NATIONAL INSURANCE INSTITUTE
Administration of Research and Planning

INCOME INEQUALITY AND INCOME COMPOSITION:
ISRAEL 1979-1991*

by

Lea Achdut

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I. INTRODUCTION

Recent studies on income distribution in Israel during the last decade have focused on the impact of inflation and unemployment as well as of government tax and transfer policies on income disparities. During the years 1979-1985 Israel experienced high rates of inflation which peaked at more than 450 percent annually in the first half of 1985. In July 1985, the government introduced a sweeping package of measures which rolled the inflationary tide back to an annual level of less than 20 percent during the years 1986-1991. The price stabilization period, however, was characterized by an additional expansion in unemployment, which emerged gradually since 1979.

Achdut and Bigman (1990) found that while the pre-tax and transfer income distribution, as well as the pre-tax and post transfer income distribution, became much more unequal during the high inflation period, inequality in post-tax and transfer income increased only moderately. Achdut (1992), examining the impact of the transition from rapid to low and stable inflation on inequality, showed that after a decline in inequality in 1985 which was more prominent in the post-tax and transfer income, the following years witnessed a renewed increase. The latter was lower in post transfer income than in post-tax and transfer income. These results suggest that different income sources, such as ecoonomic income (mainly labor market income), transfers or direct taxes, played a different role in determining overall inequality in various periods.

Within this context the purpose of this paper is to extend the examination of the trends in income inequality in Israel to include additional measures, to evaluate the relative importance of various income sources to overall inequality in the years 1979-1991 and to identify the factors which may explain the changes in overall inequality over time. The next section presents the trends in income inequality over the investigated period, using microdata from the Annual Income Surveys conducted by the Central Bureau of Statistics (since 1965, with the exception of 1986).[1] Changes in income

distribution have been examined by alternative summary measures of income inequality, which differ in their sensitivity to income changes at different ranges of the distribution. Differences among percentiles in real income changes have been considered as well. In addition, an attempt has been made to rank the income distributions in the years under investigation on the basis of Generalized Lorenz curve dominance.

Section III discusses the results of the decomposition of overall inequality - as indicated by the Gini coefficient - by income source. Section IV suggests a number of explanations for the changes over time in overall inequality and for the role of various income sources in these changes. It focuses on the developments in unemployment and wages as well as on transfer and tax policies, such as the measures taken by the government to moderate the distributional costs of inflation, the tendency towards greater selectivity in national insurance (NI) benefits or the gradual reduction in the marginal income tax rates, as possible explanators of the observed trends in inequality. Section V concludes with a summary of the main results.

II. TRENDS IN INCOME INEQUALITY

In analyzing the trends in income distribution during the 1979-1991 period, four measures of income inequality were applied: the Gini coefficient, the Extended Gini coefficient, the coefficient of variation (CV) and the Atkinson measure. The Extended Gini coefficient,

$$EG(k) = \frac{1}{\mu\phi_n(k)} \sum_{i=1}^{n} (\mu-y_i)(n+1-i)^k, \qquad (1)$$

was calculated for three alternative values of k (=2,3,4),[2] where n is the size of the population, y is income, μ is the

mean income and $\phi_n(k) = \Sigma i^k$. The Atkinson measure,

$$A(\varepsilon) = 1 - [\sum_{i=1}^{n} (y/\mu)^{1-\varepsilon}f(y)]^{1/(1-\varepsilon)}, \qquad (2)$$

was calculated for four alternative values of ε (=0.5, 1.5, 2.0, 2.5), where ε reflects inequality aversion, and $f(y)$ is the percentage of the population with income y. These different inequality measures reflect different sensitivities to income changes at different ranges of the income distribution. The Gini coefficient is relatively more sensitive to income changes at the middle range, whereas the Extended Gini coefficient attaches higher weights (increasing with k) to variations at the lower tail of the income distribution (Kakwani 1980). The coefficient of variation is more sensitive to income changes at the upper and the lower tails, and the Atkinson measure gives more weight to income changes at the lower tail and less weight at the top as ε increases (Atkinson, 1970).

The major methodological issues in the analysis of income distribution relate to the choice of the unit of analysis, the income measure, the weighting of the units and the way by which income units are ranked. In this study, the unit under investigation is the household (hereafter, 'family'). The income measure is the post-tax and transfer income, adjusted to family size using the equivalence scale adopted by the National Insurance Institute and the Central Bureau of Statisics.[3] In the calculation of income inequality measures each family is weighted by its number of persons where the families are ranked by the adjusted income.

Table 1 presents the absolute values of the various measures of post-tax and transfer income inequality. To emphasize the trends in income inequality registered by the different measures, their values in the various years have been normalized by their value in 1979. The normalized values of the Gini coefficient, the Extended Gini for k=4 and the coefficient of variation are presented in Figure 1a,[4] whereas

Table 1: Measures of Income Inequality: 1979 – 1991

	Gini	Egini2	Egini3	Egini4	Atk(0.5)	Atk(1.5)	Atk(2)	Atk(2.5)	Cv
1979	0.3181	0.4390	0.5061	0.5499	0.0819	0.2400	0.3259	0.4290	0.6395
1980	0.3239	0.4462	0.5145	0.5593	0.0860	0.2570	0.3580	0.4927	0.6531
1981	0.3185	0.4421	0.5115	0.5570	0.0825	0.2482	0.3421	0.4607	0.6214
1982	0.3135	0.4348	0.5019	0.5457	0.0786	0.2355	0.3219	0.4272	0.5908
1983	0.3018	0.4205	0.4868	0.5302	0.0730	0.2182	0.2941	0.3770	0.5663
1984	0.3283	0.4535	0.5227	0.5677	0.0871	0.2583	0.3481	0.4465	0.6380
1985	0.3119	0.4298	0.4955	0.5388	0.0783	0.2285	0.3040	0.3819	0.6113
1987	0.3186	0.4429	0.5136	0.5607	0.0822	0.2586	0.3748	0.5254	0.6168
1988	0.3221	0.4483	0.5202	0.5681	0.0842	0.2617	0.3771	0.5277	0.6528
1989	0.3237	0.4453	0.5130	0.5574	0.0844	0.2471	0.3329	0.4271	0.6489
1990	0.3263	0.4526	0.5235	0.5703	0.0870	0.2736	0.3980	0.5820	0.6263
1991	0.3273	0.4517	0.5211	0.5663	0.0870	0.2604	0.3585	0.4742	0.6493

Figure 1: Measures of Inequality

a

Legend: □ Gini + Cv ◇ Extended Gini (K=4)

## b

Legend: □ Atk(0.5) + Atk(1.5) ◇ ATK(2) △ Atk(2.5)
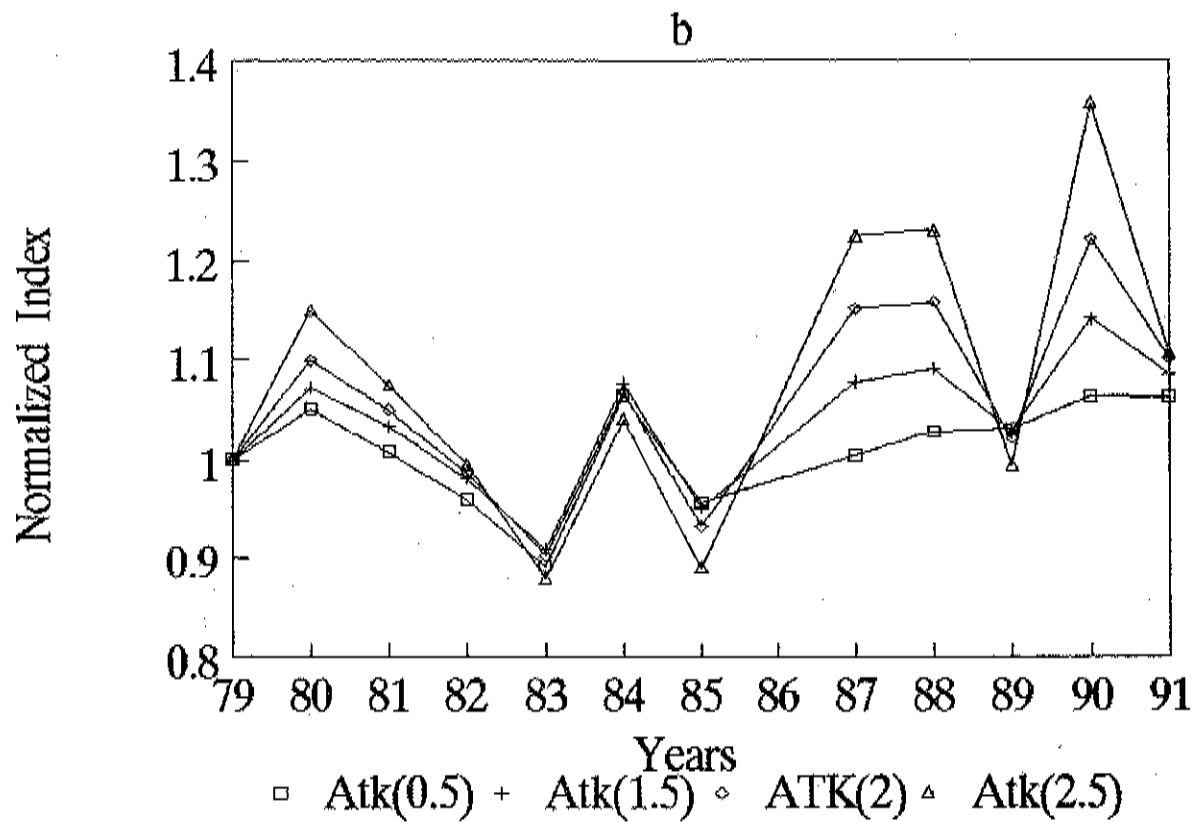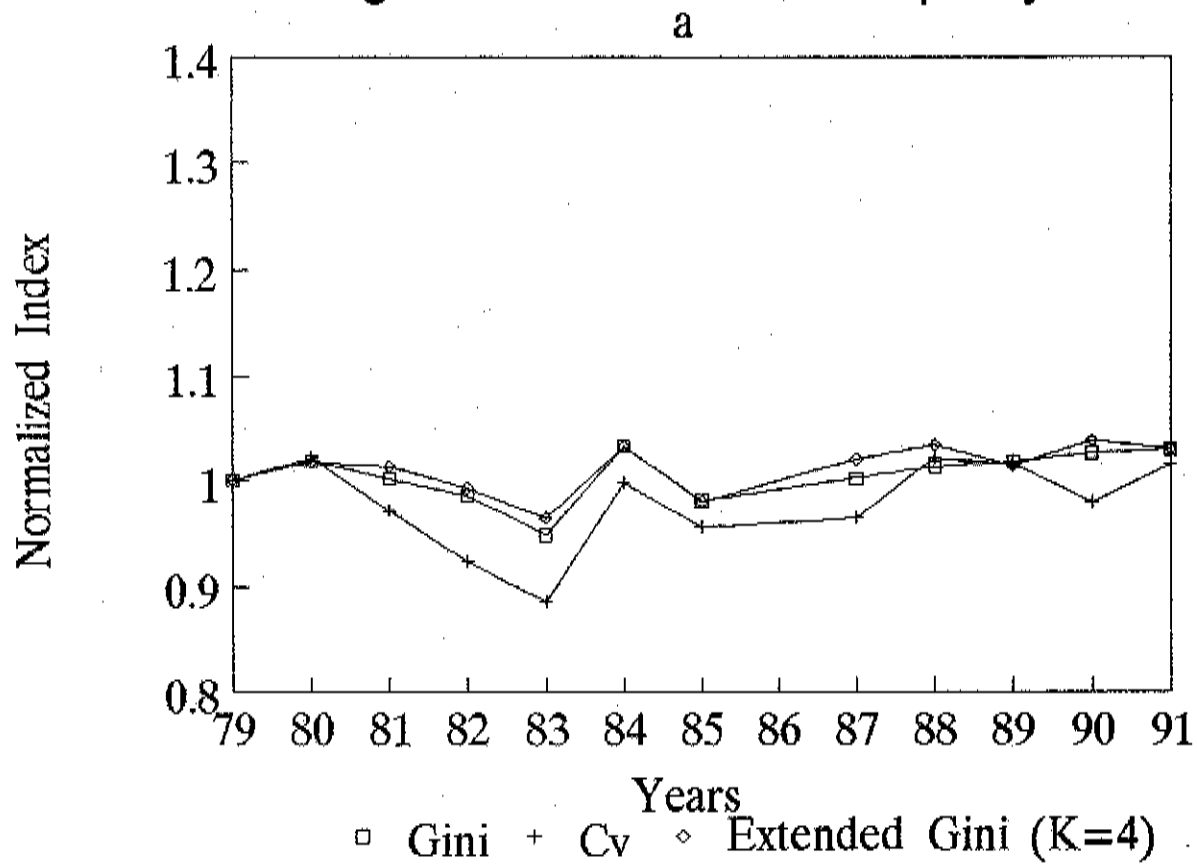
the normalized values of the Atkinson measure for alternative ε's are plotted in Figure 1b. The figures reveal that all measures follow identical trends (excluding 1989 and 1991), however of different magnitude. Despite the sharp changes in the inflation and unemployment rates, in real wages and in other macroeconomic variables which characterized the Israeli economy in the last decade, there were surprisingly small changes in income inequality over the thirteen year period. As shown in Figure 1a, income inequality increased slightly by 1.5 - 3.0 percent according to all measures. Even over the rapid inflation period, 1979-1984, income disparities did not widen considerably: between 1979 and 1984, the Gini and the Extended Gini coefficients register an increase of about 3.0 percent, whereas the coefficient of variation remained unchanged.

However, an examination of the year to year changes shows relatively large variations in the extent of income inequality within the inflation period as well as within the price stabilization period, 1985-1991. During the first period, there were differences between the developments in the years 1980 and 1984 - in which the inflation rate jumped to higher levels - and the developments in the years 1981-1983, in which the inflation rate was high but relatively steady. According to all measures, after a 2.0 percent rise in income inequality in 1980, the years 1981-1983 witnessed a continuous and significant decline: 6.0-7.5 percent according to the Gini and the Extended Gini coefficients and 15.0 percent according to the coefficient of variation. In 1984 inequality rose again by 9.0 and 7.0 percent according to the former measures, respectively, and by 13 percent according to the coefficient of variation. Figure 1b shows that the decline in inequality in 1981-1983, as indicated by the Atkinson measure, increases with ε, while the increase in inequality in 1984 is almost identical for all ε's. This finding suggests that in 1983 the relative position of low income families improved and did not worsen in 1984.

In 1985, when the stabilization policy was implemented, the trend reversed, and income inequality decreased by 4.0-5.0 percent (Figure 1a). In the following years income disparities widened again; between 1985 and 1991, the Gini coefficient increased steadily by 5.0 percent, where the main increase occurred in 1987-1988. The Extended Gini coefficient and the coefficient of variation indicated a similar increase over the entire period, although they register a slight decline in 1989 and 1991. The increase in income inequality between 1991 and 1985 is also evident by the Atkinson measure, which indicates a greater increase the higher the value of ε (Figure 1b).

The investigated peroiod was characterized not only by changes in income inequality but also by changes in real income, which may be used as an indicator of standard of living. Figures 2a and 2b show, for each percentile of the income distribution, the real increase in the absolute income, adjusted for population growth (that is, the real increase in income per capita) between selected pairwises of years. The figures support the above results relating to the changes that occurred in the relative position of low income families (as indicated, for example, by the Atkinnson measure for different ε's). The continuous decrease in inequality from 1980 to 1983 was accompanied by an increase in the mean income per capita in real terms. As is clearly evident from Figure 2b, the rate of increase in real income declined continuously with the percentile of income distribution. Real income per capita of the 10th percentile grew almost by 25 percent, while income per capita of the 90th percentile grew by less than 18 percent. The decrease in income inequality between 1984 and 1985 was, in contrast, accompanied by a real decrease in incomes. However, the decrease in the bottom of the distribution was smaller than that in the middle and the top of the distribution. Between 1979 and 1991, and mainly between 1985 and 1991, when income inequality rose, families in the low percentiles gained a lower rate of real increase in income than others (Figure 2a).

Figure 2: The Ratio Of Real Absolute Income
Between Two Selected Years, By Percentile. (a)

P

* 1985−91 + 1979−91 ~ 1979−84

(b)

P

* 1980−83 + 1984−85
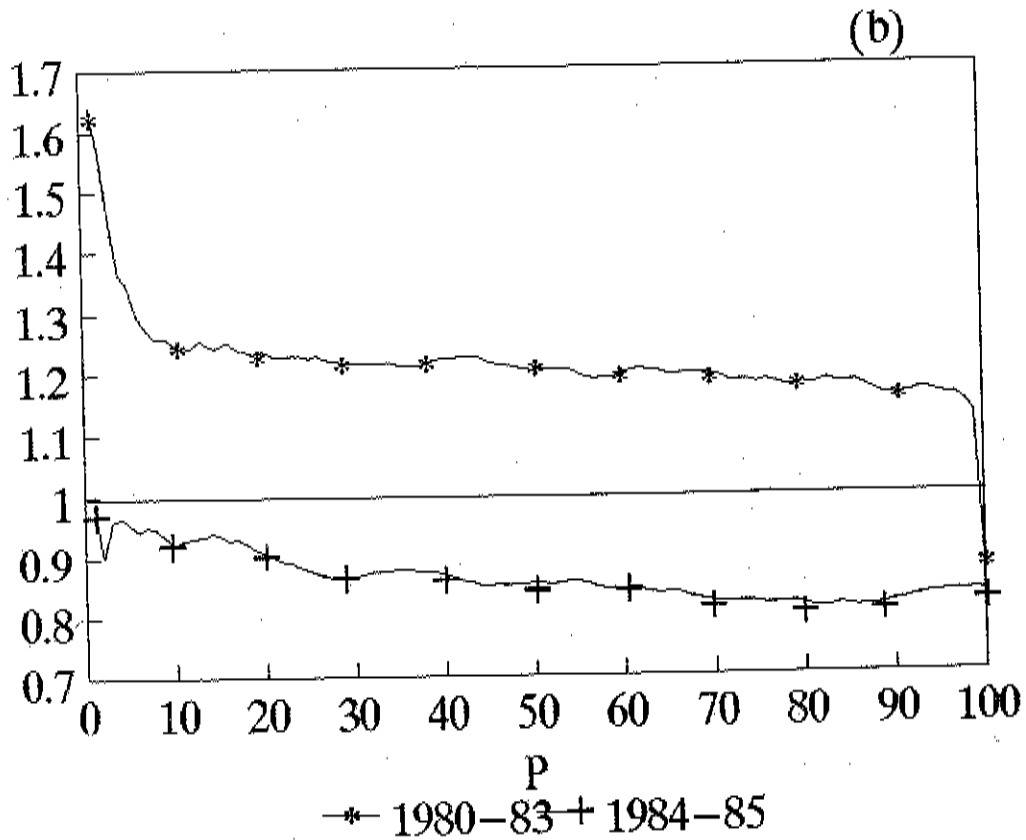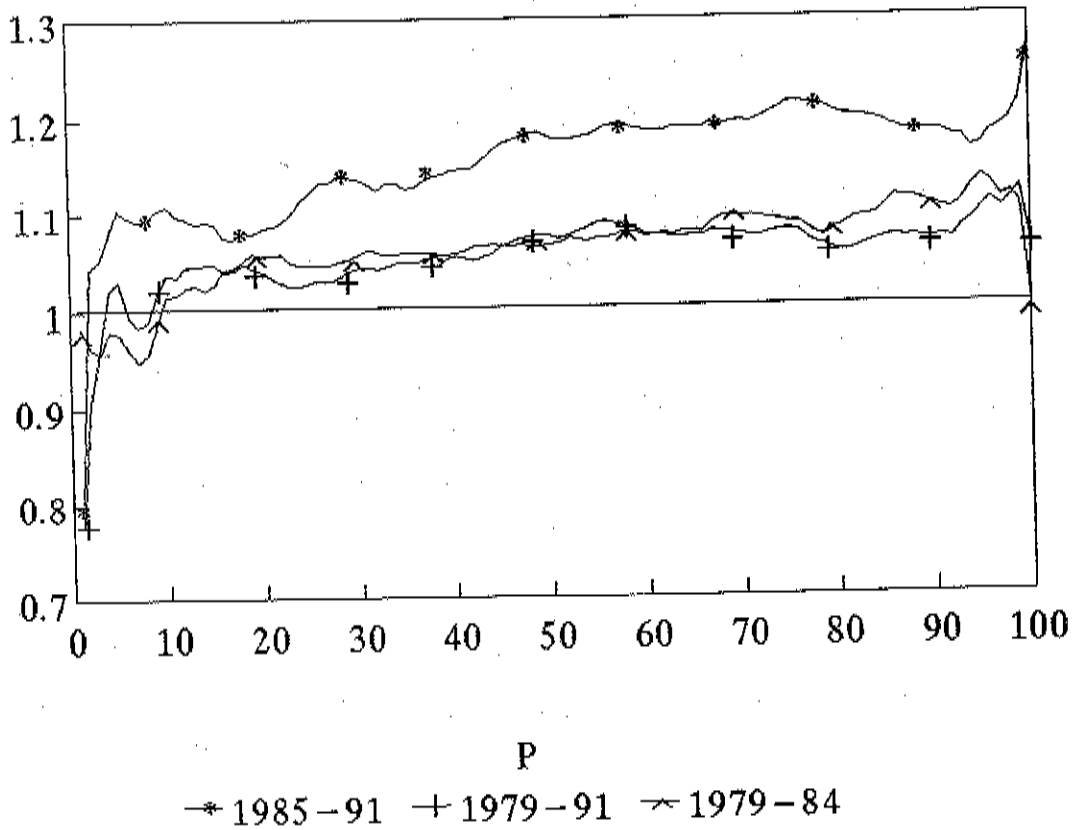
The calculation of the real absolute income for each percentile, which served to plot Figures 2a and 2b, can be used to derive the Generalized Lorenz curve. The Generalized Lorenz curve is obtained by scaling up the ordinary Lorenz curve by the mean of the income distribution. Following Shorrocks (1983), if generalized curves for two income distributions do not intersect, the two distributions can be ranked unambiguously. The income distribution with the higher generalized Lorenz curve is socially more desirable for any choice of a utilitarian welfare function satisfying positive and decreasing marginal utilities of income. Figures 3a and 3b show the Generalized Lorenz curves for selected years, when incomes are expressed in 1991 prices.[5] The most striking finding is that 1983 is ranked as the year with the highest level of welfare (i.e., has the highest and non-intersecting Generalized Lorenz curve). Two additional results are finally worth mentioning. First, the Generalized Lorenz curve of 1985, a year when both real incomes and income inequality fell, lies below that of 1984. The increase in the relative shares in the lower income groups in 1985 was not sufficient to offset the decline in the real mean income. Second, although the Generalized Lorenz curve of 1991 intrsects those of 1979 and 1984, Figure 3b shows that the two curves are very close to each other.

III. DECOMPOSITION OF INEQUALITY BY INCOME SOURCE

One property of the Gini coefficient is that it is additively decomposable by income source (Pyatt, 1976, Kakwani, 1980, Lerman and Yitzhaki, 1985). This property is usefull for determining the relative contribution of a particular income source to overall inequality at a specific point in time, as well as for explaining variations in inequality over time by changes in income composition. Given K components of total income, the Gini coefficient for overall inequality, G, can be written as

$$G = \sum_{k=1}^{K} S_k G_k R_k , \qquad (3)$$

Figure 3: Generalized Lorenz Curves

(a)

(b)
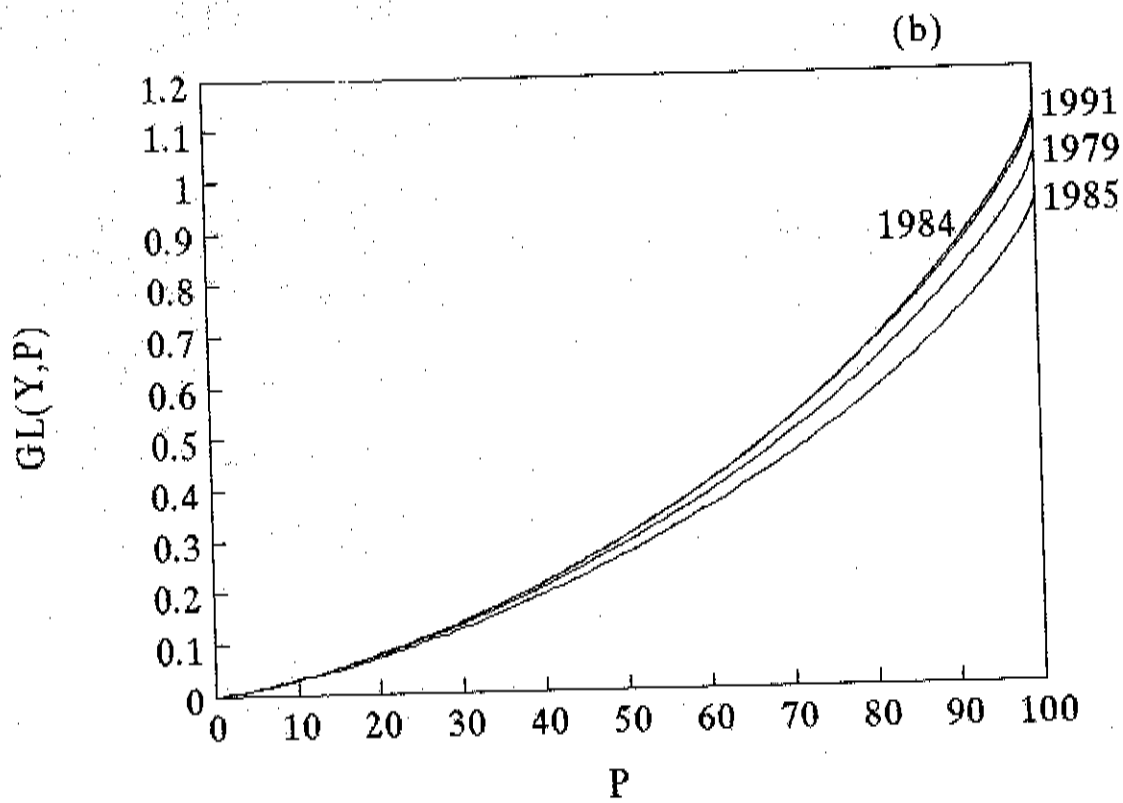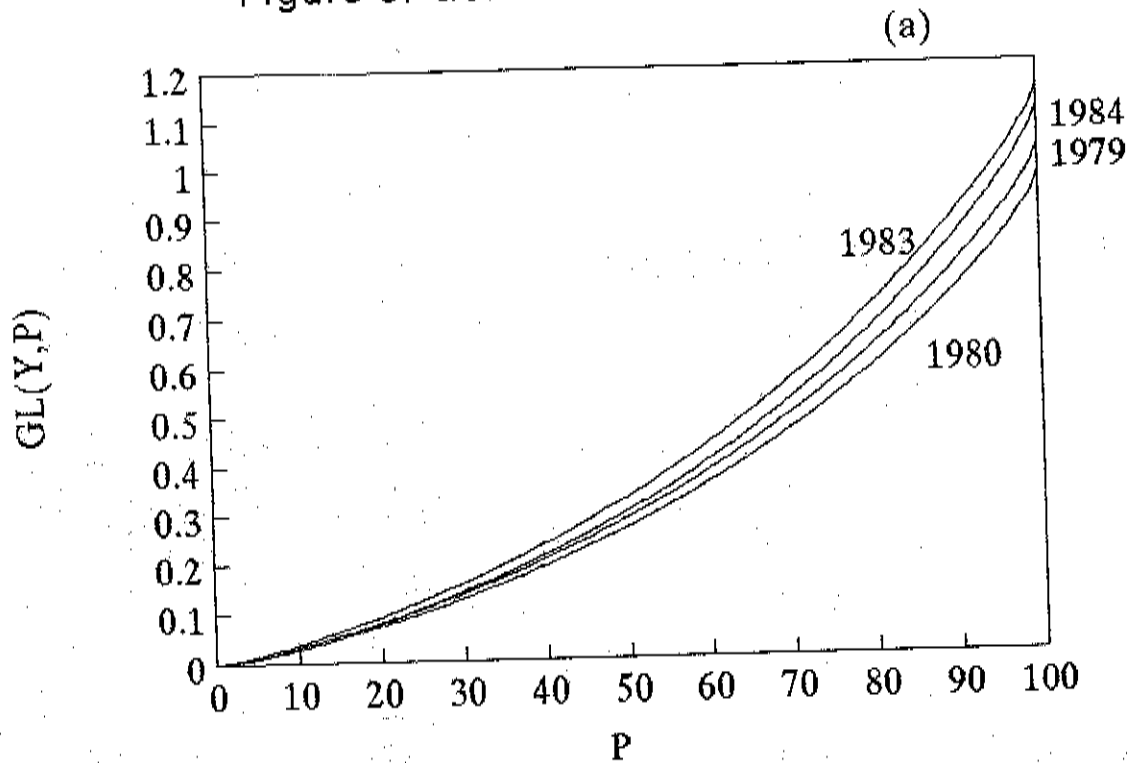
where S_k is the income component k's share of total income
(k=1,...,K), G_k is the Gini coefficient of income component
k, and R_k is the "Gini correlation", i.e., the correlation
coefficient between the ranking of families by income
component k and the ranking of families by total income. The
share of inequality attributed to each income source, I_k, is
given by

$$I_k = \frac{S_k G_k R_k}{G}, \tag{4}$$

where I_k is negative for an income source which reduces
inequality. A secondary decomposition of the Gini coefficient
is to break the G_k's into two components

$$G_k = (1-p_k) + p_k G_k^*, \tag{5}$$

where p_k is the proportion of families with income source k,
and G_k^* is the Gini coefficient for the distribution of
income source k among families with that income.

In the present research, post-tax and transfer income was
divided into eight components: family's head earnings,
spouse's earnings, other family members' earnings, NI
benefits, other government and public institutions'
transfers, occupational pensions, other income (mainly
property income, transfers from relatives and from abroad)[*]
and direct taxes (income tax and national insurance
contributions). Table 2 presents the results of the
decomposition of the Gini coefficient for selected years.
Figures 4, 5, 6 and 7 plot the time series of S_k, G_k, R_k and
I_k, respectively.

The largest income component, family's head earnings,
exhibits dramatic variations in its contribution to overall
inequality. During the inflation period 1979-1984, the
relative share of family's head earnings in total income grew
continuously (from 80 to 90 percent). At the same time, the
inequality in the distribution of this income component rose
sharply (the Gini coefficient increased from 0.469 to 0.522)

Table 2: Decomposition of Gini Coefficient by Income Source; Selected years

Family's Head Earnings (H_E)

	Gk	Sk	Rk	Ik	G_k^*	P_k
1979	0.4693	0.8044	0.7667	90.97	0.2781	73.51
1980	0.4725	0.8081	0.7494	88.33	0.2843	73.71
1983	0.4817	0.8391	0.7746	103.71	0.2679	70.80
1984	0.5220	0.8991	0.8080	115.50	0.3203	70.34
1985	0.5136	0.8286	0.7895	107.71	0.3113	70.63
1987	0.5089	0.7697	0.7934	97.55	0.2871	68.88
1991	0.5442	0.7081	0.8018	94.41	0.3237	67.40

Spous's Earnings (S_E)

	Gk	Sk	Rk	Ik	G_k^*	P_k
1979	0.7959	0.1865	0.7767	36.23	0.3250	30.24
1980	0.7914	0.1940	0.7744	36.70	0.3053	30.03
1983	0.7779	0.2175	0.7886	44.19	0.2824	30.96
1984	0.7933	0.2075	0.7815	39.19	0.3127	30.07
1985	0.7918	0.1843	0.7365	34.45	0.2437	27.53
1987	0.7870	0.1768	0.7186	31.38	0.2155	27.15
1991	0.7777	0.1744	0.7152	29.64	0.2112	28.18

Other's Earnings (O_E)

	Gk	Sk	Rk	Ik	G_k^*	P_k
1979	0.9217	0.0738	0.4666	9.98	0.2987	11.17
1980	0.9204	0.0748	0.4386	9.32	0.2984	11.35
1983	0.9072	0.0730	0.4058	8.90	0.4453	16.73
1984	0.9367	0.0594	0.4515	7.65	0.3608	9.91
1985	0.9222	0.0643	0.4230	8.04	0.1935	9.65
1987	0.9180	0.0640	0.4271	7.88	0.1850	10.06
1991	0.9115	0.0642	0.4571	8.18	0.1955	11.00

NII Benefits (NII_Ben)

	Gk	Sk	Rk	Ik	G_k^*	P_k
1979	0.5307	0.1111	−0.3529	−6.54	0.4001	78.23
1980	0.5650	0.1125	−0.2269	−4.45	0.4471	78.67
1983	0.5740	0.1235	−0.3342	−7.85	0.4741	81.00
1984	0.5767	0.1239	−0.2827	−6.15	0.4765	80.87
1985	0.5987	0.1295	−0.3354	−8.34	0.5013	80.48
1987	0.6246	0.1229	−0.2254	−5.43	0.4540	68.77
1991	0.6456	0.1263	−0.2309	−5.75	0.4130	60.37

Other Transfers (O_Ben)

	Gk	Sk	Rk	Ik	G^*_k	P_k
1979	0.9751	0.0097	−0.0387	−0.12	0.4746	4.75
1980	0.9750	0.0102	−0.0736	−0.23	0.4363	4.44
1983	0.9805	0.0114	0.2250	0.83	0.9538	4.23
1984	0.9819	0.0086	0.1047	0.27	0.4921	3.57
1985	0.9632	0.0170	0.0408	0.21	0.4781	7.05
1987	0.9613	0.0166	−0.0341	−0.17	0.4303	6.80
1991	0.9264	0.0374	−0.0611	−0.65	0.3674	11.63

Occupational Pensions (Pen)

	Gk	Sk	Rk	Ik	G^*_k	P_k
1979	0.9478	0.0384	0.3521	4.03	0.5830	12.52
1980	0.9526	0.0421	0.4646	5.76	0.5945	11.69
1983	0.9423	0.0432	0.3122	4.21	0.5858	13.93
1984	0.9436	0.0441	0.3729	4.73	0.6106	14.48
1985	0.9363	0.0506	0.4206	6.38	0.5803	15.17
1987	0.9272	0.0553	0.3650	5.87	0.5855	17.57
1991	0.9292	0.0563	0.4468	7.14	0.5999	17.70

Other Income Family (O_Inc)

	Gk	Sk	Rk	Ik	G^*_k	P_k
1979	0.9500	0.0683	0.6199	12.64	0.8100	26.30
1980	0.9410	0.0691	0.5924	11.89	0.7748	26.22
1983	0.9619	0.0364	0.4019	4.66	0.6321	10.35
1984	0.9130	0.0536	0.4096	6.11	0.6489	24.79
1985	0.9711	0.0293	0.5472	4.98	0.6662	8.66
1987	0.9693	0.0317	0.5371	5.19	0.6675	9.22
1991	0.9648	0.0282	0.4467	3.71	0.6047	8.90

Direct Taxes (Tax)

	Gk	Sk	Rk	Ik	G^*_k	P_k
1979	0.5715	−0.2921	0.8992	−47.19	0.4511	78.06
1980	0.5646	−0.3108	0.8735	−47.32	0.4441	78.32
1983	0.5816	−0.3439	0.8849	−58.64	0.4405	74.78
1984	0.6180	−0.3963	0.9023	−67.29	0.4917	75.17
1985	0.6295	−0.3035	0.8725	−53.45	0.4936	73.16
1987	0.6354	−0.2369	0.8942	−42.26	0.4998	72.89
1991	0.6827	−0.1948	0.9026	−36.68	0.5540	71.15

along with a moderate increase in its Gini correlation. In contrast, during the subsequent 1985-1991 period, the share of family's head earnings declined gradually (down to 71 percent), the Gini coefficient, that fell in the years 1985-1988, rose again up to 0.544 in 1991. The Gini correlation, however, remained steady since 1984. As a result of these developments, the share of family's head earnings in overall inequality rose consistently from 91 percent in 1979 to 115 percent in 1984, and fell thereafter down to 94 percent in 1991. The slight increase in the contribution of this component to overall inequality between 1979 and 1991 is due to two offsetting trends: a decline in its share in total income, on the one hand, and an increase in its Gini coefficient and correlation, on the other hand.

The contribution of the spouse's earnings to overall inequality increased a little from 1979 to 1984, after which it began to decline gradually until 1991, when it was even less than in 1979. In 1979 nearly 19 percent of total family income came from spouse's earnings. This share rose to almost 21 percent in 1984 but declined to 17 percent in 1991. At the same time, the Gini coefficient of this component, which was more or less steady in 1979-1984, decreased to 0.778 in 1991, as compared to 0.796 in 1979. The Gini correlation, which increased between 1979 and 1984, declined continuously in the following years. The combined effect of these three factors – a fall in the income share, in the Gini coefficient and in the Gini correlation – was to reduce the contribution of spouse's earnings to overall inequality from 36 percent in 1979 to nearly 30 percent in 1991.

Similarly, the share of other family members' earnings (consisting 6.5-7.5 percent of total income) in overall inequality declined from 10 percent in 1979 to 8 percent in 1991. This was due to a slight decrease in all three factors of decomposition. This income source is very unequally distributed because only 10-11 percent of all families receive it. Two other income sources, which are also very unequally distributed, are occupational pensions and 'other income'. As a share of total income, pensions increased from about 4 percent in 1979 to almost 6 percent in 1991.

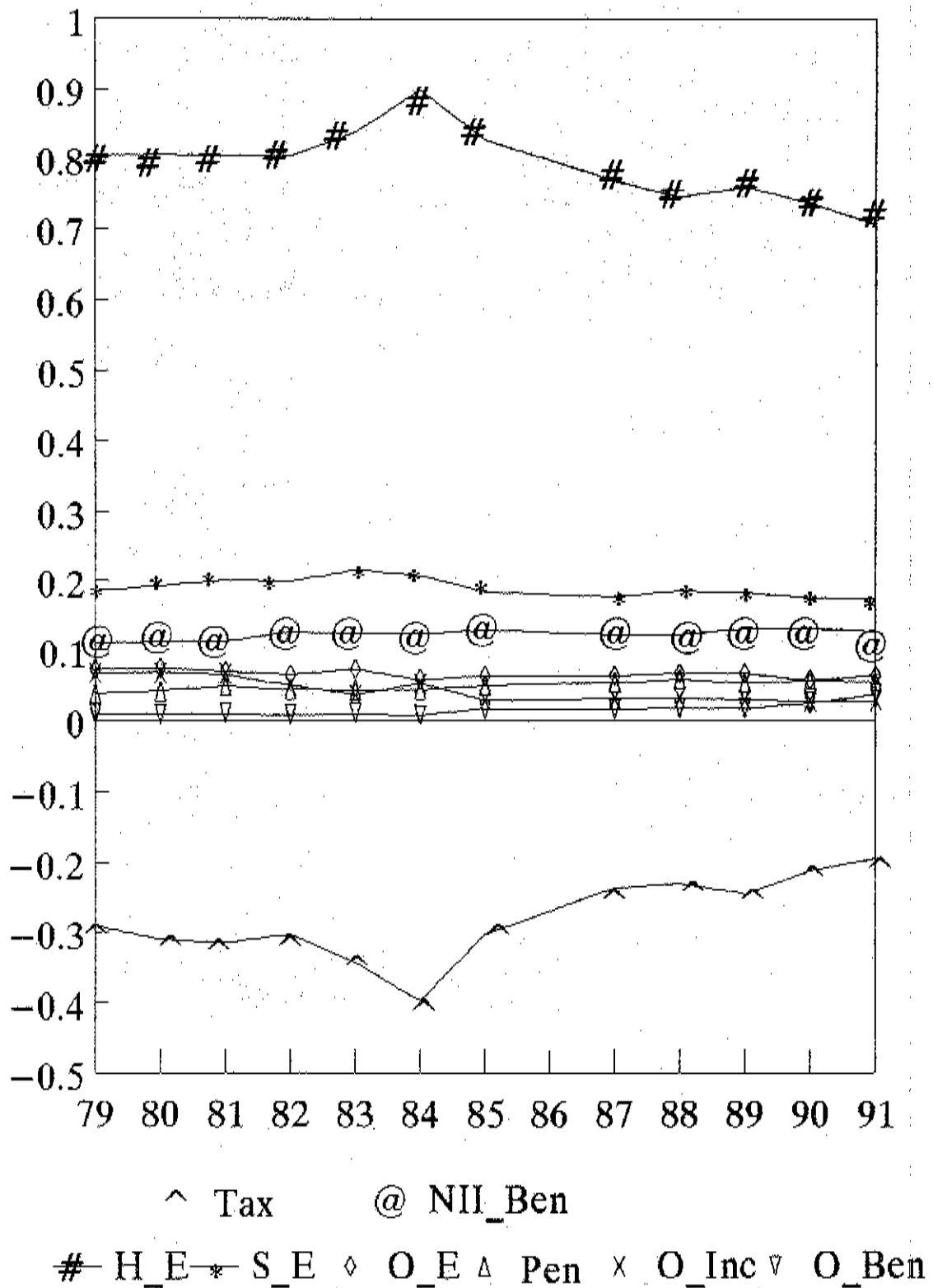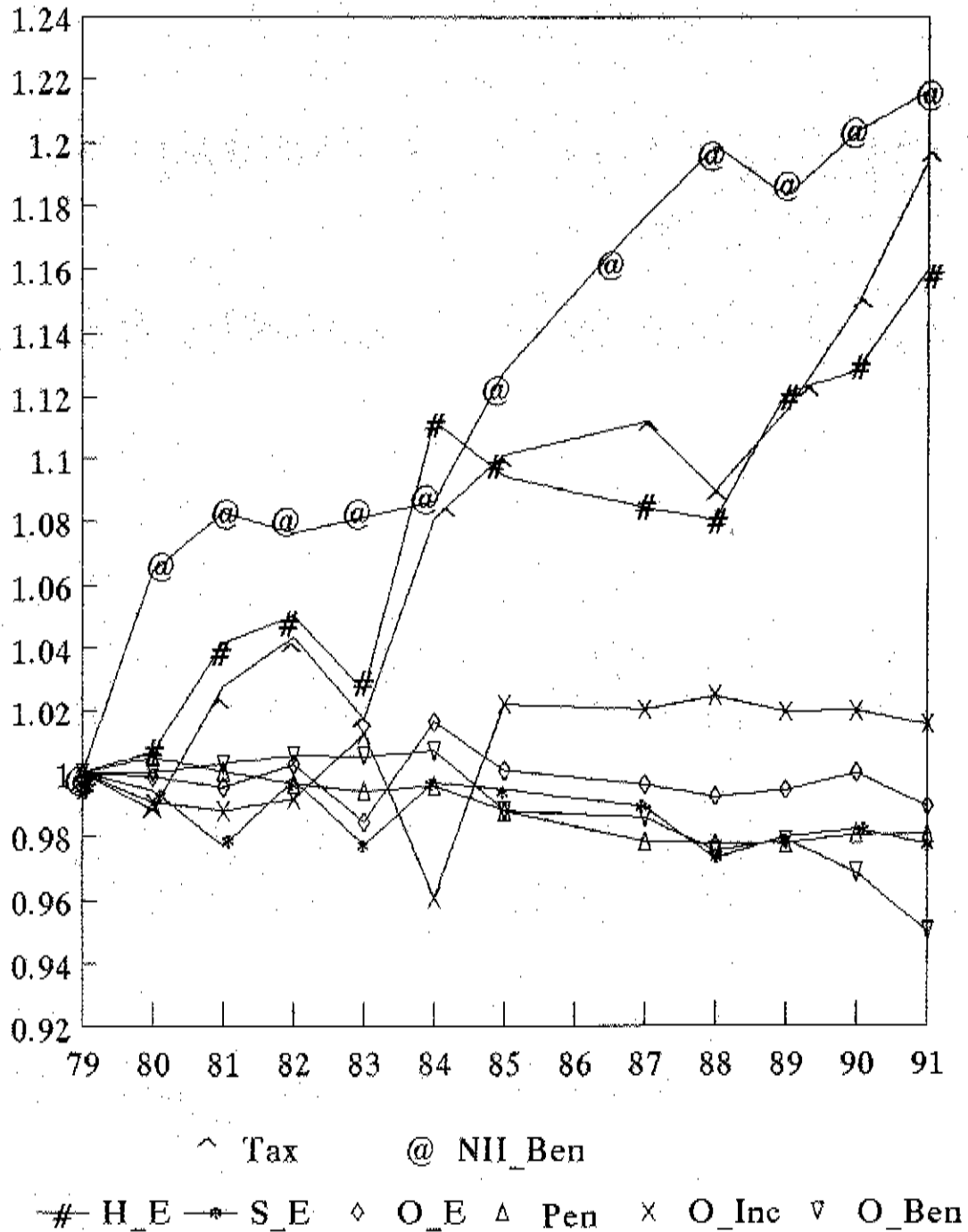# Figure 4: Share of Total Income

by Income Source, 1979−1991

^ Tax   @ NII_Ben

\# H_E —*— S_E ◊ O_E ▵ Pen ✕ O_Inc ▽ O_Ben

Figure 5: Gini Coefficient by Income

Source (Normalized Values, 1979=100)

Legend:
- ^ Tax
- @ NII_Ben
- # H_E
- * S_E
- ◇ O_E
- △ Pen
- × O_Inc
- ▽ O_Ben

Throughout this period, inequality in this component declined (due only to the increase in the number of families receiving pensions), but pensions became more correlated with total income. The net effect was a rise in the contribution of pensions to overall inequality. The share of 'other income' in total income fell from 7 percent in 1979 to 3 percent in 1991.[6] This, along with a decline in the Gini correlation of this component, reduced the share of 'other income' in overall inequality from almost 13 percent in 1979 to 4 percent in 1991.

NI benefits, which comprise non means-tested benefits (e.g., old-age and survivors', disability, unemployment, work injury, maternity and children allowances) as well as means-tested benefits, have an inequality reducing effect - as indicated by the negative I_k term. The positive impact of NII on inequality weakened in 1980 (I_k rose from -6.5 percent in 1979 to -4.5 percent in 1980), strengthened gradually until 1983 (I_k declined to -7.9 percent), and weakened again in 1984 (I_k rose to -6.2 percent). In 1985 the inequality reducing effect of NI benefits grew dramatically (I_k peaked at -8.3 percent), but dropped in 1987 (-5.4 percent). During the following years the NI benefits effect fluctuated less: remained steady in 1988-1989, declined slightly in 1990 and increased in 1991 (-5.8 percent). Over the whole period, particularly in 1980-1987, the fluctuations in the inequality reducing effect of NI benefits reflected mostly the fluctuations in the negative correlation of this component with total income. In contrast with the Gini correlation, the NI benefit share in total income increased almost gradually throughout the whole period (from 11 percent in 1979 to 13 percent in 1991) as well as its Gini coefficient.

Other government and public institutions' transfers had, most of the years, a positive impact on overall inequality, although of a very slight magnitude. Due to the increase in the income share of this component (from 1 percent in 1979 to 3.7 percent in 1991) and its negative Gini correlation, the importance of these transfers in reducing inequality increased.

Figure 6: Gini Correlation between Each

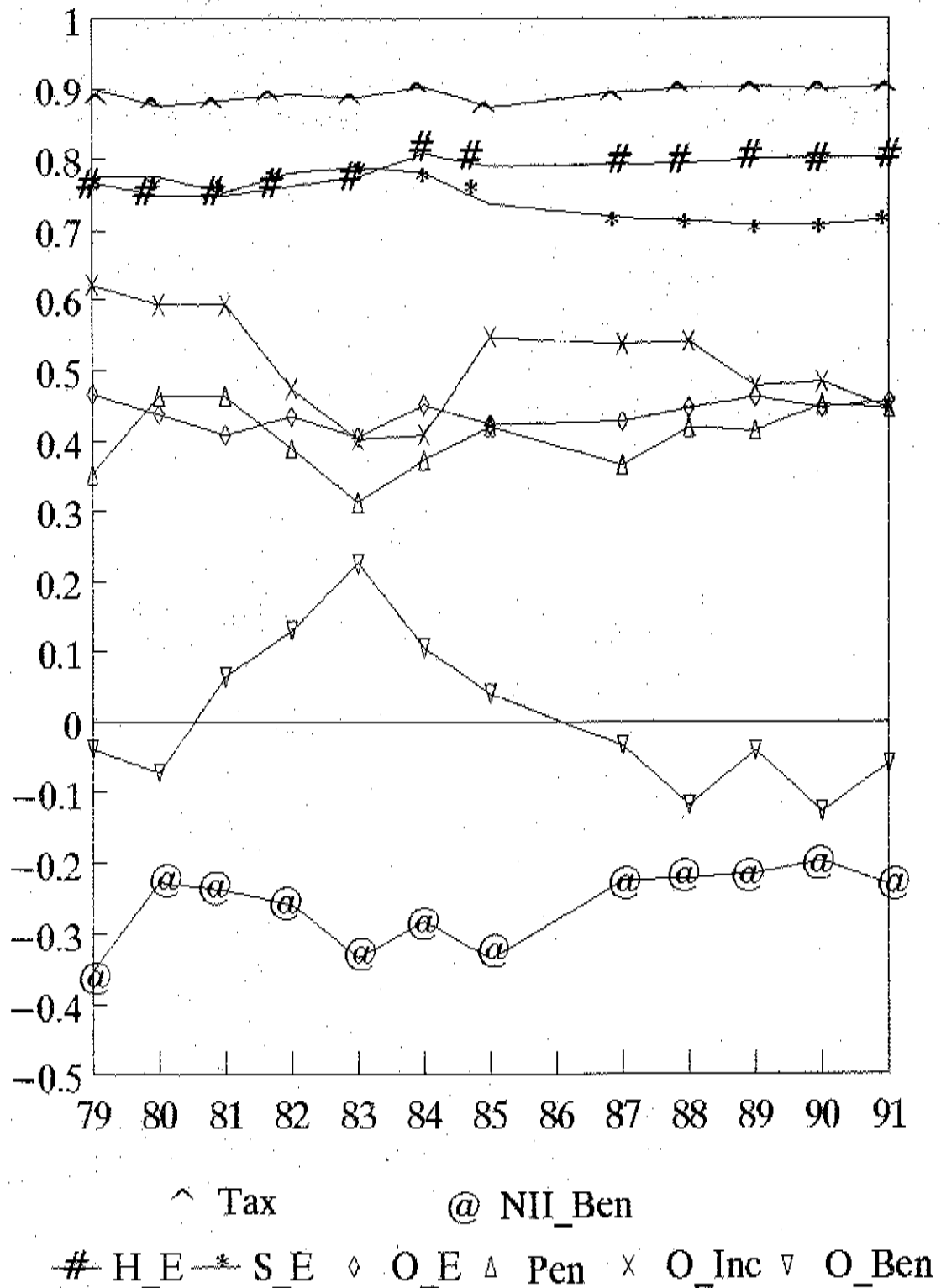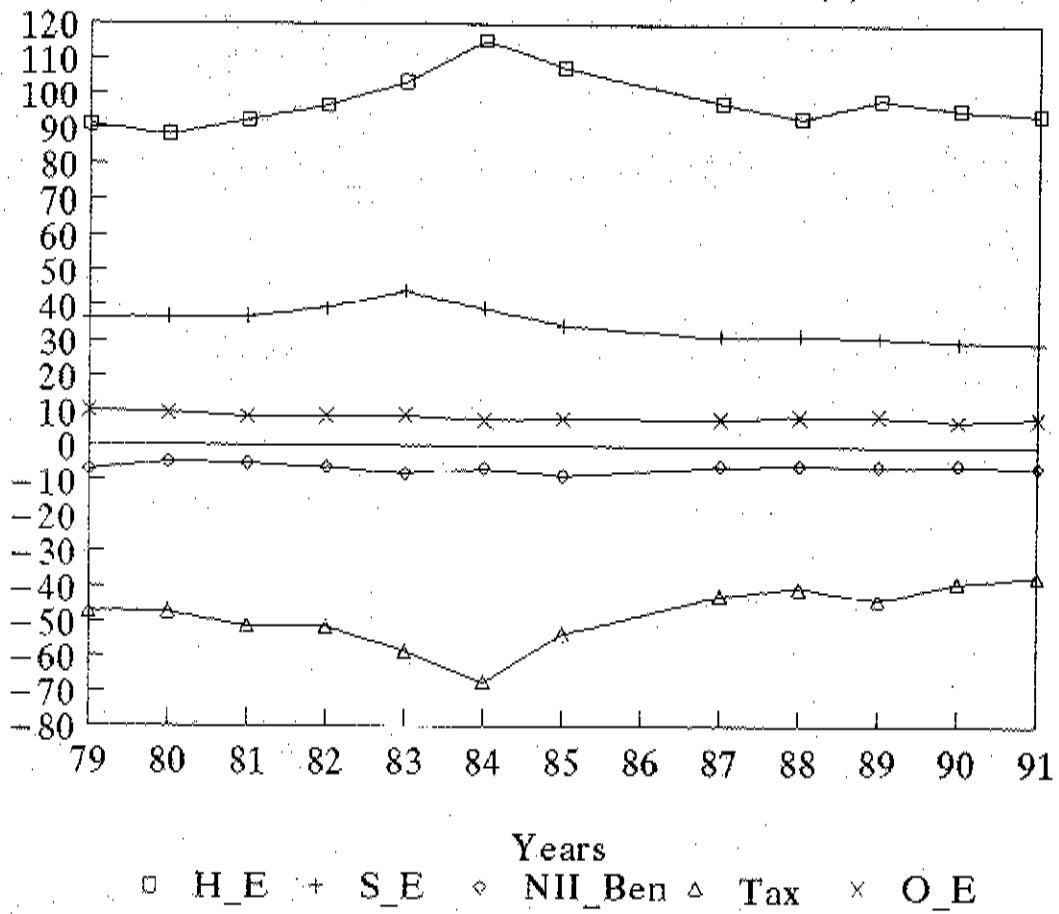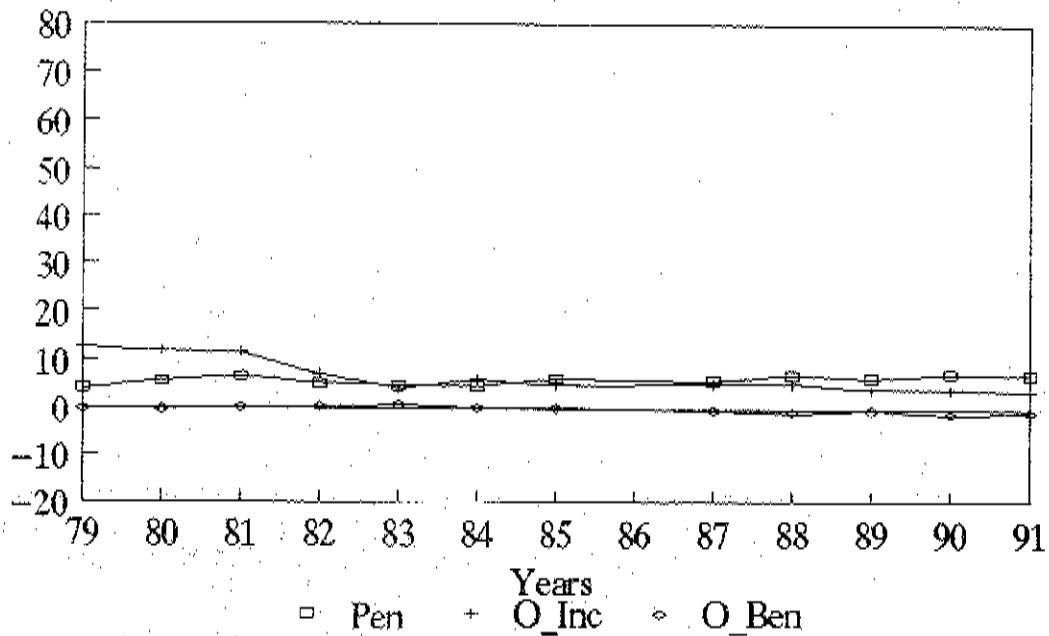## Income Source and Total Income,1979−91

^ Tax   @ NII_Ben

H_E * S_E ◊ O_E △ Pen X O_Inc ▽ O_Ben

Figure 7: Share of Income Inequality by
Income Source, 1979 – 1991   (a)

Years

□ H_E   + S_E   ◇ NII_Ben   △ Tax   × O_E

(b)

Years

□ Pen   + O_Inc   ◇ O_Ben

The last income component, direct taxes, the share of which in post-tax and transfer income is negative, acts also to reduce inequality, as indicated by its nagative I_k term. The inequality reducing effect of direct taxes exhibited opposing trends in the 1979-1984 and the 1985-1991 periods. The first period was characterized by an increasing positive impact of taxes on overall inequality (the I_k term declined from -47 percent in 1979 to -67 percent in 1984). In 1985 the trend reversed. During the following years the reducing inequality effect of direct taxes diminished gradualy, and by 1991 it was even lower than that of 1979 (I_k rose to -37 percent). This development reflected the increasing share of direct taxes in total income during the first period and their decreasing share in total income during the second period. During both periods the Gini correlation of direct taxes remained steady, and the Gini coefficient rose continuously.

The above results with respect to the decomposition of the Gini coefficient for overall inequality may help identify the factors which explain the changes in overall inequality throughout the entire 1979-1991 period or during subperiods. Between 1979 and 1991 the Gini coefficient increased by 0.0092 (from 0.3181 to 0.3273). This relatively moderate increase *does not* reflect minor variations in income composition, in the distribution of each income source among families or in its correlation with total income. It is rather a result of opposing forces: the inequality increasing effects of the rise in inequality in family's head earnings and in the share of pensions (and in its correlation with total income) as well as of the decline in the income share of direct taxes and in the correlation of NI benefits with total income dominated the inequality reducing effects of all other factors.

As regards the subperiods, the increase in overall inequality in 1980 was caused by the decline in the negative correlation of NI benefits with total income. The continuous decrease in overall inequality in the years 1981-1983, which occurred despite the inequality increasing effect of family's head and

spouse's earnings, is attributed to the growing contribution of NI benefits (due to increases in S_k, G_k and mainly in R_k) and direct taxes (due to increases in S_k as well as in G_k). The rise of 0.0265 in the Gini coefficient in 1984 stemmed from the continuing increase in the negative impact of family's head earnings on inequality (due to increases in S_k and G_k) as well as from the decline in the inequality reducing effect of NI benefits (due to a decline in R_k). In 1985 the distribution of total income became less unequal, mostly because family's head and spouse's earnings fell as a share of total income, and because NI benefits became more negatively correlated with total income. Finally, the rise in overall inequality between 1985 and 1991 resulted mainly from a decrease in the share of direct taxes in total income, the decline in the negative correlation of NI benefits with total income and from the fact that the distribution of family's head earnings continued to become more unequal.

IV. CHANGES IN INCOME INEQUALITY - WHAT ACCOUNTED FOR?

This section offers several explanations for the rise in overall income inequality throughout the entire period of investigation as well as for the variations in inequality between subperiods. As a background for the discussion, selected indicators for tax and transfer payment and macroeconomic (inflation, wages, employment) developments are presented in Tables 3 and 4.

Transfer payment policy

In order to maintain the purchasing power of incomes and to moderate the distributional cost of inflation, the government introduced, as early as 1979, a widespread system of indexation which embraced wages, financial assets, the NI benefits and the income tax structure. When inflation accelerated to higher levels - as in the years 1979-1980 and 1984, the government policy was to elaborate the updating mechanisms of NI benefits by raising the degree and the frequency of indexation. This policy was more favorable towards the elderly and low inome beneficiaries which were

Table 3: Indicators of Main Economic Developments in Israel: 1979 - 1990*

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Real Annual Change in: (%)													
GDP	4.7	3.5	3.2	0.8	2.0	1.7	3.9	3.6	5.4	2.7	1.7	5.4	5.9
Private Consumption	7.9	-2.8	1.2	7.3	8.0	-7.3	-0.5	14.2	9.0	4.2	0.0	5.3	7.6
Gross Average Wage	9.5	-3.3	11.0	-1.0	4.9	-0.4	-9.0	7.8	7.9	6.0	-1.3	-1.0	-3.2
Minimum Wage	-0.7	-15.8	44.9	6.4	7.1	-3.7	-17.2	0.2	28.8	16.0	3.6	0.1	-0.1
Minimum Wage as % of Average Wage	31.0	26.3	36.0	36.8	37.6	36.5	31.8	31.5	36.8	40.1	41.3	42.9	43.6
Rate of Inflation (%)	111	133	101	132	191	445	185	19.6	16.1	16.4	20.7	17.6	18.0
Rate of Unemployment (%)	2.9	4.8	5.1	5.0	4.5	5.9	6.7	7.1	6.1	6.4	8.9	9.6	10.6

* Calculated for a calendar year, which is not identical to the period of the survey.

Table 4: Indicators of Main Developments in Social Security and Income Tax Systems: 1979 - 1990*

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1. Real change in tax threshold(%)	0.2	-12.2	-7.7	3.5	-3.3	-9.0	25.3	38.2	2.2	0.1	1.1	8.7	16.8
2. Tax threshold as % of average wage	40.7	36.0	36.6	36.5	33.6	31.2	39.8	55.0	50.3	47.3	47.6	53.7	64.4
3. Tax threshold as % of minimum wage	131.3	136.9	102.0	99.2	89.4	85.5	124.7	174.0	136.5	117.7	115.3	125.2	147.8
4. Real change in basic old-age pension (%)	-0.7	+1.4	+17.0	+10.0	+1.7	-1.1	2.0	-0.1	10.8	1.4	-0.1	-3.1	
5. Basic old-age and survivors pension as % of average wage***	12.1	12.4	13.7	14.5	14.0	14.0	15.1	16.7	16.8	15.3	15.4	15.9	15.8
6. Real change in minimum guaranteed income (%)	-0.6	+10.8	+9.5	+10.4	+1.0	-2.8	+10.3	+6.5	-6.1	+9.0	+0.6	-3.3	-5.1
7. Minimum guaranteed income as % of average wage**	20.5	22.9	23.7	25.1	24.2	23.7	27.5	28.9	24.6	25.2	25.2	25.4	24.7
8. Real change in child allowance point (%)	-8.3	-12.0	-6.7	-3.5	-2.7	-14.4	+10.2	+37.0	0	+0.6	+2.0	0	0
9. Child allowance point as % of average wage	3.2	2.8	2.8	2.8	2.6	2.2	2.5	3.4	3.1	2.9	2.9	3.0	3.1

*Calculated to fit the period of the survey

**For a single person

entitled to the guaranteed minimum income (old-aged and survivors, disabled, women receiving alimony and other low income families receiving income supplementary benefits). The indexation policy resulted in an improvement in the benefit level paid to these families during the years 1980-1981. But as inflation jumped to a higher level in the end of 1983 and during 1984, the benefits eroded again, although at a moderate rate. In contrast, the updating mechanism of the universal children allowances, which is the same as that of the income tax parameters, was changed only once (1981). Therefore, the children allowances' value eroded during the entire inflation period - in real terms and relative to the average wage - reaching its lowest level in 1984 (only half of the 1979 value, in real terms). The partial compensation (an increase in the child allowance) given to large families, who are highly vulnerable to any adverse change in their benefits, succeeded in maintaining the real value of the allowances during the years 1981-1983, but not in 1984 when inflation went up.

The considerate erosion in child allowances may explain the decrease in the ability of NI benefits to reduce inequality in 1980, whereas the improvement in the level of benefits paid to low income and large families, which had already begun in 1980, may explain the increase in the inequality reducing effect of NI benefits during the years 1981-1983. The renewed erosion in benefits paid to low income families and the continued erosion in child allowances accounted in 1984 for the decrease in the NI benefits correlation with total income and therefore to the decrease in their contribution to reducing inequality. However, the Gini coefficient for NI benefits increased gradually during each of the inflation years since the government policy favored low income families.

In 1985, when the stabilization policy was implemented, NI benefits contribution to reducing inequality increased significantly. While the employees suffered a deliberate erosion in their real wages, as part of the stabilization

policy, NI beneficiaries gained a real increase in their benefits. This was due to the introduction of temporarily special indexation arrangements for benefits paid to low income families (to cope with the soaring inflation in 1984, and in the first half of 1985), and to the one-time real increase in the NI benefits (in the second half of 1985), following the transition from a 20 percent monthly rate of inflation to less than 2 percent.

Another measure taken by the government was to cut NI expenditures by abolishing the allowance for the first child to small families (with 1-3 children), with the exception of low income families. Low income families whose head was an employee received the allowance for the first child through their employers rather than directly from the NI. This policy was expanded to the second child in 1991. The decline in the inequality reducing effect of NI benefits after 1985 was not only a result of that policy, but also of the expiration of the validity of the special indexation arrangement. It should be noted that the Gini coefficient for NI benefits continued to increase in the years 1987-1991, mainly because of the fall in the number of NI benefit recipients (from 80 percent in 1985 to 69 in 1987 and to 60 percent in 1991). The Gini coefficient for NI benefits among NI beneficiaries (G_k*) fell in 1987 and 1991. Since the annual income surveys for the years 1987-1991 do not include information about low income employees receiving the allowance for the first and second child, S_k and especially R_k and G_k are underestimated. Finally, the increase in the inequality reducing effect of NII benefits in 1991 reflects the rise in NI expenditures on income supplement and unemployment benefits, paid mostly to low income families, which followed the massive immigration to Israel and the expansion of unemployment.

Tax policy

The decomposition analysis in the previous section shows that the marked changes in the redistributive impact of direct taxes between the years 1979-1984 and 1985-1991 reflect the decrease in their share in total income, while the progressivity of taxes (as indicated by the Gini coefficient)

grew during all the years. The increased income share of taxes during the first period and its decrease in the second period were an effect of legislative amendments as well as of the transition to low and steady inflation. As mentioned above, in contrast to the NI benefits, the indexation mechanism of the income tax brackets and the tax credits remained almost unchanged during the inflation period. The failure to properly adjust these parameters drove nominal incomes into higher tax brackets, and thus raised the real tax burden and eroded real net incomes. As an illustration, the tax threshhold declined from 41 percent of the average wage in 1979 to 31 percent in 1984. In addition, in July 1982 the government imposed a temporarily compulsory loan ('peace of the Galilee') which was in force until June 1983. This, together with raising the maximum income liable to NI contributions (from twice to three times the average wage) in the end of 1982, further increased the average tax rate. The rise in the maximum income liable to NI contributions also accounts, in part, for the increase in the progressivity of direct taxes, as indicated by G_K. Moreover, the increase in G_K supports the prevalent opinion that the increase in the tax rate, as inflation went up, was even higher in the middle and high income ranges.

Since 1985 the average income tax rate declined gradually. First, with the drastic curb of inflation, income tax brackets and tax credits increased in real terms, while wages eroded as a result of a deliberate government policy. Secondly, in the middle of 1984, the lowest marginal tax rate was reduced from 25 percent to 20 percent, and within the 1987 tax reform the highest marginal tax rate was set at 48 percent (the marginal rates of 50 and 60 percent were abolished). In order to reduce the regressiveness of the 1987 tax reform, the government introduced in 1990 special tax credits defined as a given percentage of the tax liability, which declines as income rises. Taxpayers with very high income were not entitled to these credits. This policy further raised the tax threshhold up to 65 percent of the average wage. The decrease in the income share of direct taxes in the second half of the eighties was accompanied by a

decrease in the number of taxpayers. The Gini coefficient for the distribution of taxes among taxpayers declined in 1988 (after the 1987 tax reform), but increased again in 1990 - 1991.

Unemployment and wage structure

Given that the largest component of family income is derived from the labor market, changes in employment patterns and wage structure are likely to have a considerable impact on overall inequality. Unemployment expanded throughout the whole period, mainly in 1980, 1984-1985 and 1989-1991. Umployment among women increased more than among men, but at the same time the number of employed women rose by a higher percentage than that of men, particularly in the later years. The percentage of familiy heads with earnings declined from nearly 74 in 1979 to 70 in 1985 and to 67 in 1991. The proportion of the elderly among family heads remained almost unchanged (24-25 percent), so that the decline in the number of earners among family heads reflects the impact of unemployment. The number of spouses with earnings (most of whom are women) declined only slightly from 30 percent in 1979 to 28 percent in 1991. The increased share of family head's earnings in total post-tax and transfer income in 1983-1984 was due to the increase in the average tax rate, whereas the decrease in this share since 1985 reflected the impact of the decline in the average tax rate as well as that of the growing unemployment.

The decomposition results presented above show that the family head's earnings distribution became more unequal between 1979 and 1991 not only as a result of the decline in the percentage of family heads with earnings, but also because of the rise in wage dispersion. The latter occurred in the years 1980-1981, 1984 and 1989-1991, while the other years experienced a decline. Inspection of the macroeconomic indicators in Table 3 reveals that the developments in wage inequality among family heads during the examined period are highly correlated with the unemployment rate and the minimum wage level. The decrease in the minimum wage level, in real

terms and relative to the average wage, in 1980 and 1984-1985 may thus explain the increase in inequality in these years. When the mininum wage level improved in 1981-1982, with the renewal of the employers-employees minimum wage agreement, and in 1987-1988, following the legislation of the Minimum Wage Law, wage inequality declined. It is likely that changes in the minimum wage had a greater impact on the inequality in spouse's earnings. As shown by Yaniv and Sharon (1986), almost one fifth of wage-earning women in Israel received the minimum wage or less compared with one tenth of wage-earning men. Another possible explanation to the increased inequality in wages during the periods of the high and unanticipated inflation is that wage-earners in strongly unionized industries succeeded more than others in protecting their real wages.

During 1989-1991, when unemployment expanded rapidly (due mainly to the massive immigration to Israel), real average wage declined. However, various industries differed in their wage response, the greatest decline occurring in less unionized, low paying or non-professional labor intense industries (personal and other services, building and public works, agriculture, forestry and fishing). This may further explain the growing inequality in family head's earnings in these years. The rise in wage inequality may also be explained by the government policy since 1985 to weaken the indexation mechanism of wages to prices. It is likely that high wage earners succeeded more than others in gaining compensations for the erosion in their real wage through special wage increments.

V. CONCLUSIONS

We have examined the trends in income inequality in Israel over the last decade with a special emphasis on the relative contribution of various income sources to overall inequality. The decomposition by income sources shows that the moderate inrcease in inequality in the distribution of post-tax and transfer income between 1979 and 1991 does not reflect minor variations in income composition or in the way that each income source is distributed among families. It is rather a

result of opposing forces where the inequality increasing effects dominated only slightly the inequality reducing effects. The rise in inequality throughout the entire period reflects mainly the decline in the contribution of taxes to reducing inequality and the increased impact of family's head earnings and pensions.

The results enable us to evaluate the redistributive impact of tax and transfer policies in counteracting the rise in the pre-tax and transfer inequality, mainly in family's head earnings. Taxes have been found to play a crucial role in determining the degree of overall inequality. The government anti-inflationary policy to erode disposable incomes by not adjusting the indexation mechanism to the accelerating inflation brought about an increase in the inequality reducing effects of taxes between 1979 and 1984, at the expense of increasing the tax burden. In contrast, the tax policy since 1985 to enhance work incentives and economic growth by reducing the marginal tax rates resulted in the weakening of the inequality reducing effects of taxes. the increase in the tax share in total income between 1979 and 1984 and its decrease since 1985 were accompanied by a rise in the tax progressivity (as indicated by its Gini coefficient).

Since a change in the relative share of taxes generates a same direction change in the relative shares of other income sources, the increase in the tax share between 1979 and 1984 strengthened the inequality increasing effects of earnings. An opposite development took place since 1985; the decrease in the tax share along with the growing unemployment contributed to weakening the inequality increasing effects of earnings.

The transfer policy over the investigated period succeeded to a large extent in maintaining the reducing inequality effects of transfers. Even when inflation accelerated, transfers lost only a little of their impact. In 1981-1983 the growing impact of NI benefits, in addition to that of taxes, led to a reduction in overall inequality. In 1985, while employees

suffered a considerate erosion in their real wages, as a part of the stabilization policy, NI beneficiaries gained a real increase in their benefits. This was the year when NI benefits were most effective. The cut in child allowances since 1985 apparantly weakened somewhat the redistributive impact of transfers. Other public transfers, which increased during 1990-1991 and were mostly granted to the new immigrants, further contributed to reducing inequality.

F O O T N O T E S

[1]The Annual Income Surveys cover all the households in urban localities, whose head is either an employee or does not work. The sample therefore does not include the population in rural areas, espacially in Moshavim and Kibutzim, nor does it include households in urban areas whose head is self - employed. The surveys cover approximately 80 percent of the total population.

[2]The Extended Gini is a general class of inequality measures, of which the Gini index is a particular member for k=1.

[3]The equivalence scale used in this research is:

Number of persons	1	2	3	4	5	6	7	8
Number of standard adults	1.25	2	2.65	3.20	3.75	4.25	4.75	5.20

where a weight of 0.40 is given to each additional person.

[4]The normalized values of the Extended Gini coefficient for k=2,3 are very similar to those of the Gini coefficient.

[5]Inspection of the data reveals that Generalized Lorenz curves do not intersect in 33 of the 66 pairwise comparisonsbetween years.

[6]In the years 1979-1982 and 1984 'other income' includes also occasional earnings, which could not be attributed to the family's head, the spouse or other family member.

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