

MEASUREMENT OF POVERTY: POLAND IN THE 1980s

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This paper presents results of an examination of poverty in Poland in the 1980s. The individual welfare measure is expenditure on consumption per equivalent adult. Household equivalence scales are estimated using a quasi-exact scales translogarithmic model. Four poverty indices are calculated. These are intended to capture the following aspects of poverty: (1) incidence, (2) relative deprivation, and (3) social ability to eliminate poverty by income transfers. The study revealed significant changes in poverty during the investigated period, from 9 to 30 percent with persistent poverty resulting for pensioners, farmers and low educated persons.

I. INTRODUCTION

This paper reports results of an examination of trends and distribution of poverty during the 1980s in Poland. This decade may be considered an introductory period for the transition to a market economy launched in 1990. In 1980 the *Solidarity* revolution emerged giving an impulse for changes in the Polish economy, in 1989 the first non-communist government was established.

The investigated decade may be divided into four periods characterized by different economic policies of the government. In the years 1980-81 the money incomes of households increased together with a decline in consumer goods supply and maintained price control. This resulted in a strong demand surplus on the consumer market. In the years 1982-84, after rising prices in February 1982 (the official annual CPI was equal to 2.01), both prices and incomes were under government control, with rationing of some goods. The years 1985-87 were characterized by a modest liberalization of prices and incomes as well as by increasing inflation. These processes accelerated in the 1988-89 period. The Gross Domestic Product (GDP) during the eighties reached bottom in 1982 and peaked in 1988.

The principal elements of the present poverty investigation include: (1) selecting an individual welfare measure, (2) setting a poverty threshold for an individual of a given (reference) type, (3) ensuring comparability between individuals, and (4) calculating aggregate poverty indices for the society and social groups.

The individual welfare measure is expenditure on consumption per equivalent adult. It has gained wide recognition in large scale studies, especially those derived from family budget surveys (see e.g. Jorgenson, 1989; Barreiros, 1992; Flik and Van Praag, 1991). Another rationale for using expenditures rather than incomes in this study is that in Poland an official poverty threshold is defined in terms of some minimum expenditure on consumption. It is estimated by the Institute of

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Labour and Social Affairs (ILSA) as the so-called "social minimum." The equivalence scales, which ensure comparability between household welfare measures, are estimated using a translogarithmic demand system. They are then employed in the calculation of four poverty indices for the country as a whole and for selected socio-demographic groups. The source of data is the Household Budget Survey collected annually by the Polish Central Statistical Office.

This study is being continued in the 1990s in order to investigate changes in the income distribution among the poor which accompanied transition to the market economy. The general principles are the same, however some improvements have been made. For example, more reliable estimates of equivalence scales estimates have been obtained, since shortages on the consumer market have been overcome (see Szulc, 1993, 1994).

It should be noted that two other examinations of Polish poverty in the 1980s, based on the same HBS, were performed. The first one was completed by the Central Statistical Office (see Kordos, 1992). It employs poverty threshold in the form of current equivalent income of the 15-th percentile in income per head distribution in 1980. The study by Milanovic adopts the ILSA poverty line.

Both studies use incomes rather than expenditures as welfare measures. Other differences are in the form of equivalence scales. In the CSO research incomes per head are employed, while Milanovic adopted the CSO's consumer units based on nutrition norms. Finally, in both studies only poverty incidence (head count ratios) was examined.

The paper is organized into six remaining sections. In section II the data base is presented. Section III introduces a quasi-exact equivalence scales model proposed by Szulc (1992b) along with some empirical results. Section IV provides a discussion of the theoretical aspects of poverty indices and poverty line selection. The final results on aggregate poverty measures and poverty distribution are presented in sections V and VI. Section VII concludes.

II. DATABASE

The major component of the data set employed in this research is from the *Household Budget Survey* (HBS) collected by the Polish Central Statistical Office. The aggregated data are published annually (see *Household Budget Survey*, CSO). The following microdata from this survey are utilized: (1) household expenditures on consumption (totals) for the years 1980–82 and 1984–89 (data for 1983 are not available), (2) budget shares for 1987 and 1988 years for four groups of commodities (for details see section III), and (3) household demographic attributes.

The period under investigation includes two different formations of households in the sample. In the years 1980–82 the samples of approximately 7,500 households annually were observed. These samples were unchanged during the year. In the years 1984–89, HBS was carried out by a partial rotation method on a quarterly basis. The sample covered quarterly about 7,500 households. On average, about 4,500 households out of 30,000 were unchanged during the year. HBS did not cover certain types of households: employees of the Ministry of National Defense and Ministry of Interior and the self-employed not in

the agriculture. This excluded about 10 percent of the households from the survey.¹

The sampling design is two stage.² Urban and rural areas in the respective voivodships (the largest administrative units which number is 49) constitute the strata at the first stage. As a sampling frame the updated register of regions established for the National Population Census of 1978 was being used in the 1980s. At the second stage households are sampled using a stratification with respect to a source of income, household size and income per head. The system of weights is adopted, however due to high non-response rate for some groups, it is possible to preserve exact proportion between urban/rural households only.

The poverty line ("social minimum") is calculated by the ILSA for four types of households, including that appointed as a reference one in the equivalence scales estimation (single pensioner living in urban area). As equivalent expenditures are comparable between any types of household, only that type of poverty line is utilized in this study

III. QUASI-EXACT EQUIVALENCE SCALES

The general equivalence scale m_k comparing cost of living for two households, k -th and r -th, is defined here following Deaton and Muellbauer (1980).

Definition 1

$$(1) \quad m_k = m(\mathbf{P}, u, \mathbf{A}_k, \mathbf{A}_r) = \frac{C(\mathbf{P}, u, \mathbf{A}_k)}{C(\mathbf{P}, u, \mathbf{A}_r)},$$

where: $\mathbf{P} = [p_1, p_2, \dots, p_n]$ —vector of prices, p_i —price of the i -th ($i = 1, 2, \dots, n$) commodity, u —utility level, $\mathbf{A}_t = [A_{1t}, A_{2t}, \dots, A_{mt}]$ —vector of demographic attributes of the t -th household ($t = k, r$), A_{lt} — l -th demographic characteristics ($l = 1, 2, \dots, m$) of the t -th household (e.g. number of children), C —cost (expenditure) function.

The present model utilizes Diewert's (1973) translog cost function. The demographic attributes are incorporated following the demographically flexible Almost Ideal Demand System proposed by Deaton and Muellbauer (1980), for which Diewert's function is a special case (with a linear term reflecting the interaction between prices and utility). The parameters are assumed to be the same for all households, therefore differences between them enter the cost function through differences in attributes only. The arguments of the cost function are, along with the utility level, so called effective prices which are the products of nominal prices and commodity specific equivalence scales, m_i

$$(2) \quad m_i(\mathbf{A}_t) = \sum_{l=1}^m m_{il} \ln A_{lt}$$

($i = 1, 2, \dots, n$) where m_{il} is the demographic elasticity of consumption.

¹Recently all major types of households, including the self-employed and social assistance recipients, are covered.

²Details are presented in Kordos (1982) and Lednicki (1982).

The parameters necessary for calculation of the equivalence scales are obtained through the estimation of Hicksian budget shares derived from Shephard's lemma. They come out in the form

$$(3) \quad w_{it} = a_i + \sum_{j=1}^n a_{ij} \left(\ln p_j + \sum_{l=1}^m m_{jl} \ln A_{lt} \right) + d_i \ln u_t.$$

For this study household consumption expenditure is divided into the following groups:

1. food, alcohol, tobacco;
2. clothing, footwear, hygiene and medical services;
3. housing, energy; and
4. transportation, education, entertainment, other expenses.

The vector of demographic attributes \mathbf{A}_t includes: family size (from 1 to 6 and more), household head age (16–29, 30–44, 45–64, 65 and more years) and type of residence (urban and rural). This yields 48 types of households. The utility level is approximated by the function estimated for Poland by Welfe (1982) using the Stone linear expenditure system. Results from simple simulations reveal that the form of the utility function does not affect substantially the d_i ($i = 1, 2, \dots, n$) estimation nor the final results, i.e. equivalence scales values.

Given the results of the estimation, general equivalence scales are calculated using the following theorem (by Szulc, 1992b) on “quasi-exact” equivalence scales.

Theorem 1

- If (1) the r -th and k -th households minimize their translog cost functions,
 (2) \mathbf{A}_k and \mathbf{A}_r are positive then

$$(4) \quad \ln \frac{C(\mathbf{P}, u_*, \mathbf{A}_k)}{C(\mathbf{P}, u_*, \mathbf{A}_r)} = \frac{1}{2} \sum_{l=1}^m \sum_{i=1}^n [m_{il}(w_{ik} + w_{ir})] \ln \frac{A_{lk}}{A_{lr}},$$

where: u_* —geometric mean of the r -th and the k -th households utilities,
 w_{it} — i -th budget share of the t -th household.

The left-hand side of (3) represents the general equivalence scale defined by (1). The right-hand side can be calculated using w_{it} , A_{lt} and m_{il} ($i = 1, 2, \dots, n$; $l = 1, 2, \dots, m$) only. This allows relaxing the influence of stochastic disturbances in the estimation of parameters a_i , a_{ij} and d_i ($i, j = 1, 2, \dots, n$). Table 1 presents general equivalence scales calculated for selected types of households.

As one could expect, all scales are increasing in the number of persons in the household. The general scales are the lowest for reference households, i.e. of persons aged over 65 years living in the urban area. The highest scales, as far as age of household head is concerned, result for households with heads aged from 45 to 65 years. The rural households are by 24 percent more expensive than urban ones. For more details on these results see Szulc (1992a).

To conclude this section it should be mentioned that neoclassical models of consumer behaviour hardly fit an economy with market disequilibrium, especially with a strong demand surplus. This case applies obviously to Poland in the 1980s, the years covered in this study. However, the results of a preliminary estimation of equivalence scales for a more balanced consumer market in Poland in the years

TABLE 1
EQUIVALENCE SCALES FOR SELECTED HOUSEHOLDS

Size	Household Demographic Attributes						Scale
	Age of household head				Residence		
	>29	30-44	45-65	65+	Urban	Rural	
1	0	0	0	1	1	0	1.00
2	0	0	0	1	1	0	1.61
3	0	0	0	1	1	0	2.12
4	0	0	0	1	1	0	2.56
5	0	0	0	1	1	0	3.01
1	1	0	0	0	1	0	1.15
1	0	1	0	0	1	0	1.16
1	0	0	1	0	1	0	1.23
1	0	0	0	1	0	1	1.24

1990-91 (Szulc, 1993) do not reveal important differences in general equivalence scale values, as compared to those estimated for the 1980s.

IV. POVERTY INDICES AND POVERTY LINES

Poverty indices employed in this research have been chosen to provide possible comprehensive assessments of different aspects of poverty by means of a minimum set of formulas. They are intended to explain the following aspects of this phenomenon: (1) poverty incidence, (2) poverty gap, (3) social ability to eliminate poverty by income transfers, and (4) inequality among the poor.

The individual welfare measures are aggregated by Jorgenson's (1990) social welfare function (SWF), which is related to the equivalence scale approach. To obtain comparability between units, individual utilities are replaced here by household equivalent expenditures. The SWF is employed to provide a representative income which is a form of the money metric measure of social welfare. The representative income, ξ , for Jorgenson's SWF takes a form of an average welfare, minus an inequality measure, and can be specified as

$$(5) \quad \xi(\mathbf{X}) = \frac{\sum_{i=1}^K x_i}{\sum_{i=1}^K m_i} - \gamma(\mathbf{X}) \left[\frac{\sum_{i=1}^K m_i \left| \frac{x_i}{m_i} - \frac{\sum_{i=1}^K x_i}{\sum_{i=1}^K m_i} \right|^{-\rho}}{\sum_{i=1}^K m_i} \right]^{-1/\rho},$$

where: K —number of households, x_i , m_i —expenditure and equivalence scale, respectively, of the i -th household ($i=1, 2, \dots, K$), $\mathbf{X}=[x_1, x_2, \dots, x_K]$, $\gamma(\mathbf{X})$ —function ensuring satisfaction of the Pareto principle by SWF (for details see Jorgenson, 1990), ρ —parameter representing social aversion to inequality.

The first poverty measure employed in this study is the head count ratio (hereafter: H). It is defined as a proportion of households with equivalent expenditures below the poverty threshold (i.e. the "social minimum" for the reference type household). This index is supplemented by an evaluation of the average

welfare gap experienced by the poor. Given the aggregator function defined by (5), the relative poverty gap takes the form which is a type of the aggregate Dalton (1920) index

$$(6) \quad D = \frac{z - \xi(\mathbf{X}_p)}{z},$$

where: z —poverty line for the equivalent adult, $\mathbf{X}_p = [x_1, x_2, \dots, x_q]$ —vector of expenditures of the poor, q —number of poor.

The Blackorby–Donaldson (1980) index combines both types of information obtained separately from the H (incidence) and D (relative gap) indices

$$(7) \quad BD = HD.$$

The last poverty index is derived from the Jorgenson–Slesnick (Jorgenson, 1989) concept of an index which measures proportion of representative expenditure lost due to failure to eliminate poverty. In other words, this index is intended to measure social ability to eliminate poverty by income transfers. It is defined as

$$(8) \quad JS = \frac{\xi([z\mathbf{1}_{K-r}, \mathbf{X}_r]) - \xi(\mathbf{X})}{\sum_{i=1}^K x_i / \sum_{i=1}^K m_i},$$

where: $\mathbf{1}_{K-r}$ —vector of units of size $K-r$, r —number of non-poor households, $\mathbf{X}_r = [x_1, x_2, \dots, x_r]$ —vector of expenditures of non-poor. The numerator is a difference between the representative income of a population in which all households' expenditures are raised to z and the representative income of the actual population.³ The denominator is an average equivalent expenditure.

The poverty indices used in the study seem to capture all aspects of poverty: incidence, depth and social ability to eliminate poverty. They may be interpreted (except for the head count ratio) in terms of social welfare function theory. These indices also focus on welfare distributions, since they incorporate an inequality measure into the SWF. Indeed, Phipps (1993) has found head count ratio and poverty gap measure flawed, as they do not hold certain properties.⁴ Nevertheless, the head count ratio, for example, is intended to measure nothing but poverty incidence and it fulfills its task. The same may be said about the other indices used here.⁵ It is rather unlikely to devise a poverty index which could pass all theoretical requirements. Therefore, the set of indices seems to be a better choice.

³This term is obtained by substituting \mathbf{X} in equation (5) by the vector of censored expenditures, after stacking it in non-descending order. This is specified as: $[z, z, \dots, z, x_{q+1}, x_{q+2}, \dots, x_K]$.

⁴For example, H does not increase due to the falling welfare of poor households while D pays no attention to the number of poor.

⁵It should be stressed that poverty indices are not selected here to pass possible axioms. For example, Kakwani's (1980) transfer sensitivity axiom, which meets a requirement of giving higher weights to poor households is undesirable. Phipps (1993), arguing for the Foster–Greer–Thorbecke (1984) index which satisfies this axiom, presents two distributions. In the first one (A) the inequality measure is lower than that calculated for the alternative distribution (B). However, the average welfare of the poor is lower in distribution A. As a result, the FGT index is higher for distribution B. This is because the FGT index gives more weight to equity than to an average welfare. In other words, the Pareto principle, which is passed by D , BD and JS indices, is violated. One more argument against using the FGT index is the impossibility to set an indisputable parameter representing inequality/poverty aversion which determines weighting poor households. By incorporating Jorgenson's SWF, it is possible to take into account two extreme values of inequality aversion (egalitarian and anti-egalitarian concept).

The poverty line (“social minimum”) is calculated by the ILSA quarterly. It is equal to the current, monetary value of the bundle of goods supposed to satisfy minimal needs at a given time. Therefore, the social minimum is higher than the subsistence minimum and, in the 1980s, by 25–30 percent higher than the half-mean poverty line. During the investigated period the bundle was approximately stable, except for 1982 (under martial law introduced in December 1981) when some commodities were deleted by government decision. For further discussion of the Polish poverty line see Milanovic (1992) and Panek and Szulc (1991).

V. AGGREGATE POVERTY IN THE 1980s

All poverty indices have been calculated for Poland as a whole for each year from 1980 to 1989 (excluding 1983) and are reported in Table 2. All indices, except for the head count ratio, have been calculated in two versions. The first one, called egalitarian, gives maximum weight to the equity consideration. This is obtained by taking $\rho = -1$ in the representative income function (5). The next version, being an opposite concept (called here anti-egalitarian), takes ρ tending to minus infinity and results in the second term in (5) equaling zero. The anti-egalitarian indices are indicated by subscript A.

TABLE 2
POVERTY INDICES FOR POLAND IN 1980–89 YEARS

Period	H	D_A	D	BD_A	BD	JS_A	JS
1980	0.144	0.203	0.264	0.029	0.038	0.017	0.024
1981	0.093	0.190	0.251	0.018	0.023	0.009	0.013
1982	0.139	0.169	0.226	0.023	0.031	0.014	0.020
1984	0.299	0.281	0.366	0.084	0.109	0.059	0.082
1985	0.195	0.208	0.273	0.041	0.053	0.023	0.032
1986	0.188	0.206	0.269	0.039	0.051	0.023	0.033
1987	0.237	0.212	0.275	0.050	0.065	0.033	0.046
1988	0.153	0.203	0.266	0.031	0.041	0.016	0.023
1989 ¹	0.167	0.242	0.322	0.042	0.055	0.022	0.031

¹For 1989 all indices are calculated as averages of four quarters. The quarterly data do not include some expenditures (mainly on durables) included in annual data. This applies to all presented tables.

The head count ratios (H) revealed significant changes in the poor population size: from 9 percent in 1981 to 30 percent of households in 1984. The high value in 1984 resulted from large price increases in 1982, which were not compensated by income augmentations. Lower poverty rates in succeeding years are caused by the moderate GDP growth, but also by increasing money supplies leading to serious shortages on the consumer market. Moreover, it seems that H values for 1982 and 1989 are understated. This is implied by the poverty lines underestimation resulting, in turn, from the underestimation of the CPIs. The price increases in both years were very strong. The government decision to reduce the “social minimum,” mentioned at the end of the previous section, also influenced 1982 poverty rate.

D_A and D appraise consumption levels of the poor as a whole apart from the number of households below the poverty line. In the investigated period these indices were much more stable than H . The values for 1989 were relatively higher, comparing them to H . This should be interpreted that the poor became, on average, poorer over time.

BD_A and BD unify H and D_A and D properties. Therefore they provide more complex information on poverty, as they take into account both poverty extent (as H does) and depth (as D_A and D do). These indices show the strongest poverty development in 1984, as was in the case of H , D_A and D . The minimal values were reached in 1981, as in the case of H .

The Jorgenson–Slesnick indices provide results similar to those presented above. The measures of poverty related to social welfare do not reveal substantial changes in the relative ability to eliminate poverty under given H , except for 1984 when ratios JS/H and JH_A were much higher than for remaining periods.

Generally, poverty incidence was being changed considerably during the 1980s, from 9 percent in 1981 to 30 percent in 1984. However, some reservation should be put on these results. As mentioned in the Introduction, household monetary incomes or expenditures for some years increased due to the cash issue rather than to welfare increases. Unfortunately, there is no reliable statistics on money supplies for the 1980s. It is worth mentioning that there are no important differences in the assessments of trends in poverty incidence, comparing this study to those mentioned in the Introduction. Differences appear for 1987. Both Milanovic and the CSO obtained H higher than for 1984. Moreover, Milanovic obtained for 1981 the head count ratio higher than for 1980.

VII. POVERTY DISTRIBUTION AMONG SOCIAL GROUPS

This section presents poverty indices calculated for selected sociodemographic groups. They are calculated in the same manner as for the country as a whole. It seems that the results on the poverty distribution are much less sensitive to the poverty lines underestimation than those on the trends. Two indices are calculated: the head count ratio (H) evaluating poverty incidence and the Dalton index (D_A) evaluating depth. Since inequality measures are incorporated into poverty indices in order to take into account poverty aversion only, calculating inequalities within sociodemographic groups is not very informative. Therefore, indices are calculated in the anti-egalitarian version only. For similar reasons the Jorgenson–Slesnick index, which is interpreted with reference to the welfare of the entire society, is dropped. Results on the Blackorby–Donaldson index distribution are almost identical to those obtained by means of the head count ratio, therefore there is no need to produce them for groups.

The population under examination is divided in accord with five criteria: major source of income, biological type of family, head of household age, head of household education level and type of residence. As found by Panek (1992), who employed path analysis for the same data set, all these factors have a significant effect on households income variability.

A. *Poverty by Source of Income*

The following groups are considered: employees, farmers, farmers/workers (mixed) and pensioners/annuitants. The incidence of poverty (H) was the lowest for employees (in 7 years) and farmers/workers (in 5 years). It ranged from 30 percent to 40 percent of that indicated for the country as a whole. The highest percentages of poor were observed usually among pensioners/annuitants. However in 1984, when H reached its peak in the 1980s, households of farmers were the most frequently hurt by poverty. The highest head count ratios were approximately doubles of the national indices.

TABLE 3
POVERTY BY SOURCE OF INCOME

Year	H				
	Total	Employees	Farmers	Mixed	Pensioners
1980	0.144	0.055	0.291	0.160	0.308
1981	0.093	0.036	0.194	0.086	0.199
1982	0.139	0.052	0.263	0.138	0.292
1984	0.299	0.135	0.577	0.327	0.535
1985	0.195	0.088	0.280	0.110	0.410
1986	0.188	0.106	0.264	0.094	0.353
1987	0.237	0.163	0.322	0.124	0.382
1988	0.153	0.064	0.194	0.061	0.331
1989	0.167	0.063	0.299	0.086	0.330

Year	D_A				
	Total	Employees	Farmers	Mixed	Pensioners
1980	0.203	0.161	0.251	0.172	0.213
1981	0.190	0.146	0.263	0.146	0.179
1982	0.169	0.119	0.229	0.162	0.161
1984	0.281	0.176	0.456	0.244	0.274
1985	0.208	0.153	0.280	0.175	0.224
1986	0.206	0.161	0.276	0.157	0.220
1987	0.212	0.179	0.269	0.179	0.224
1988	0.203	0.153	0.260	0.162	0.213
1989	0.242	0.158	0.384	0.186	0.213

The poverty analysis based on the Dalton index provided results much more stable in time. For all periods the farmer households faced the highest shortfall below the poverty line. The least burdensome poverty was indicated for households of employees (7 years) and mixed (3 years). The results suggest extreme poverty located in rural areas and relatively equal distribution of welfare among pensioners/annuitants. This hypothesis is confirmed by an observation of the income distribution for different sociodemographic groups (see Panek and Szulc, 1991).

Distribution of poverty incidence, with respect to a source of income, was examined also in the CSO's and Milanovic's studies. Some results are different. Milanovic obtained the lowest H for mixed households in all years of the 1981-88 period. For the CSO's and the present study the lowest head count ratios were obtained usually for employee households. The highest poverty incidence was

obtained by Milanovic for pensioners/annuitants households for all years. In the remaining studies the highest H was obtained for some periods for farmers. In the case of the present study this may be explained, to some extent, by using higher equivalence scales for rural households.

B. Poverty by Biological Type of Family

Six groups are considered: couples of adults, couples with 1 child, couples with 2 children, couples with 3 children, couples with 4 or more children, single mother with one or more children. The results of the calculations are displayed in Table 4.

TABLE 4
POVERTY BY TYPE OF FAMILY

Year	H						
	Total	Couple	Couple +1	Couple +2	Couple +3	Couple +4+	Single mother
1980	0.144	0.155	0.054	0.073	0.228	0.363	0.240
1981	0.093	0.112	0.037	0.054	0.116	0.260	0.179
1982	0.139	0.159	0.061	0.068	0.199	0.267	0.202
1984	0.299	0.329	0.149	0.191	0.405	0.564	0.408
1985	0.195	0.195	0.091	0.116	0.255	0.337	0.363
1986	0.188	0.162	0.096	0.131	0.269	0.368	0.401
1987	0.237	0.205	0.144	0.202	0.369	0.488	0.514
1988	0.153	0.162	0.075	0.084	0.168	0.222	0.325
1989	0.167	0.179	0.079	0.099	0.185	0.232	0.277

Year	D_A						
	Total	Couple	Couple +1	Couple +2	Couple +3	Couple +4+	Single mother
1980	0.203	0.201	0.187	0.180	0.193	0.186	0.239
1981	0.190	0.184	0.183	0.174	0.190	0.176	0.216
1982	0.169	0.154	0.176	0.162	0.151	0.158	0.185
1984	0.281	0.268	0.258	0.238	0.244	0.270	0.283
1985	0.208	0.193	0.216	0.182	0.176	0.195	0.252
1986	0.206	0.203	0.207	0.179	0.186	0.196	0.253
1987	0.212	0.198	0.203	0.183	0.205	0.215	0.272
1988	0.203	0.185	0.207	0.187	0.161	0.207	0.253
1989	0.242	0.212	0.245	0.248	0.236	0.216	0.279

The incidence of poverty was, for all periods, the lowest among couples with one child. Compared to the latter group, the higher indices for childless couples are likely to be the result of a high proportion of pensioner households among childless couples. The pensioner households were more frequently affected by poverty than the average ones (see Table 3). H values for couples with one child ranged from 40 to 60 percent of the national index.

Households characterized by the highest head count ratios were of two types: couples with 4 or more children and single mothers. The previous type dominated from 1980 to 1984, the latter in remaining years. Indications for both types were at least 2 times higher than national head count ratios. It should be added that in four years H indices for households of single fathers (not shown in Table 5)

were the highest. However, these results should not be treated with full confidence since there are very small numbers of households of this type (10–20) in the sample.

The distribution of poverty depth revealed by the Dalton index was different from the distribution of poverty incidence. There was no dominance of one type among households with the lowest D_A values and, what may be found surprising, couples with one child did not appear among households with the minimum poverty gap. Single mother households had the greatest poverty shortfall for all years.

C. Poverty by Head of Household Age

The households are divided in accordance with the head's age into six groups: below 25 years, 25–29, 30–39, 40–49, 50–59, 60 years and over. The results of the index calculations are reported in Table 5.

TABLE 5
POVERTY BY AGE OF HEAD

Year	<i>H</i>						
	Total	<25	25–29	30–39	40–49	50–59	60+
1980	0.144	0.114	0.099	0.099	0.104	0.126	0.291
1981	0.093	0.052	0.070	0.070	0.052	0.100	0.175
1982	0.139	0.054	0.083	0.096	0.080	0.148	0.276
1984	0.299	0.249	0.241	0.225	0.193	0.301	0.513
1985	0.195	0.120	0.156	0.141	0.110	0.186	0.361
1986	0.188	0.119	0.168	0.155	0.115	0.165	0.315
1987	0.237	0.169	0.213	0.222	0.163	0.210	0.348
1988	0.153	0.073	0.104	0.105	0.086	0.149	0.283
1989	0.167	0.084	0.123	0.121	0.100	0.160	0.296

Year	D_A						
	Total	<25	25–29	30–39	40–49	50–59	60+
1980	0.203	0.181	0.155	0.181	0.218	0.213	0.216
1981	0.190	0.172	0.154	0.188	0.188	0.212	0.187
1982	0.169	0.178	0.153	0.151	0.166	0.191	0.175
1984	0.281	0.266	0.219	0.244	0.308	0.322	0.298
1985	0.208	0.228	0.182	0.195	0.205	0.228	0.217
1986	0.206	0.226	0.198	0.190	0.199	0.227	0.215
1987	0.212	0.203	0.197	0.201	0.206	0.236	0.219
1988	0.203	0.189	0.190	0.187	0.212	0.220	0.204
1989	0.242	0.189	0.241	0.240	0.273	0.267	0.220

The lowest head count ratios (60–75 percent of the national H) occurred among households aged below 50 years, with a weak dominance of those aged below 25 years (in 4 periods). The households most frequently affected by poverty were headed by persons at age 60 years or older. The H values were for them 1.8–2.0 times higher than the national indices, however in the periods characterized by the highest poverty incidence (1984, 1987) this disproportion declined (to 1.4–1.7 of the average).

The differences between the head count ratios and aggregated Dalton indices are important. The Dalton index reveals that the poverty gap was the smallest for households headed by persons aged between 25 and 29 years (in 5 periods), although incidence of poverty among them was the lowest in one period only. Moreover, the households in which head was 60 years or older (characterized by the highest incidence of poverty for all periods) did not appear among the poorest, based on the aggregate Dalton indications. This index reached the highest value for households aged from 50 to 59 years (in 8 periods) and from 40 to 49 years (4 periods). The households of the latter type were distinct by the lowest poverty incidence for 7 periods.

D. Poverty by Head of Household Education Level

The households are divided into seven groups with respect to the head's education level: university, university not completed, secondary school, secondary school not completed, vocational school, primary school, below primary school level. The results are reported in Table 6.

TABLE 6
POVERTY BY EDUCATION LEVEL

<i>H</i>								
Year	Total	University	University*	Secondary	Secondary*	Vocational	Primary	Primary**
1980	0.144	0.001	0.044	0.092	0.099	0.219	0.388	0.204
1981	0.093	0.009	0.031	0.053	0.055	0.141	0.294	0.179
1982	0.139	0.008	0.055	0.110	0.102	0.221	0.373	0.163
1984	0.299	0.050	0.153	0.264	0.245	0.438	0.689	0.500
1985	0.195	0.036	0.102	0.193	0.144	0.287	0.488	0.386
1986	0.188	0.043	1.101	0.124	0.142	0.267	0.406	0.454
1987	0.237	0.057	0.135	0.180	0.200	0.316	0.464	0.386
1988	0.153	0.029	0.079	0.137	0.102	0.220	0.393	0.274
1989	0.167	0.018	0.077	0.137	0.123	0.249	0.400	0.292
<i>D_A</i>								
Year	Total	University	University*	Secondary	Secondary*	Vocational	Primary	Primary**
1980	0.203	0.149	0.167	0.247	0.166	0.207	0.238	0.225
1981	0.190	0.247	0.159	0.301	0.141	0.189	0.240	0.222
1982	0.169	0.187	0.151	0.108	0.140	0.174	0.215	0.084
1984	0.281	0.171	0.213	0.232	0.235	0.311	0.359	0.355
1985	0.208	0.153	0.173	0.214	0.189	0.220	0.239	0.348
1986	0.206	0.176	0.172	0.197	0.190	0.216	0.223	0.331
1987	0.212	0.187	0.186	0.194	0.194	0.227	0.225	0.249
1988	0.203	0.157	0.184	0.177	0.185	0.213	0.221	0.203
1989	0.242	0.215	0.206	0.259	0.240	0.256	0.244	0.305

*University or secondary not completed.

**Below primary level.

The results demonstrate the important influence of education on poverty incidence. Poverty incidence increases with decreases in education, with very few exceptions from this rule. Poverty incidence for the households with the highest education level was, on average, at least 10 times (!) lower than the national poverty rate. *H* values for households with the highest poverty incidence, i.e. those with a primary education level (except for 1986), were from 2 to 3 times higher than average ones.

The analysis of poverty by means of the aggregate Dalton index produce different results. The poverty depth for households with head's university education was the lowest for six periods only. For the remaining periods it was the lowest mainly for households with the head's education at the "university not completed" level.

E. Poverty by Type of Residence

The households are divided into four types of residence: cities over 100,000 inhabitants (big cities in Table 7), cities from 20,000 to 100,000 inhabitants (mean cities), cities below 20,000 inhabitants (small cities), and rural areas.

TABLE 7
POVERTY BY TYPE OF RESIDENCE

<i>H</i>					
Year	Total	Big City	Mean City	Small City	Rural Area
1980	0.144	0.074	0.083	0.109	0.246
1981	0.093	0.034	0.054	0.075	0.170
1982	0.139	0.073	0.092	0.115	0.242
1984	0.299	0.156	0.201	0.231	0.495
1985	0.195	0.123	0.144	0.158	0.294
1986	0.188	0.103	0.138	0.137	0.265
1987	0.237	0.125	0.166	0.179	0.313
1988	0.153	0.078	0.106	0.107	0.204
1989	0.167	0.079	0.106	0.106	0.233

<i>D_A</i>					
Year	Total	Big City	Mean City	Small City	Rural Area
1980	0.203	0.155	0.177	0.160	0.216
1981	0.190	0.144	0.125	0.138	0.207
1982	0.169	0.122	0.123	0.124	0.190
1984	0.281	0.186	0.203	0.190	0.315
1985	0.208	0.171	0.187	0.173	0.223
1986	0.206	0.172	0.172	0.170	0.216
1987	0.212	0.182	0.177	0.183	0.221
1988	0.203	0.187	0.176	0.187	0.208
1989	0.242	0.178	0.185	0.193	0.256

The results based on both types of poverty indices, reveal that rural households are the least privileged. The lowest poverty incidence (*H*) was indicated in all periods for households in big cities. The aggregated Dalton, as in the previous cases, did not provide unique results on the lowest poverty depth. Households in big cities were distinguished by the lowest poverty gaps in 5 years. The differences between the highest and the lowest indices were not as dramatic as presented in the previous tables, especially Table 6 displaying results on the influence of an education.

VIII. CONCLUDING REMARKS

The number of poor households was the highest in 1984 and the lowest in 1981. It is also possible, by calculating the head count ratios for sociodemographic

groups, to indicate types of households with the highest risk of poverty: pensioners/annuitants, farmers, old people, low educated persons, large and monoparental families. The head count ratio is the most obvious poverty measure, however it does not provide information on the depth of poverty. This is provided by the aggregated Dalton index, being a measure of the relative shortfall of poor below the poverty line. Differences in H and D_A distributions suggest the existence of extremely poor households, with welfare dramatically below the average standard of living of the poor. This was true especially for households of farmers. The opposite phenomenon occurred among households of pensioners/annuitants and old people. They are usually characterized by the highest poverty incidence and relatively low poverty depth. This suggests relatively equal poverty distribution among them and a low number of extremely poor.

The Blackorby–Donaldson index, which combines information on poverty depth and incidence, yields an assessment of the trend and distribution of poverty similar to the head count ratio. The Jorgenson–Slesnick index, calculated for the country as a whole only, also provides an assessment of the trend similar to the head count ratio. One can interpret this as a lack of important changes in the inequality over time. This hypothesis is confirmed by the fact that incorporating an inequality measures into the indices did not change the poverty dynamics.

It should be however noted that considerable reductions of the poverty rates indicated for some years is caused not only by the GDP growth. An assessment of poverty incidence may be biased due to: (1) shortages on the consumer market and (2) the poverty line underestimation for some years.

The system of a permanent observation of poverty which could be derived from the research described above is addressed to the institutions interested in the following information: (1) assessment of trends in poverty, (2) assessment of different poverty natures (e.g. extent vs. depth, i.e. head count ratio vs. aggregated Dalton; social ability to eliminate poverty by welfare transfers), and (3) poverty distribution among sociodemographic groups. The system can also provide a foundation for better assessments of individual poverty, as welfare is calculated per equivalent adult rather than per person or household.

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