty Measures

In analyzing the basic trends and year to year changes in poverty, we examined the three factors that determine the level of overall poverty and the changes thereof: (i) the percentage of the poor in the total population, i.e. the "width" of poverty, (ii) the size of the income gap of the poor, i.e. the "depth" of poverty, and (iii) the distribution of the poverty gap among the poor, i.e. the "relative deprivation" aspect of poverty. Different poverty measures represent, however, different sensitivities to each of these factors and thus may register different degrees of intensity of the poverty problem and perhaps even different trends in the development of poverty over time.

Similarly, different income inequality measures such as the Gini coefficient, the coefficient of variation and the Atkinson measure also reflect different sensitivities to income changes at different ranges of the income distribution. The Gini coefficient, for instance,

is relatively insensitive to income changes at the middle range. The coefficient of variation (CV) does not distinguish between income changes at the upper or the lower tails, and thus does not satisfy the principle of transfers of Dalton (which requires that a finite sequence of transformations transferring income from the rich to the poor has to decrease the value of the inequality index).

The differences between the various poverty and inequality measures are basically a reflection of the different sensitivities of the social welfare functions which are implicit in each measure. In the analysis in this paper we will therefore consider the trends in poverty and inequality as indicated by a number of indices. This will allow us also to examine the changes at the various ranges of the income distribution.

The differences between alternative inequality measures are well documented in the literature (see, e.g. Atkinson, 1971), and need not be repeated here. In this section we briefly review the functional form of alternative poverty measures and their construction as a function of the three characteristics of overall poverty, viz. the "width", "depth" and "relative deprivation".

The literature on poverty measures that followed the seminar work of Amartya Sen (1976) has generally taken (with only few exceptions) the basic approach put forward by Sen: the measure of aggregate poverty was defined as a weighted sum of the individual poverty; the individual poverty itself was measured by the income gap

up to the (predetermined) poverty line³; the weights of the aggregate measure were determined so that the measure will satisfy a set of axioms or desired properties defined so that the measure will represent certain ethical norms. The three basic axioms proposed by Sen to determine the weights are:

- (F) The Focus Axiom: Poverty is measured on the basis of the incomes of the poor only.
- (M) Monotonicity Axiom: Given other things, a reduction in the income of any poor individual must strictly raise the measure of aggregate poverty.
- (T) Transfer Axiom: Given other things, a transfer of income from a poor individual to any one who is richer must strictly raise the measure of aggregate poverty.⁴

These axioms induce a rather general structure on the functional form of poverty measures (see Bigman, 1986), and a considerable number of alternative poverty measures have consequently been proposed that satisfy the three axioms but differ, sometimes quite markedly, in their functional form from the index proposed by Sen (see e.g. Kakwani, 1980; Thon, 1979; Anand, 1977; Foster, Greer and Thorbecke, 1984).

Bigman (1987) proposed a different approach. Following Dalton he defined the measure of aggregate poverty as the welfare losses resulting from the income gaps of the poor. He then proved that poverty measures having this general form for "well-behaved" (i.e.

continually differentiable and concave) welfare and utility functions will satisfy the following axioms: (i) Non-negativity; (ii) Monotonicity; (iii) Scale independence, and (iv) Anonymity. (See footnote 5 for a detailed specification of these axioms) - if and only if they have the following functional form:

$$P = H[1-(1-G)^\alpha(1-I_p^A)^\alpha] \quad \alpha > 0 \quad (1)$$

where H is the "Head-Count" ratio, i.e. the proportion of the poor population in the total population; G - is the "Poverty-Gap", i.e. the percentage shortfall of the poor's average income from the poverty line; I_p^A is an Atkinson-type measure of the income inequality among the poor of the form:

$$I_p^A = 1 - \left[\sum_{i=1}^p r_i \left(\frac{y_i}{\bar{y}_p} \right)^\alpha \right]^{\frac{1}{\alpha}} \quad \sum_{i=1}^p r_i = 1 \quad (2)$$

where \bar{y}_p is the average income of the poor and the summation is over the p poor individuals only. These indices will satisfy also the Transfer axiom (in its weaker version) if and only if I_p^A is S-convex (i.e. agree with the Lorentz quasi-ordering). It can also be verified that almost all the poverty measures that have been proposed in the literature are special cases of this general family.

Four poverty indices will be examined in this paper: the Head Count ratio (denoted by H), the Poverty Gap ratio (G) and the two poverty measures proposed by Sen (PS) and Foster et.al. (PF). The two indices H and G are the common measures of poverty in empirical studies although their weaknesses have widely been discussed in the literature (see, e.g. Sen, 1979, 1981; Foster, 1984; Bigman, 1986). The Head Count measure does not reflect the "depth" of poverty i.e. the size of the poverty gap. The Poverty Gap measure (for which $\alpha=1$ and $I_p^A = 0$), does not reflect the "width" of poverty i.e. the size of the poor population, nor is it sensitive to the inequality in the distribution of the poverty gap among the poor.

The other two indices, PS and PF, reflect all the three components of overall poverty, namely the "width", the "depth" and the degree of inequality among the poor or "relative deprivation", but each index attaches different weights to each of these components. These two indices can be written in the following form:

$$\text{Sen:} \quad \text{PS} = H \left[G + (1-G) I_g^p \right] \tag{3}$$

$$\text{Foster } \underline{\text{et.al.}}: \text{PF} = H \left[G^2 + (CV_p)^2 \right]$$

where I_g^p is the Gini coefficient of income inequality among the poor, and (CV_p) is the coefficient of variation of the poor's income.

We will also examine three indices of income inequality: the Gini coefficient, the coefficient of variation, and the extended - rank weighted coefficient of variation. By giving higher weights to deviations from the mean at the lower tail of the income distribution, the latter index ensures that the Dalton's principle of transfers is satisfied. At the same time it is more sensitive than the Gini coefficient to the size of the deviations from the mean and thus reflects a higher sensitivity to the size of the poverty gap (see Bigman, 1986).

Data sources are the annual income surveys, which the Central Bureau of Statistics has conducted since 1965. The investigation unit in these surveys is the individual household, and the population includes households whose head is an employee or did not work in urban localities⁷. The income surveys distinguish between three definitions of income: (i) Economic (or market) income - All current income prior to any deduction and transfer payments. (ii) Gross income = Economic income plus all cash transfer payments. (iii) Net income = Gross income minus the deduction of obligatory payments (mainly income tax and the National Insurance contributions paid by the employees).

The definition of the poverty line in our analysis is the same as that of the National Insurance Institute which determines the line at that income per "standard adult" which is equal to 40% of the median "equivalent" gross income. The calculation of the average

income per "standard adult" divides the total income of the household to the number of individuals in that household and "standardizes" this average income to take into account economies of scale in consumption.

II. Trends of Income Inequality

Despite high and rising rates of inflation, there have been only very small changes in income inequality over the four-year period 1979 - 1983: the inequality in the distribution of economic income has risen slightly by 1.1 percent to 3.4 percent - depending on the index of inequality, the inequality of net income has declined by 5 percent according to the Gini coefficient and even by more according to the CV measure. In 1984, however, the inflationary shock caused a steep rise in the inequality of net incomes - by 9 to up to 19 percent - depending on the index. This rise in inequality was largely due to the lagged adjustment of the social security benefits as we shall see later on. At the same time, though, lags in the adjustment of the tax structure have increased the average tax rate, especially at the middle and lower income ranges, thereby enhancing the progressivity of the tax system. As a result, the rise in inequality as an effect of the inflationary shock was somewhat smaller for net than for gross incomes. These trends are summarized in Tables 1 through 3, for economic, gross and net incomes.

Table 1

Inequality Measures of Total Population: Economic Income

		1979	1980	1981	1982	1983	1984
GINI	INDEX	0.4308	0.4327	0.4368	0.4433	0.4357	0.4706
	DLT%	.	0.45	0.93	1.50	-1.72	8.01
ATKINSON	INDEX	0.1869	0.1890	0.1947	0.2003	0.1934	0.2196
	DLT%	.	1.13	3.02	2.88	-3.47	13.52
C.V.	INDEX	0.8425	0.8297	0.8653	0.8510	0.8328	0.9438
	DLT%	.	-1.51	4.28	-1.65	-2.13	13.32
EXTENDED C.V.	INDEX	0.8315	0.8399	0.8491	0.8697	0.8565	0.9390
	DLT%	.	1.02	1.09	2.42	-1.51	9.63

Table 2

Inequality Measures of Total Population: Gross Income

		1979	1980	1981	1982	1983	1984
GINI	INDEX	0.3659	0.3688	0.3715	0.3688	0.3620	0.3997
	DLT%	.	0.79	0.72	-0.72	-1.84	10.41
ATKINSON	INDEX	0.1077	0.1098	0.1116	0.1085	0.1048	0.1283
	DLT%	.	1.96	1.70	-2.79	-3.48	22.49
C.V.	INDEX	0.7305	0.7197	0.7515	0.7231	0.7079	0.8214
	DLT%	.	-1.48	4.42	-3.78	-2.10	16.02
EXTENDED C.V.	INDEX	0.6090	0.6208	0.6222	0.6108	0.6011	0.6780
	DLT%	.	1.93	0.23	-1.83	-1.59	12.80

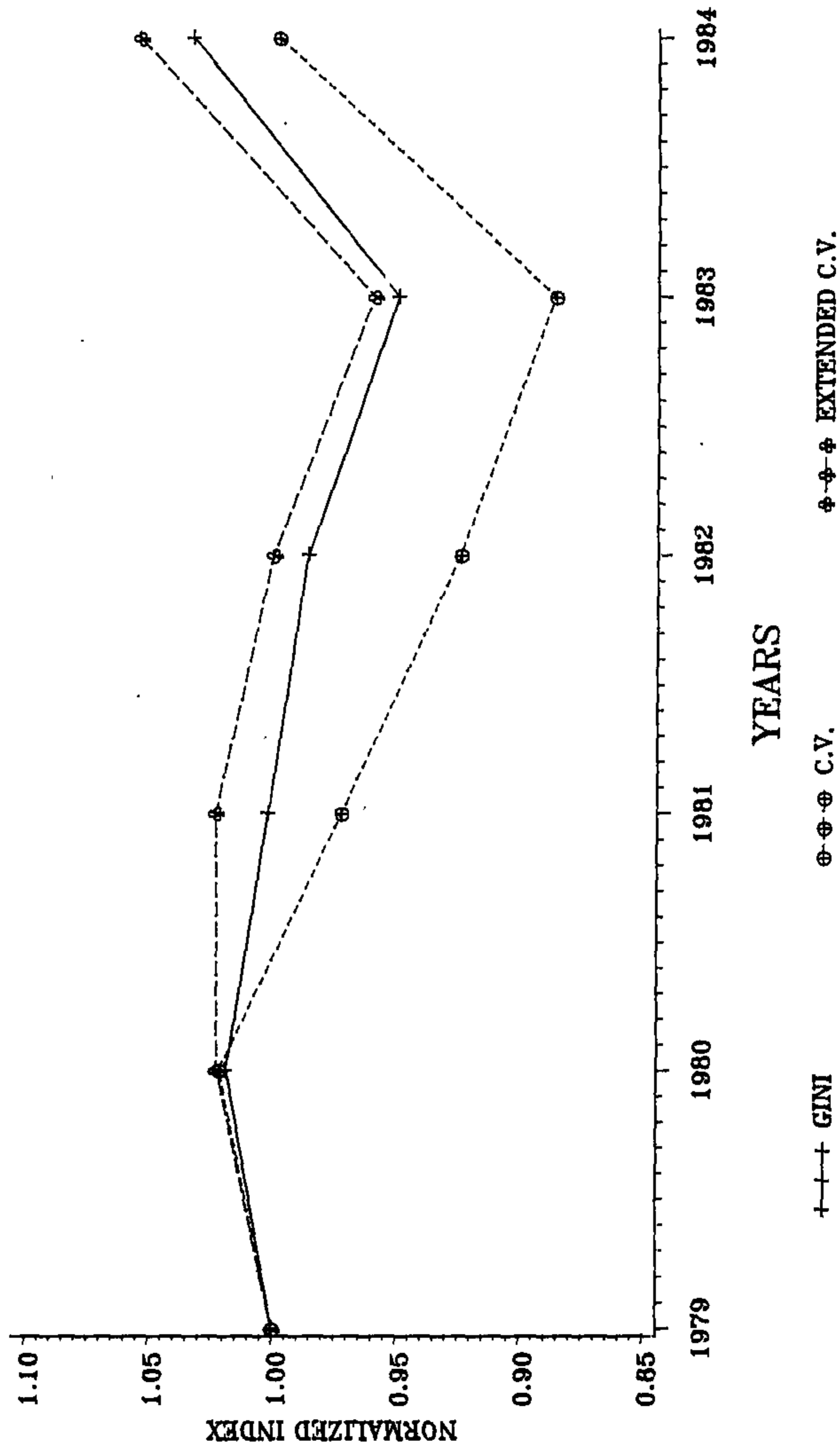
Table 3

Inequality Measures of Total Population: Net Income

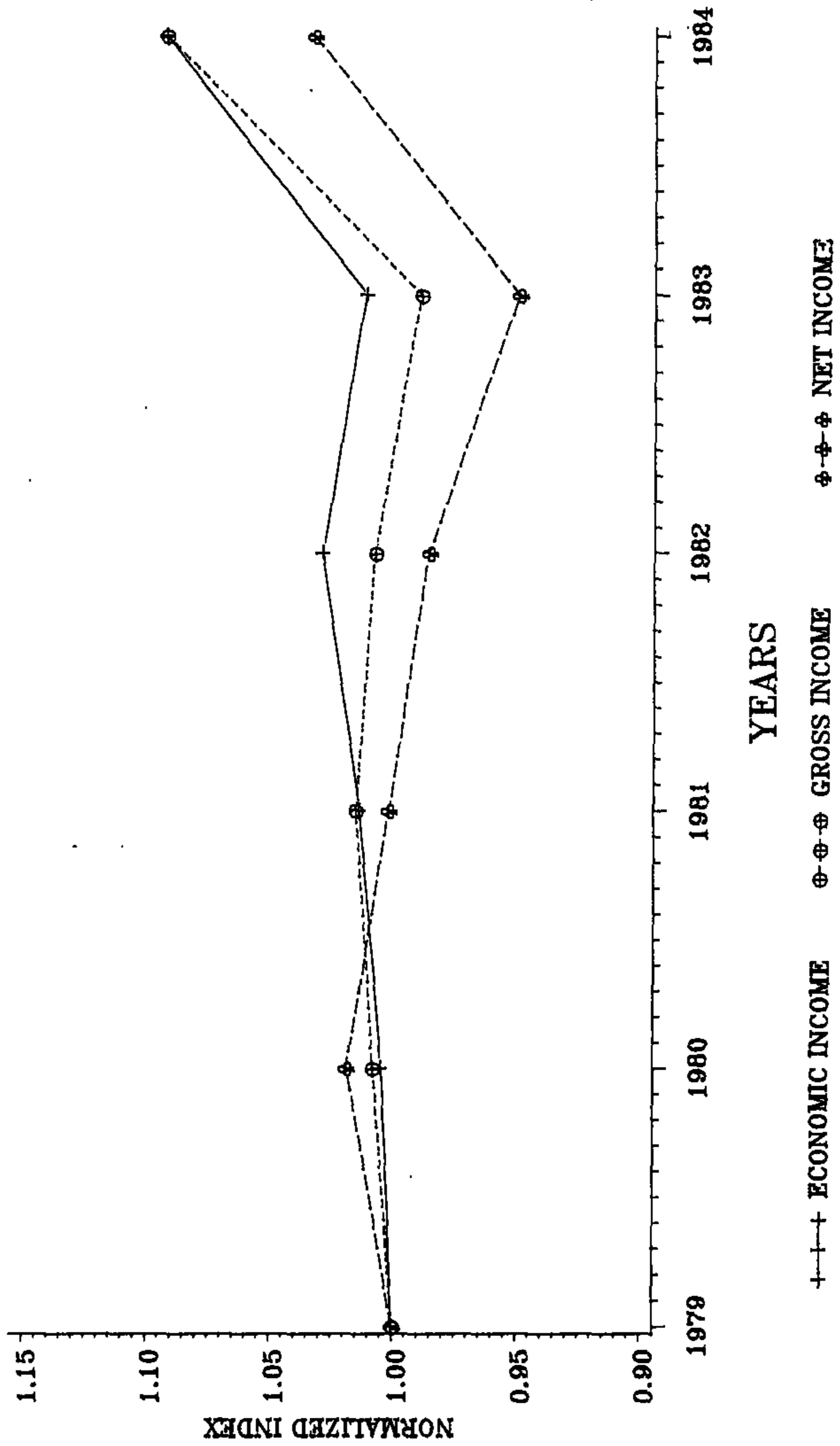
		1979	1980	1981	1982	1983	1984
GINI	INDEX	0.3176	0.3236	0.3183	0.3132	0.3016	0.3280
	DLT%	.	1.86	-1.64	-1.59	-3.69	8.75
ATKINSON	INDEX	0.0817	0.0857	0.0823	0.0783	0.0727	0.0866
	DLT%	.	4.82	-3.93	-4.81	-7.19	19.07
C.V.	INDEX	0.6387	0.6525	0.6211	0.5904	0.5660	0.6376
	DLT%	.	2.15	-4.82	-4.93	-4.12	12.63
EXTENDED C.V.	INDEX	0.5098	0.5213	0.5215	0.5098	0.4891	0.5373
	DLT%	.	2.25	0.05	-2.25	-4.05	9.86

To further emphasize the trends registered by the different indices, we have normalized their values in the various years by their value in 1979. The normalized indices, for net income, which manifest the percentage changes from that base year, are presented in Figure 1. It shows that the three indices differ quite markedly in the magnitude of the changes which they register. In the three-year period from 1980 to 1983 the Gini coefficient shows a decrease of 6.8 percent whereas the CV measure shows a decrease of 13.3 percent. In 1984 income inequality has risen by 8.8 percent according to the Gini coefficient

FIGURE 1:
MEASURES OF INEQUALITY OF TOTAL POPULATION
NET INCOME



**FIGURE 2:
GINI INDEX
ALL INCOMES**



and by 12.6 percent according to the CV. These differences indicate that most of the variations took place at the upper tail of the income distribution to which the CV is more sensitive. High wages were indexed at a lower rate than low and middle incomes and were less influenced by the changes in the social security benefits. These factors may explain the higher variability of incomes at the higher tail of the distribution.⁸

Figure 2 compares the main trends of the three income categories as registered by the Gini coefficient. In the 1980 through 1983 period there has been a slight increase of 0.7 in the inequality of the economic income, a slight decrease of 1.9 percent in the inequality of gross income and a more considerable decrease of 6.8 percent in the inequality of net income. As noted earlier, these differences manifest the effect of the real increase in the social security benefits on the one hand and the rising progressivity of the income tax system - as more incomes rose to higher tax brackets with the tides of inflation.

The rise in the progressivity of the income tax system with inflation can also be observed by comparing the income inequality indices for gross and net incomes. On average the income taxes have brought the Gini index based on net income to a level lower by 13 to 15 percent than the index based on gross income. In 1980, however, the reduction in the inequality index was by 13.3 percent. It rose to 15 percent in 1981 and 1982 and further rose to 17 percent in 1983 and 18

percent in 1984, despite frequent adjustments in the tax structure to take account of inflation. Another indicator of the rise in the progressivity of the income tax system is the continuous decline of the tax threshold as percentage of the average wage. In 1977 and 1978 incomes lower than 45 percent of the average wage were exempt from income taxes. In 1980 this percentage declined to 36 percent and in 1984 it further declined to 31 percent. These trends are summarized in Table 4.

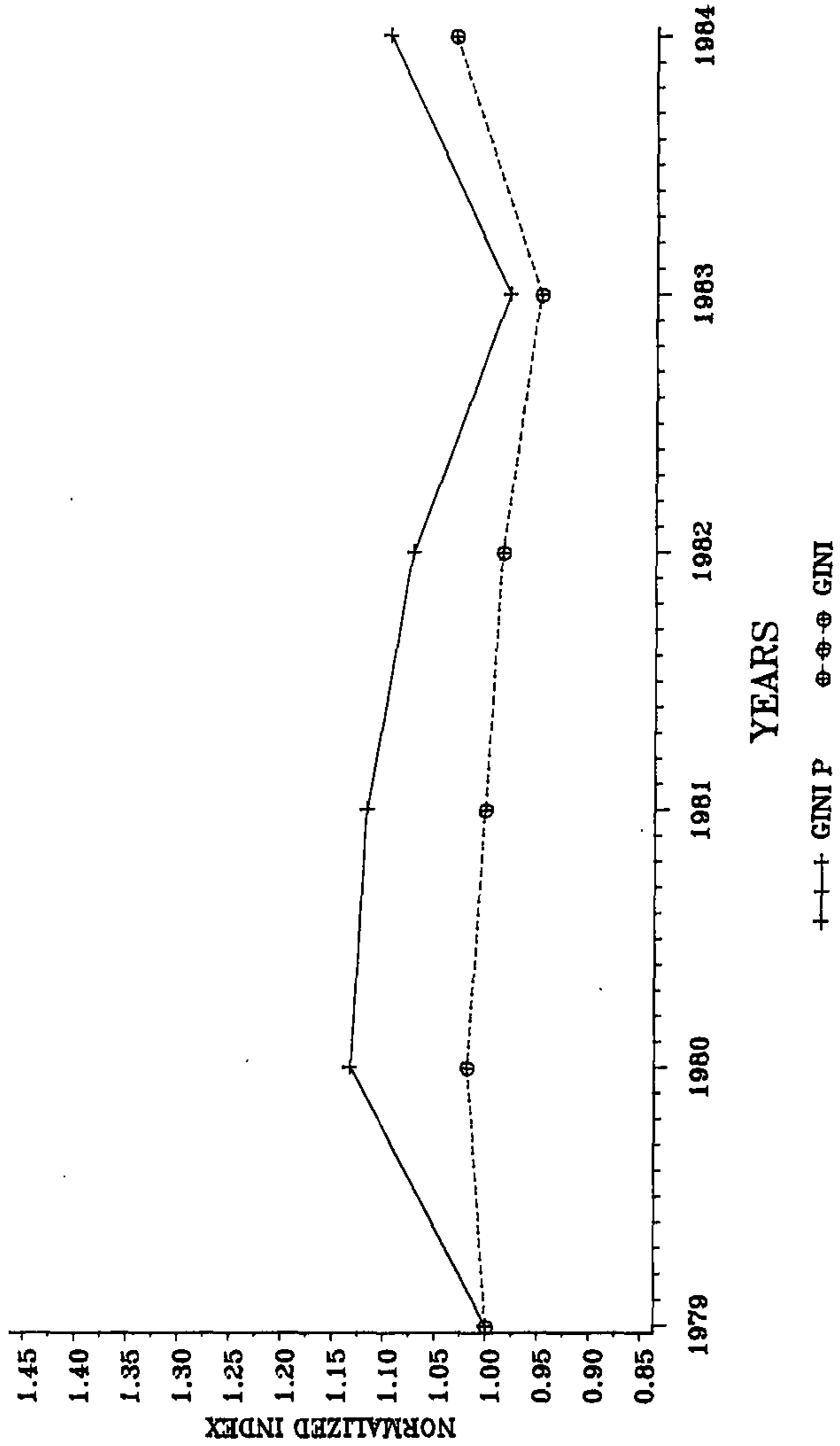
Table 4
Indicators of Progressivity of the Income Tax System

	1979	1980	1981	1982	1983	1984
Gini coef. of net income as % of Gini coef. of gross income	86.8	87.7	85.8	84.9	83.3	82.0
CV coef. of net income as % of CV coef. of gross income	87.4	90.6	82.6	81.6	80.8	77.6
Real change in tax threshold (%)	0.2	-12.2	7.7	3.5	-3.3	-8.0
Tax threshold as % of average wage	40.7	36.0	36.6	36.5	33.6	31.2

The rise in the progressivity of the income tax system is a familiar phenomenon of high inflation. It cannot be concluded, however, that this trend is necessarily a desirable one. For one, it only raises the dead-weight loss of the income tax system, provides growing disincentives to work and encourages tax evasion. Secondly, a larger share of the burden falls on middle incomes, whereas the average tax rate of the high incomes rises at a much slower pace. This can be observed more clearly by comparing the CV index of gross income to that of net income, since the CV is more sensitive to changes at the middle range of the income distribution. From 1979 to 1984 the ratio between the CV index of net income to that of gross income has declined from 87.6 to 77.6 percent, indicating a reduction by 12.4 percent in 1979 and up to 22.4 percent in 1984.

Finally, Figure 3 compares the trends in income inequality - as measured by the Gini coefficients of net income - of the total population to that of the poor population. From 1979 to 1983 the inequality in the distribution of net income among the general population has steadily declined by a total of 5.1 percent. In contrast, inequality among the poor population has risen sharply by 13.2 percent in 1980 and declined by a total of 13.5 percent from 1981 through 1983 - largely due to the rise in the social security benefits. In 1984 the inequality among the poor population has risen by 12 percent, compared with a rise of 8.7 percent among the general population.

FIGURE 3:
GINI/GINI P INDEX
NET INCOME



III. Trends in Poverty

The most noteworthy observation of our analysis of the trends in poverty is the sharp distinction between the trends in the three-year period from 1981 through 1983 in which inflation was high but rather steady and developments in the two years, 1980 and 1984, in which inflation rose to new heights. In the 1981 - 1983 period the percentage of the population with net income below the poverty line declined by 4.8 percent and the poverty gap of net income narrowed by 10.6 percent. As a result, the two poverty indices PS and PF registered a decrease in poverty by 14.1 and 22.5 percent respectively. In 1980, in contrast, with the rise of inflation from a monthly level of 3 to 4 percent to a level of 7 percent per month, the Head Count ratio rose by 7.3 percent and the Poverty Gap rose by 5.3 percent. In 1984, as inflation further rose to a monthly level of 15 percent and more, the Head Count ratio rose by another 26.4 percent and the Poverty Gap rose by 19.4 percent. As a result Sen's poverty index rose in that year alone by 45.3 percent and the index of Foster et.al. rose by more than 60 percent. These results are summarized in Tables 5, 6 and 7 for economic, gross and net incomes.

Table 5

Poverty Measures: Economic Income

		1979	1980	1981	1982	1983	1984
POVERTY GAP	INDEX	0.5588	0.5659	0.5907	0.5846	0.5897	0.5976
	DLT%	.	1.26	4.38	-1.02	0.86	1.33
HEAD COUNT	INDEX	0.2358	0.2379	0.2331	0.2513	0.2438	0.2780
	DLT%	.	0.90	-2.03	7.83	-2.98	14.00
SEN	INDEX	0.1799	0.1834	0.1852	0.1983	0.1924	0.2203
	DLT%	.	1.95	0.95	7.11	-2.98	14.46
FOSTER	INDEX	0.1044	0.1075	0.1119	0.1190	0.1152	0.1319
	DLT%	.	2.97	4.09	6.36	-3.25	14.57

Table 6

Poverty Measures: Gross Income

		1979	1980	1981	1982	1983	1984
POVERTY GAP	INDEX	0.2731	0.2864	0.2785	0.2869	0.2544	0.3010
	DLT%	.	4.85	-2.75	3.01	-11.33	18.32
HEAD COUNT	INDEX	0.1377	0.1410	0.1414	0.1262	0.1344	0.1759
	DLT%	.	2.35	0.31	-10.75	6.47	30.88
SEN	INDEX	0.0533	0.0589	0.0573	0.0516	0.0498	0.0738
	DLT%	.	10.40	-2.61	-10.03	-3.48	48.38
FOSTER	INDEX	0.0162	0.0194	0.0183	0.0163	0.0147	0.0238
	DLT%	.	20.27	-5.90	-10.90	-9.91	61.83

Table 7

Poverty Measures: Net Income

		1979	1980	1981	1982	1983	1984
POVERTY GAP	INDEX	0.2516	0.2649	0.2710	0.2573	0.2396	0.2862
	DLT%	.	5.29	2.30	-5.05	-6.87	19.42
HEAD COUNT	INDEX	0.1622	0.1741	0.1665	0.1606	0.1658	0.2096
	DLT%	.	7.30	-4.32	-3.56	3.25	26.38
SEN	INDEX	0.0586	0.0674	0.0650	0.0601	0.0579	0.0841
	DLT%	.	14.91	-3.46	-7.59	-3.73	45.25
FOSTER	INDEX	0.0169	0.0209	0.02	0.0178	0.0162	0.0260
	DLT%	.	23.85	-4.21	-11.28	-8.78	60.26

The changes in poverty appear to be dominated by the inflationary shocks whereas the changes in the rates of unemployment appear to have only a small or no effect. In 1981, for instance, the percentage of the population with economic income lower than the 'poverty-line' has declined by 2 percent, despite the rise in the rate of unemployment from 3.8 to 4.9 percent. These changes are summarized in Table 8, which presents selected macro-economic and poverty indicators.

Table 8

Selected Macro-Economic and Poverty Indicators

Indicator	1979	1980	1981	1982	1983	1984
Rate of unemployment	3.2	3.0	4.9	4.9	4.6	5.0
Rate of inflation*	58.2	109.6	128.4	112.2	130.8	242.8
Real change in the average wage* (%)	+8.4	-1.0	+6.1	+4.0	+4.8	-0.8
Real change in minimum wage* (%)	-0.7	-15.8	+44.9**	+6.4	+7.1	-3.7
Minimum wage as percent of average wage	31.0	26.3	36.0	36.8	37.6	36.5
Poverty line income in 1984 prices (old Israeli shekels)	15,351	14,648	15,563	16,330	17,935	17,939
Real change in poverty line income (%)	..	-4.6	+6.2	+4.9	+9.8	0
Poverty line as % of average gross income	39.8	39.6	39.1	40.7	40.4	39.9
Poverty line as % of average net income	46.6	47.1	46.6	47.6	48.9	50.5

* Calculated to fit the period of the survey, which is different from the calendar year.

** This rise in 1981 is due in large part to the change in the definition of the minimum income by including additional components in the calculation of the amount of the supplementary income.

Interestingly, the changes in the average wage rate, and even more so in the minimum wage rate, do not appear to significantly lower the levels of poverty. In 1981, real wages rose by an average of 6.1 percent, along with a rise in the minimum wage that followed a new minimum wage agreement. Nevertheless, during that year the poverty gap rose by 4.4 percent. It seems that the rise in unemployment - worked to offset the effect of that rise of the minimum wage on the poverty gap. It should also be noted that the definition of the poverty line in relative terms, as percentage of the median income, may work to increase the poverty gap in years when all incomes are rising.

Figures 4 and 5 illustrates the trends in poverty by showing the values of the normalized poverty indices for economic and net incomes respectively. It emphasizes that until 1983 the two poverty measures most commonly used - the Head-Count and the Poverty Gap ratios - did not exhibit any clear trend whereas the two indices proposed by Sen and by Foster et.al. exhibit clearly the rise in poverty in 1980 and the monotonic decline in 1981 through 1983. The decline in the poverty rates until 1983 took place despite the erosion of economic incomes. From 1979 to 1983 the percentage of the population with economic incomes lower than the poverty line rose by 3.4 percent and their poverty gap rose by 5.5 percent. The large increase in the various social security benefits reversed, however, these trends and brought down the measures of poverty for net incomes, from 1981 through 1983.

FIGURE 4:
POVERTY MEASURES
ECONOMIC INCOME

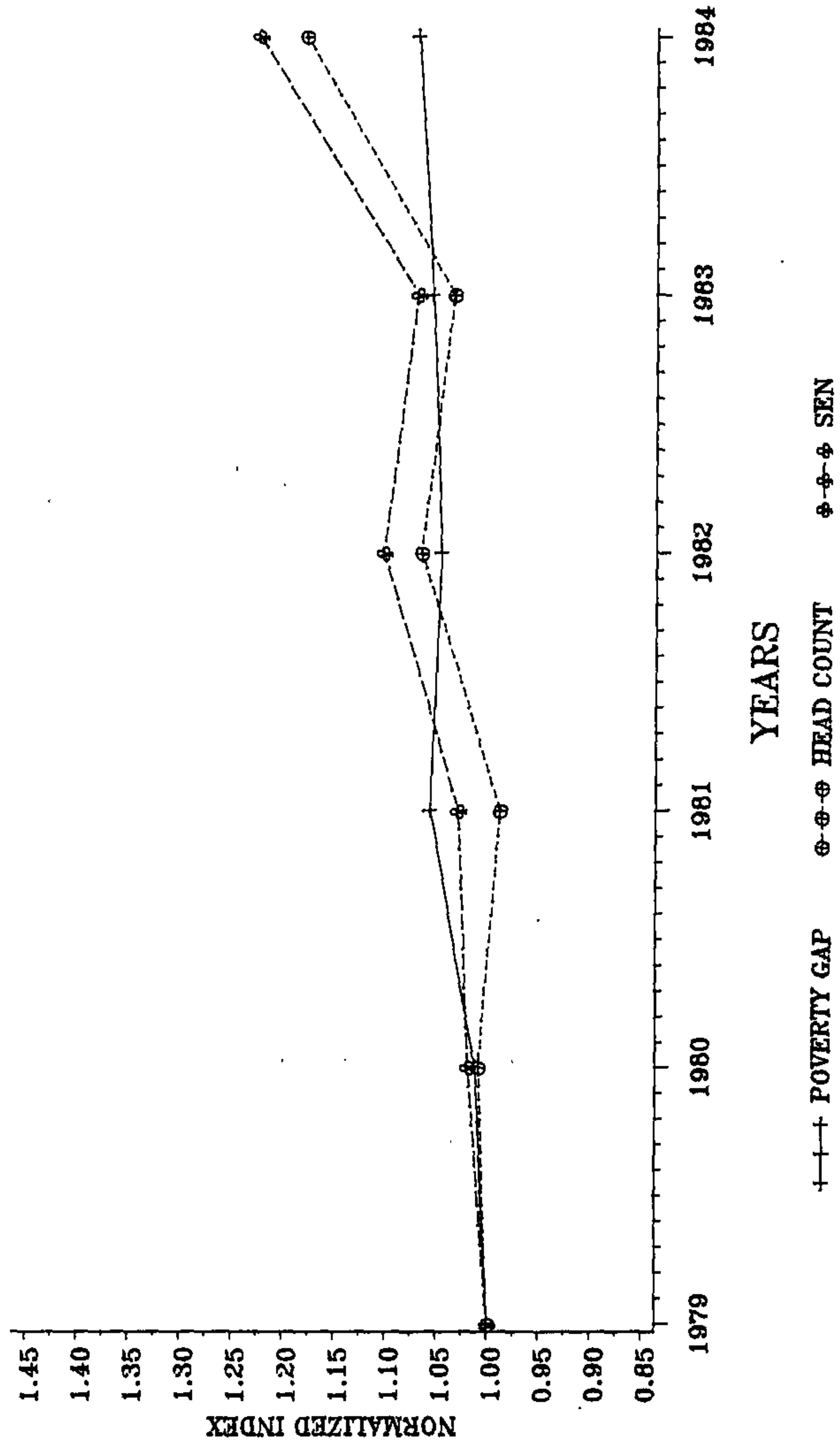
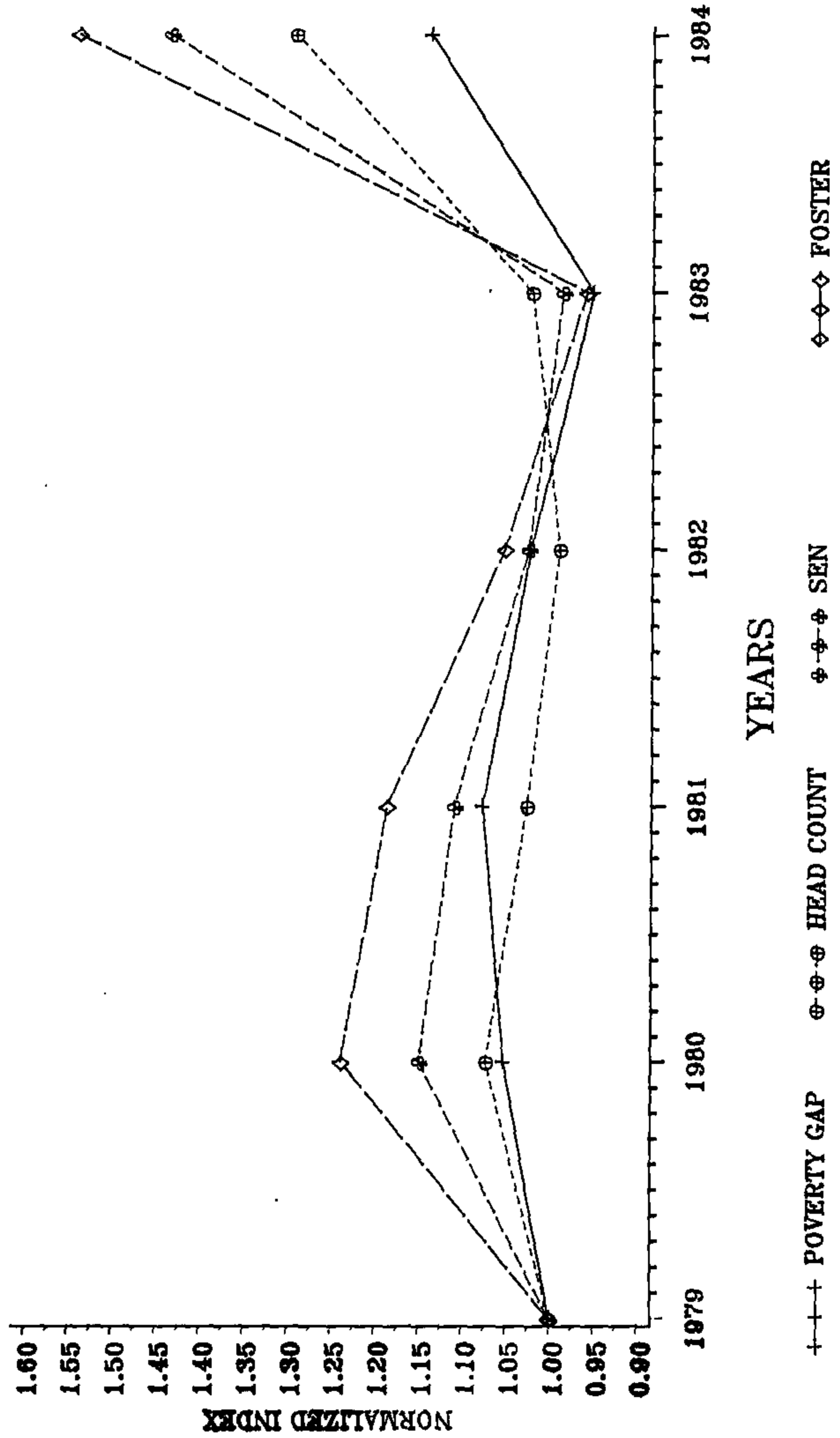


FIGURE 5:
POVERTY MEASURES
NET INCOME



These benefits, the most important of which are the children's allowance, the income support benefits and the old-age statutory benefits, allowed some 10 percent of the population who had economic income less than the poverty line to have net income higher than that line. They also reduced the poverty gap from 58 percent for economic incomes to a gap of 25.5 percent for net incomes - when the social security benefits are also taken into account. In 1984, however, these benefits could not keep pace with inflation, and as a result, the percentage of the population with net incomes below the poverty line rose from 16 to 21 percent and their poverty gap rose to 28.6 percent, even though the poverty gap of economic income has increased by a mere 1 percent. These changes are illustrated in Figure 6 which describes the trends in Sen's poverty measure for the three definitions of income.

Table 9 presents a number of indicators that can help assess the overall effects of these benefits and the changes thereof along with the effects of the income tax system. On average these benefits amounted to some 75 percent of the gross income of the poor and they have cut the poverty gap to less than half its value with economic income alone. This is indicated by the ratio between the poverty gap with net income to that with economic income. On average, this ratio was some 45 percent. This ratio declined, however, from an average of 46 percent in 1979 through 1981 to 40.6 percent in 1983 but rose sharply to 48 percent in 1984.

**FIGURE 6:
SEN INDEX
ALL INCOMES**

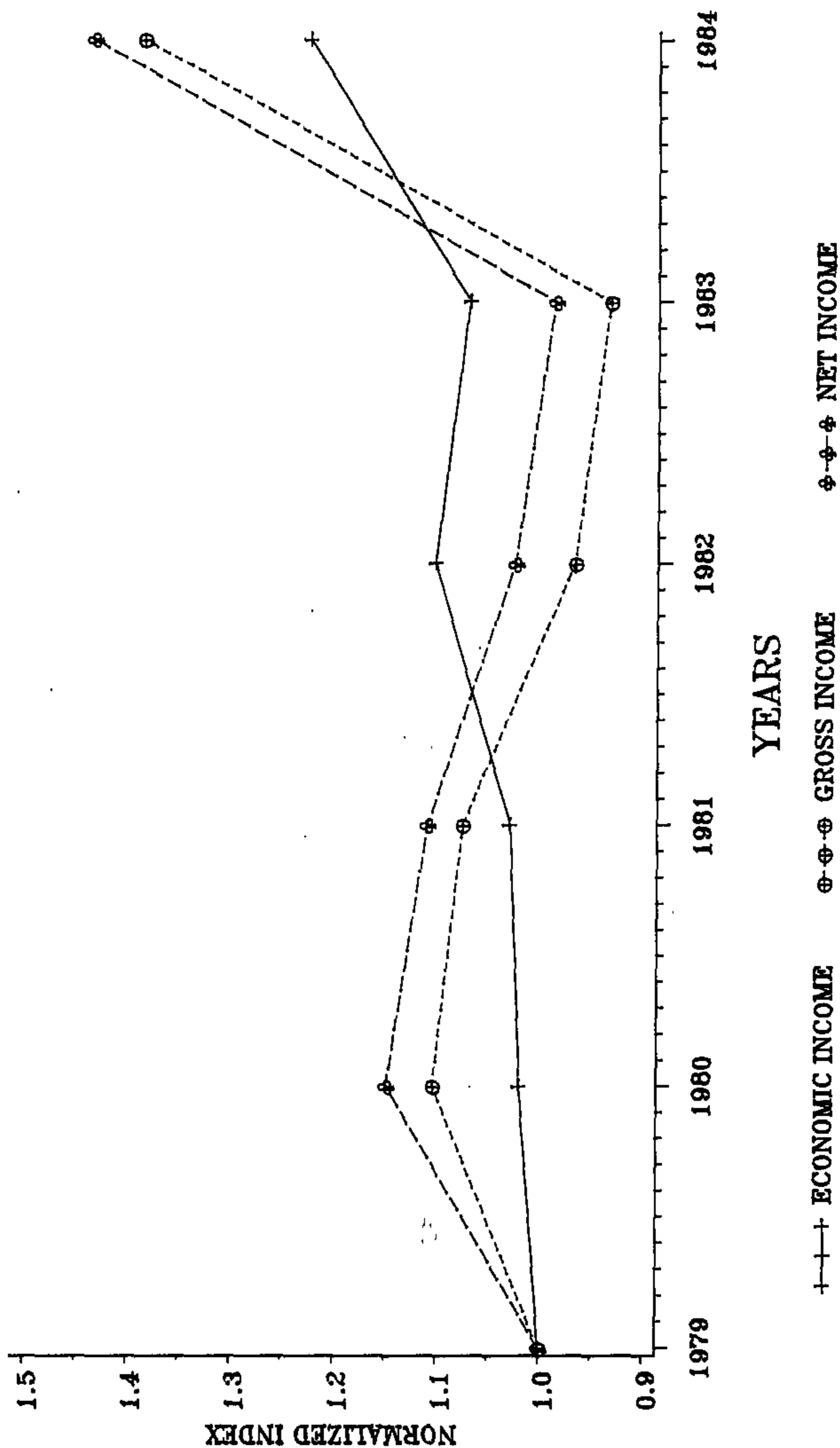


Table 9

Selected Indicators of the Effects of Social Security Benefits and Income Tax on Poverty

Indicator	1979	1980	1981	1982	1983	1984
1 Poverty gap - economic income	0.56	0.57	0.59	0.58	0.59	0.60
2 Poverty gap - net income	0.25	0.26	0.27	0.26	0.24	0.29
3 Ratio - (2) : (1)	45.0	46.8	45.9	44.0	40.6	48.0
4 Head count - economic income	0.24	0.24	0.23	0.25	0.24	0.28
5 Head count - net income	0.16	0.17	0.17	0.16	0.17	0.21
6 Ratio - (5) : (6)	68.8	73.2	71.4	63.9	68.0	75.0
7 PS - economic income	0.180	0.183	0.185	0.198	0.192	0.220
8 PS - net income	0.059	0.067	0.065	0.060	0.058	0.084
9 Ratio - (7) : (8)	32.6	36.8	35.1	30.3	30.1	38.2
10. Average gross income of the poor as % of average gross income in the population	26.1	25.6	25.5	26.0	27.1	25.3
11. Average gross income of the poor as % of their average economic income	1.64	1.65	1.76	1.71	1.82	1.74

The benefits also raised the incomes of some 6-9 percent of the population above the poverty line. Whereas on average one quarter of the population had economic income lower than the poverty line, only two-thirds of them (but three-quarters in 1984) remained poor after receiving these benefits. This is indicated in the table by the ratio between the Head Count ratio with net income to that with economic income. These trends are further accentuated by the ratio between Sen's poverty index for net income to that for economic income, since this measure summarizes the combined effects of the benefits both on the percentage of the poor population and on their poverty gap. It shows that on average poverty was reduced by 62 to 70 percent as an effect of these benefits. These and the other indicators in the table suggest that the large increases in the benefits have more than offset the negative effects of the inflationary tide in 1980 and brought down the measures of poverty in the 1981-1983 period. The second inflationary shock in 1984 has completely erased, however, these effects of the social security policy. It was this erosion of the social security benefits - much more than the erosion of real wages - that was responsible for the sharp rise in poverty in that year.

Figure 7 illustrates the three components that determined the trends in overall poverty. The "width" of poverty is measured by the Head Count ratio; the "depth" is measured by the poverty gap ratio and the "relative deprivation" is measured by the Gini coefficient of income inequality among the poor (denoted in the figure by Gini P).

**FIGURE 7:
POVERTY MEASURES
NET INCOME**

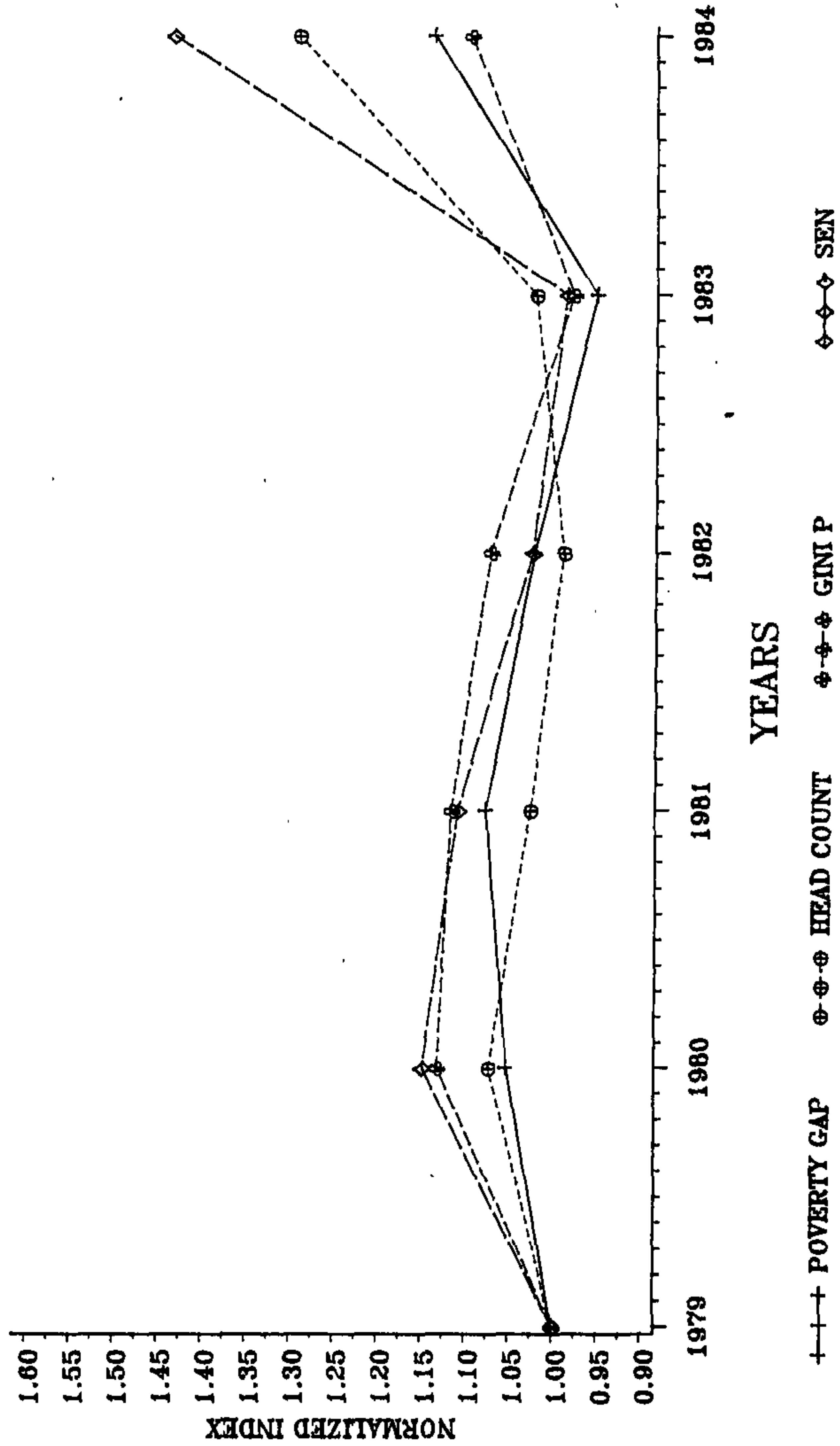


Table 10 calculates the contribution of each of these factors to the change in overall poverty. These contributions were calculated from the time differentials of IS and IF and Eq. (8). Thus, for example, the percentage change in Sen's poverty measure is given by⁶:

$$\hat{PS} = \hat{H} + \frac{G(1-I_g^P)}{G+(1-G)I_g^P} \hat{G} + \frac{I_g(1-G)}{G+(1-G)I_g^P} \hat{I}_g^P \quad (4)$$

where a hat over a variable denotes the percentage change in the variable under consideration (e.g. $\hat{X} = dX/X$). The first element, H, thus measures the contribution of the increase in the percentage of the poor population to overall poverty; the second element measures the contribution of the increase in the poverty gap and the third element measures the contribution of the increase in inequality among the poor. As noted earlier, "relative deprivation" is measured by the Gini coefficient in Sen's poverty measure, and by the coefficient of variation in the measure of Foster et.al.

The table indicates that there is a clear difference between the two years 1980 and 1984 in which inflation jumped to a higher level and the three-year period 1981 through 1983 in which inflation was high but relatively steady. In 1980 and 1984 almost one third of the total rise in poverty was due to the rise in the income inequality among the poor. In 1981 - 1983 this factor contributed only marginally to the decline in total poverty and most of the decline was due to the

Table 10
Analysis of the Changes in Overall Poverty*

Period	Poverty Measure	P	Contribution to the Change in Overall Poverty			
			"Widening"	"Deepening"	"Relative Deprivation"	Total
1979/ 1980	PS	+14.9	49	20	33	100
	PF	+23.9	29	19	52	100
1980/ 1983	PS	-14.1	67	41	2	100
	PF	-22.6	43	40	17	100
1983/ 1984	PS	+45.3	51	23	26	100
	PF	+60.3	38	31	31	100

* The percentage change in overall poverty which is due to the change in the corresponding factor.

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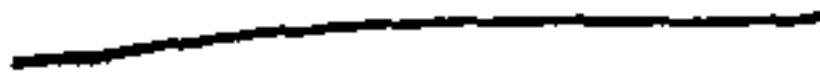
הראיון המסוייץ, (פאת) אברהם בנימין. עבריה:
יונה ימאי. תל-אביב, ספרית פועלים, (1976).
191 עם 'סידרת הטכנה רחב-בן'.

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50

decrease in the percentage of the poor and in their poverty gap. This result also suggests that despite the rise in the social security benefits, a small group among the poor population still remained poor and did not enjoy as much this rise in the benefits. This group is the hard core of the poverty problem.

The table shows also that the two poverty measures differ in the size of the changes which they register - primarily because they reflect different sensitivities to the changes in the various components of overall poverty. The results indicate that PS is less sensitive to changes in income inequality among the poor than the PF measure but is more sensitive to the changes in the Head Count ratio. As already noted above, part of the (relative) insensitivity of PS to changes in income inequality is due to the (relative) lower sensitivity of the Gini coefficient to changes in the middle range of the income distribution, since most of the changes in net incomes took place at that range.

IV. The Economic Vulnerability of the Elderly and Large Families

The economic status of the elderly and large families, with 4 children or more, has always been of a particular concern of the public policymakers in Israel. On the average, 60 percent of the elderly population had economic incomes lower than the poverty line and their economic incomes accounted for only 20 percent of the poverty line. Almost half of the people belonging to large families are poor and their economic income falls short of the poverty line by

50 percent. Therefore, these two groups, especially the elderly, depend for their livelihood largely on the social security benefits and are highly vulnerable to adverse changes in these benefits, which may result from the inflationary erosion.

The policy implemented during the years 1979-1984, with the aim of protecting the weak population's incomes against inflationary erosion, has favored the elderly over the families with children. The National Insurance Institute made great efforts to maintain the real value of the old age benefits, as well as their value relative to the average wage, and adopted a policy of automatic and increasingly more frequent adjustments. Table 11 presents some indicators of the year-to-year changes in poverty among the elderly and in the social security benefits (the basic old age pension and the minimum guaranteed income). Changes in poverty according to net income were influenced to a considerable extent by the social security benefit level. In 1979 the erosion of the benefits was the highest and, as a consequence, the level of poverty was unusually high. 36 percent of the elderly population had net income below poverty line and, on the average, their net incomes fell short of the poverty line by 20 percent. Improvements in the benefits in 1980-1982 led to a sharp decline in poverty, mainly in 1982. The percentage of elderly poor declined to less than 14 percent and the poverty gap to 16.5 percent of the poverty line. The new high inflationary waves in 1983, and especially in 1984, eroded the benefits despite all the improvements

Table 11

**Indicators of Changes in Social Security Benefits*
and Poverty Incidence Among the Elderly**

Indicator	1979	1980	1981	1982	1983	1984
Percentage of elderly with net income less than the poverty line	36.0	26.7	25.9	13.5	25.2	30.6
Percentage of elderly poor in the total population	28.0	18.1	19.3	10.6	19.2	18.8
Average short fall of elderly's net income from the poverty line (%)	20.8	18.7	16.9	16.8	17.5	22.6
Real change in basic old-age benefit (%)*	-0.7	1.4	17.0	10.0	1.7	-1.1
Basic old-age pension** as percent of the average wage	12.1	12.4	13.7	14.5	14.0	14.0
Real change in the minimum guaranteed income (%)	-0.6	10.8	9.5	10.4	1.0	-2.8
Minimum guaranteed income** as percent of the average wage (%)	20.5	22.9	23.7	25.1	24.2	23.7
Percentage Change in Sen's Poverty Measure among elderly net income		-25.2	-12.2	-45.6	+82.3	+51.1

* The real changes in benefits were calculated to fit the income survey's period, which was different from the calendar year.

** For a single person.

in the adjustments, to the extent that poverty rose back almost to its 1979 level. In 1983-1984 the Head Count ratio more than doubled and the poverty gap rose to 22.6 percent of the poverty line.

The trends of changes in poverty among large families were different. As can be seen from Table 12, the percentage of the large family population with net income below the poverty line rose from 29 percent in 1979 to 38 percent in 1980. It remained high and rather steady in 1981-1983, but rose sharply in 1984 to 43 percent. The poverty gap rose from 24 percent of the poverty line in 1979 to 30 percent in 1980-1981. After a decline to 25 percent in 1982-1983 it rose again to 32 percent in 1984.

These trends had been anticipated. In contrast to the old-age benefits, the method of updating the child allowances have already changed during the period of rapid inflation. During the last decade the credit (allowance) point has lost 30 percent of its purchasing power. The erosion relative to the average wage was even more severe and amounted to 50 percent. The highest erosion occurred in 1980 and 1984.

The government decided only in 1983-1984 to compensate partially the large families for the erosion by raising the allowances paid to them⁹. The supplements were granted only to those families who were entitled to Family Allowances for Veterans (approximately 60 percent of all large families). As a result of these increases, the real level of the child allowances to large families was maintained in 1983, but

Table 12

Indicators of Poverty Among Large Families and Social Security Benefits*

Indicator	1979	1980	1981	1982	1983	1984
Percentage of people belonging to large families** with net income less than the poverty line	29	38	37	40	37	43
Percentage of people belonging to large families in the total poor population	31.2	37.6	32.3	41.8	35.9	33.8
Average short fall of their net income from the poverty line (%) ²⁴	24	30	30	25	24	32
Real change in the value of a credit point (%)***	-8.3	-12.0	-6.7	-3.5	-2.7	-14.4
Credit point as a percent of the average wage	3.2	2.8	2.8	2.8	2.6	2.2
Real change in child allowance for families with 4 children (%)	-7.5	-10.6	2.1	3.3	3.7	-3.8
Child allowance as percent of the average wage	20.3	18.3	17.6	17.5	17.3	16.8
Average increase in the income of poor large families due to benefits (%)	33.0	31.2	31.4	39.0	47.1	55.3
Percentage change in Sen's poverty measure among large families = net income		52.9	-2.0	-5.2	-12.7	43.9

* See note to previous table.

** Families with 4 or more children.

***Includes also Family Allowance for Veterans. Only approximately 60% of all large families receive Family Allowance for Veterans.

was slightly eroded in 1984 due to the erosion in the value of the credit point. In spite of the compensation the level of child allowances did not go back to what it used to be in 1979 or even before.

It should also be pointed out that most of the poor large families are working families, and therefore the decline in the tax threshold income further worsened their economic situation. This was due to the fact that increasingly more poor large families could no longer be exempt from paying taxes.

As a result of the opposing trends in the poverty level of the elderly and the large families, the relative weight of the large families in the poor population rose. In 1979 their relative shares were more or less equal, but in 1984 that of large families was approximately 35 percent, while the relative share of the elderly was only 18 percent. At the same time their respective shares in the entire population were 17 percent and 13 percent.

Summary and Conclusions

During the years 1979 through 1984 Israel experienced very high rates of inflation. Nevertheless, during most of that period there were relatively small changes in the income inequality and in poverty. This was largely the result of an extensive and increasingly intensifying system of indexation that included wages, savings, the parameters of the income tax system, and equally or even more importantly, the social security benefits.

When inflation was relatively stable, though quite high at the 130 percent level, the indexation adjustment mechanisms proved to be highly efficient in protecting the real purchasing power of the population. Moreover, the introduction of automatic adjustment mechanisms to the main social security benefits (old age benefits and minimum guaranteed income) that has started already in 1975, even led to a reduction in income inequality and in poverty.

However, in 1980 and 1984, when inflation jumped to higher levels, these mechanisms were not sufficient to keep pace with inflation, mainly due to lags inherent in their implementation.

We should, therefore, be cautious not to conclude that inflation is not detrimental to income inequality and poverty. The comprehensive indexation mechanisms that were designed to prevent erosion in real incomes and protect the poor were themselves a major factor that contributed to the inflationary jumps. Over the entire inflation cycle there has been a clear and significant rise in both income inequality and poverty.

FOOTNOTES

1. See, e.g. Bach and Stephenson.
2. See Clark, Maddox, Schrimmer and Summer. They concluded that inflation has not adversely affected the aged largely because of the growth in Federal Transfer Programs which are almost all automatically upwardly adjusted with inflation.
3. In Sen's analysis as well as in most of the literature on aggregate poverty measures, a well-defined poverty line is assumed to be known.
4. Later, Sen (1979) replaced the Transfer Axiom by a weaker version, viz. (WT) Weak Transfer Axiom: given other things, a transfer of income from a poor individual to a more affluent but still poor individual must (strictly) raise the measure of aggregate poverty, provided that the recipient remains poor after the transfer.
5. (N) Non-negativity: $P(z, \underline{Y})$ is non-negative for all income profiles, with equality holding if and only if $y_i \geq z$ for all $i = 1, \dots, n$.
(SI) Scale Independence: $P(z, \underline{Y})$ is homogeneous of degree zero in (z, \underline{Y}) .
(A) Anonymity: $P(z, \underline{Y}) = P(z, \underline{Y})$ where \underline{Y} is an arbitrary matrix of size $n \times n$.
(SP) Separability: the poverty line partitions the set S_n of all individuals in the community into two strictly separable subsets of "poor" and "rich" individuals.

(H) Heredity: if $P(z, \underline{Y})$ has certain properties over S_n than it has the same properties over all subsets of S_n .

Axiom (N) requires poverty measures to reach their minimum value of zero when all individuals have income above the poverty line. Axiom (SI) states that individuals have no money illusion and $P(z, \underline{Y})$ is therefore independent of the units of measurement.⁹. When poverty has the meaning of relative deprivation so that Z is determined relative to the income levels \underline{Y} , the axiom means that Z is homogeneous linear in \underline{Y} , i.e. doubling all incomes doubles also the poverty line. Axiom (A) assures that poverty is a function of the size of the incomes only, independent of the personal labels assigned to incomes. Axiom (SP) requires that the conditional ordering defined by the poverty measure over income profiles of the poor is independent of the values of the incomes of the rich.

6. It should be noted that eq. (4) is only an approximation of the actual changes, made on the assumption that elements of the form HG, HI and GI can be neglected.
7. The research data do not include income of self-employees due to lack of credibility.
8. We should note that data on incomes from rent, dividends and profits, that concentrate mostly at the higher tail of the income distribution, are not as reliable as data on wages and salaries.
9. In 1983 Family Allowances for Veterans for the fourth and subsequent children were increased by one credit point per child. In 1984 half a credit point was added for the third child.

R E F E R E N C E S

Achdut, L., Bigman, D., 1987, "The Anatomy of Changes in Poverty and Income Inequality Under Rapid Inflation: Israel 1979-1984", - unpublished.

Bigman, D., 1986, "Aggregate Poverty Measures and the Aggregation of Individual Poverty: A Reconsideration of Sen's Axiomatic Approach", - unpublished.

_____ 1987, "On the Measurement of Poverty and Deprivation", - unpublished.

Foster, J.E., 1984, "On Economic Poverty: A Survey of Aggregate Measures" in Advances in Econometrics. 3:215-51.

Foster, J.E., J. Gree and E. Thorbecke, 1984, "A Class of Decomposable Poverty Measures", Econometrica 52: 761-66.

Kakwani, N.C., "On a Class of Poverty Measures" Econometrica, 48: 437-46.

Sen, A., 1976, "Poverty: An Ordinal Approach to Measurement", Econometrica, 44: 219-31.

_____ 1979, "Issues in the Measurement of Poverty" Scandinavian Journal of Economics, 285-302.

_____ 1981, Poverty and Famines: An Essay on Entitlement and Deprivation, Oxford: Clarendon Press.

APPENDIX

Table A: INEQUALITY MEASURES OF POOR POPULATION

ECONOMIC INCOME

		1979	1980	1981	1982	1983	1984
GINI P	INDEX	0.4627	0.4724	0.4980	0.4924	0.4861	0.4838
	DLT%	.	2.09	5.42	-1.12	-1.28	-0.46
C.V. P	INDEX	0.8187	0.3357	0.8851	0.8740	0.86	0.8517
	DLT%	.	2.07	5.90	-1.24	-1.61	-0.95
EXTENDED C.V. P	INDEX	1.2489	1.2784	1.3755	1.3533	1.3163	1.2717
	DLT%	.	2.36	7.59	-1.61	-2.72	-3.39
ATKINSON P	INDEX	0.3412	0.3487	0.3770	0.3714	0.3568	0.3408
	DLT%	.	2.20	8.11	-1.47	-3.92	-4.49

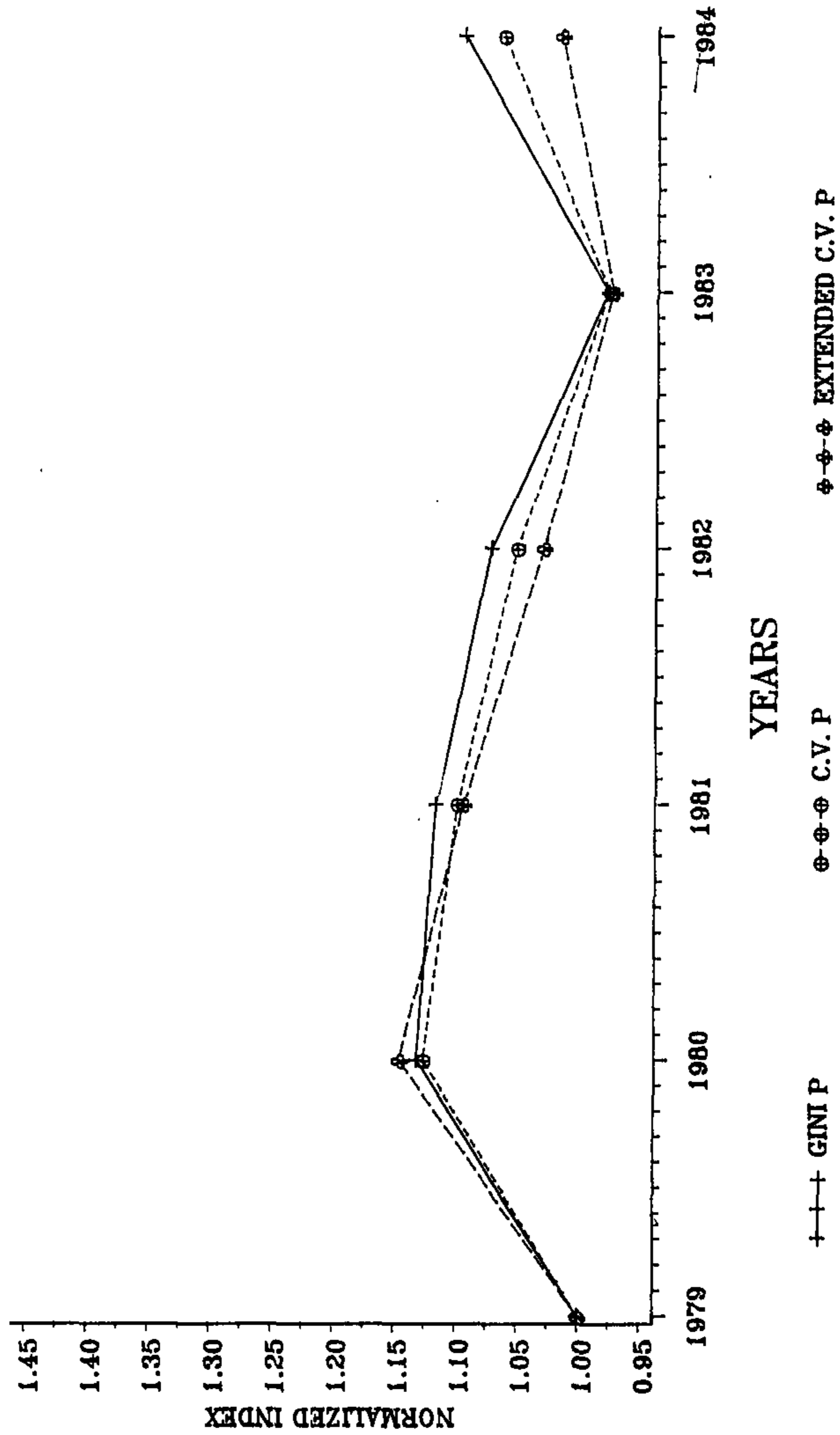
GROSS INCOME

		1979	1980	1981	1982	1983	1984
GINI P	INDEX	0.1568	0.1838	0.1758	0.1706	0.1555	0.1701
	DLT%	.	17.21	-4.34	-2.91	-8.84	9.34
C.V. P	INDEX	0.2846	0.3313	0.3155	0.3036	0.2832	0.3019
	DLT%	.	16.43	-4.78	-3.78	-6.71	6.61
EXTENDED C.V. P	INDEX	0.3364	0.4007	0.3743	0.35	0.3371	0.3443
	DLT%	.	19.11	-6.58	-6.50	-3.66	2.13
ATKINSON P	INDEX	0.0250	0.0347	0.0306	0.0278	0.0250	0.0274
	DLT%	.	38.51	-11.58	-9.36	-10.00	9.73

NET INCOME

		1979	1980	1981	1982	1983	1984
GINI P	INDEX	0.1468	0.1662	0.1640	0.1575	0.1438	0.1609
	DLT%	.	13.21	-1.33	-3.97	-8.70	11.93
C.V. P	INDEX	0.2696	0.3039	0.2966	0.2837	0.2639	0.2870
	DLT%	.	12.69	-2.38	-4.34	-6.98	8.76
EXTENDED C.V. P	INDEX	0.3221	0.3693	0.3527	0.3319	0.3142	0.3278
	DLT%	.	14.64	-4.49	-5.88	-5.35	4.34
ATKINSON P	INDEX	0.0226	0.0293	0.0273	0.0245	0.0217	0.0248
	DLT%	.	29.62	-6.95	-10.02	-11.64	14.49

MEASURES OF INEQUALITY OF POOR POPULATION NET INCOME



INFLATION

