Zeszyty naukowe

Working papers

Social Policy and Poverty: Checking the Efficiency of the Social Assistance System in Poland

Adam Szulc

Working Papers
Institute of Statistics and Demography
Warsaw School of Economics

No. 1/2009
revised on January 2011

Abstract

The study examines distribution and impact of the transfers directed by definition to the low income population (hereafter: the social assistance). During the period observed both the volume and the number of recipients increased considerably. Those benefits appeared to be fairly effective as a tool preventing the non-poor from falling into poverty and quite successful in supporting the poor in escaping from poverty. Most of the types of households exposed to higher than average risk of poverty are less likely to be discriminated in receiving social assistance. The analysis of behavioural response confirmed relatively high proportion of foregone income.

CONTENTS

1. INTRODUCTION

It is commonly believed that the transformation of the communist economies initiated around 1990 has resulted in substantial growth of poverty and inequality. For some countries this popular wisdom was partly challenged by empirical studies (Garner and Terrel, 1998, Keane and Prasad, 2002, Szulc, 2006). These authors demonstrated that increases in inequality or poverty were not so severe in Czech and Slovak republics or in Poland. In spite of the serious drops in average incomes and consumption caused by the GDP decline, inequality and poverty were mitigated by social benefits. Some other studies demonstrated, however rather unhelpful impact of such transfers in Russia (Commander and Lee, 1998) or Latvia (Milanovic, 2000). The present research examines how the social assistance affected poverty in Poland between 1997 and 2005. This interval might be informally referred to as the second stage of transition, concluded by the access to the European Union in 2004. The study covers three years of parliamentary elections in Poland: 1997, 2001 and 2005. The results of those elections give an opportunity to compare anti-poverty policies between governments considered right-wing (1997-2001; it followed the left-wing government of 1993-1997) and left-wing (2001-2005).

Contrary to the studies by Keane and Prasad (2002) and The World Bank (2004) taking into account all social protection transfers, this one focuses on the transfers directed by definition to the least privileged population. The research is based on the household survey cross section data and also on the panel sample for the years 2000-2001. The social assistance system is evaluated by several techniques, including both descriptive statistics and econometric estimations. The evaluations comprise the volume of the benefits, the targeting, the degree to which the transfers are pro-poor, impact on poverty (static and dynamic), distribution of the benefits by socio-demographic attributes and behavioural responses from individuals receiving the assistance. The remaining part of this paper is organized as follows. Section 2 presents the database. In Section 3 statistics on poverty and inequality is presented. Section 4 reports changes in the volume of the social assistance. Sections 5 and 6 are devoted to targeting and distribution of the benefits. In Section 7 impact of the social assistance on the poverty is examined. In Section 8 a model of behavioural response to receiving benefits is estimated. Section 9 concludes.

2. THE DATA

The individual data employed in this research comes from the annual household budget survey (HBS) which is generally based on the principles applied in the European Community Household Panel. It encompasses information on household income and its components, expenditures, assets, durables, dwelling conditions, demographic and socio-economic attributes, and answers to subjective income questions. The yearly samples cover approximately 32,000 households (34,800 in 2005) and 100,000 persons. The reference period of observation is one month. A two-stage sampling scheme is being applied. Former administrative regions (voivodships) split into urban and rural areas were the primary sampling units (PSUs) till 2000. After that date PSUs were based on the records of statistical areas designed for the 2002 National Census. At the second stage dwellings were sampling units. Panel data employed in this research were gathered in 2000 and 2001 (panel data are not collected on a regular basis). Information on income is collected at household level, though some estimations of individual incomes have been attempted. Due to this limitation, information on social assistance refers to the households only and it is impossible to estimate precisely number of persons receiving this type of transfer. More methodological details on Polish HBS may be found in Kordos et al (2002) and in Household Budget Survey (2007).

3. POVERTY AND INEQUALITY STATISTICS

In this part of the study two quasi-absolute poverty lines are employed. They are set at the first decile and the first quartile in 1997 income/expenditure distribution, in succeeding years adjusted by consumer price indices (consequently, the resulting poverty rates in 1997 are 0.1 and 0.25). They are referred to as extreme poverty line and poverty line, respectively. Supplementary relative poverty index is based on 60% median poverty line. Poverty depth measure is based on Dalton formula. It is defined as a relative difference between the poverty line and the mean income[1] of the poor

[1] The mean value is more sensitive to the data quality than the median income. However, the formula based on median (which would constitute the Laeken poverty depth index, see Atkinson et al, 2002) is much less responsive to income transfers.

$$D = \frac{z - \overline{Y}_p}{z} \qquad (1)$$

where z is the poverty line and $\overline{Y}_p$ denotes mean income of the poor. Gini index is adopted as an inequality measure. All poverty and inequality indices are calculated taking persons as the units. To calculate equivalent incomes OECD 70/50 scales are applied. In succeeding sections the quantile poverty rates are estimated for each year separately, to take into account changes in average income. Table 1 reports, except poverty and inequality statistics, the changes in: GDP, share of the social security expenditures, unemployment and average income. In both investigated sub-periods the average GDP growth rates were approximately equal each other. Unemployment rates were characterised by increasing trend between 1997 and 2001 and then decreased by 2 percentage points (this drop cannot be estimated precisely due to the change in unemployment definition in 2002) during succeeding four years. The share of expenditures on social protection in GDP between 2001 and 2005 decreased slightly[2]. Robust increases in GDP were not translated into equivalent changes in household incomes. This disproportion may be at least partly explained by tightening the monetary policy by the central bank, high export and investment rates[3]. Moreover, crucial in this context definitions of income and household differ between household surveys and national accounts. More details on those differences may be found in Household Budget Survey (2007, pp. 34).

Moderate increases in mean income were accompanied by permanent increases in inequality. Gini and relative poverty indices increased over the whole period by approximately 2.5 percentage points. This resulted in growth of the extreme poverty rates and relative stabilisation of the poverty rates. Increase of inequality may be explained by cumulating several factors like increase of inequality in wage and working hours, increase in the number of households with no earnings and reduction of unemployment benefits under growing unemployment between 1997 and 2002 (see The World Bank, 2004 for a detailed analysis).

[2] See comments on p.7 in Section 4 on differences between the macro- and microlevel estimates.

[3] It is worth mentioning that the national accounts indicated positive yearly growth rates during the whole period investigated, while the estimates for the period 1998-2002 derived from the household budget survey were negative.

Table 1 GDP, unemployment and monetary poverty in Poland: 1997 – 2005 (%)

	1997	2001	2005
GDP, 1997=100	100	115.8	133.1
Unemployment rate*	10.3	17.5/19.5*	17.6
Social protection expenditure (% in GDP)	n. a.	20.5	19.2
Mean income, 1997=100	100	101.8	108.2
Median income, 1997=100	100	102,3	106,6
Poverty rate	25.0	25.8	24.7
Extreme poverty rate	10.0	11.2	10.6
Poverty depth	27.6	29.0	28.6
Extreme poverty depth	25.9	26.9	25.6
Percent below 60% median	15.4	16.8	17.8
Gini index	29.9	31.0	32.6

** in 2002 the definition of unemployment was changed by the CSO*

Source: 1. Eurostat EU Economic Data Pocketbook, 2-2007 and Eurostat website
2. Author's calculations based on the HBS data

Table 2 Social assistance: 1997 - 2005

	1997	2001	2005
Percent of recipients[4]	6.5	9.3	10.5
Mean real value, 1997=100			
all persons	100	141.2	241.4
recipients	100	99.1	150.8
As percent of			
mean income	0.6	0.9	1.4
mean recipients' income	16.0	16.4	25.2
poverty gap	6.3	9.5	16.3
extreme poverty gap	21.6	34.2	59.4
*family benefits**	44.0 (100)	65.7 (94)	68.8 (154)
*unemployment benefits**	37.8 (100)	95.2 (55)	1.33 (68)

* Total amounts of benefits in the sample are compared, real changes in parentheses, 1997=100

Source: Author's calculations based on the HBS data

Due to the size of the household sample, standard errors for poverty and inequality indices can be expected reasonably low. Under assumption of simple random sampling in 2005 the estimates of standard error for the relative poverty indices were around 0.25%, for Gini 0.18% and for poverty depth measures 0.35% and 0.22%, for extreme poverty line and poverty line, respectively. However, stratification of the sample, weighting and clustering make real standard errors differ from those presented above. First two factors tend to reduce standard errors, as compared to those obtained under simple random sampling while clustering enlarges them. The importance of those factors is measured by the design effect (deff), defined as the ratio of the variance calculated under actual sample design and the variance that

[4] Due to data limitations this indicator displays the proportion of people living in households with at least one social assistance recipient.

would have been obtained under simple random sampling. Unfortunately, the Central Statistical Office recently does not supply identifiers allowing reconstruction of stratification and clustering from the individual data. The design effect for poverty indices may be roughly estimated from the published data. In 2005 the standard error for the mean income provided by the CSO in Household Budget Survey (2007) was by 45% higher than it would be obtained under simple random sampling. Design effects for 1993-1999 poverty rates were estimated by Szulc (2006) and those for the income poverty rates were higher by 10-20% than those for the mean income. Using simple extrapolation it is possible to estimate roughly the design effect for 2005 poverty rates as 2.3 - 2.5 which translates into increase of the standard errors by 1.51 - 1.58.

4. CHANGES IN THE VOLUME OF THE SOCIAL ASSISTANCE

Keane and Prasad (2002) estimated that the average share of social transfers in household income in Poland increased from 0.23 in 1988 to 0.26 in 1990 and to 0.32 in 1997. However, those increases were caused to high extent by increasing number of pensioners, especially retirees, to less extent by the increasing unemployment. In the present research the focus is made on the social assistance which is by definition directed to the individuals with lowest incomes. For that reason housing benefits, that are means tested in Poland, are also included into the study. As reported in Table 2, the whole period was characterised by considerable growth of the share of social assistance in incomes of the recipients, from 15.9% in 1997 to 24.8% in 2005. The real growth of absolute values was also extensive, by 51%. However, the whole portion of the growth in both fields should be attributed to the second sub-period. The proportion of the people living in households receiving social assistance increased from 6.6% to 10.5%. In that case, more rapid growth (by 43%) took place during the first sub-period.

Relating amount of the social assistance to the total income of the population is not necessarily informative when low income population is the object of interest, as income changes in higher percentiles also affect this indicator. For that reason, adequacy of the social assistance can be evaluated better by a ratio of its total amount to the absolute poverty gap(s). In this part of the research the poverty lines were calculated for each year separately to take into account changes in mean incomes and their distribution between compared years. Consequently, the poverty and the extreme poverty rates are equal to 0.1 and 0.25,

respectively, for each year. As reported in Table 2, the volume of social assistance in comparison with poverty gaps increased substantially over the period of observation. In 1997 it would be enough to close 22% of extreme poverty and 59% in 2005. Analogous values for poverty gap changed at similar pace: from 6% in 1997 to 16% in 2005. This results should not be misinterpreted, however. The ratio equal to 100% would not necessary mean that directing the actual social assistance to the poor only would eradicate poverty, as a poverty gap is calculated using incomes including also social assistance. The better targeting, the less informative is that ratio. It is hence reasonable to take into account only this part of social assistance which is received by the non-poor. Such simulations are reported in Section 7.

5. DISTRIBUTION OF THE SOCIAL ASSISTANCE

5.1. Descriptive statistics

Distribution of the social assistance across income deciles is reported in Table 3. Approximately its one fourth is allocated to the first decile and 60% is received by first three deciles. As income is not ideal measure of well-being, due to its volatility and measurement errors, consumption, which is more smooth, is also applied here. The relative amounts of the transfers received by the first expenditure deciles are similar. Slightly higher, by 1-2 pp, first decile shares are observed if deciles are based on combined income and expenditure. Taking into account the first decile shares, the best allocation is observed for 1997 and the worst for 2001. The largest share of social assistance received by households above the median income was observed for 2001 and the lowest in 1997, though the differences are lower than 1 pp. The comparisons between the concentration curves (Fig. 1) are rather inconclusive due to the crossing of the curves.

Table 3 Shares of social assistance in its total sum, by income deciles (%)

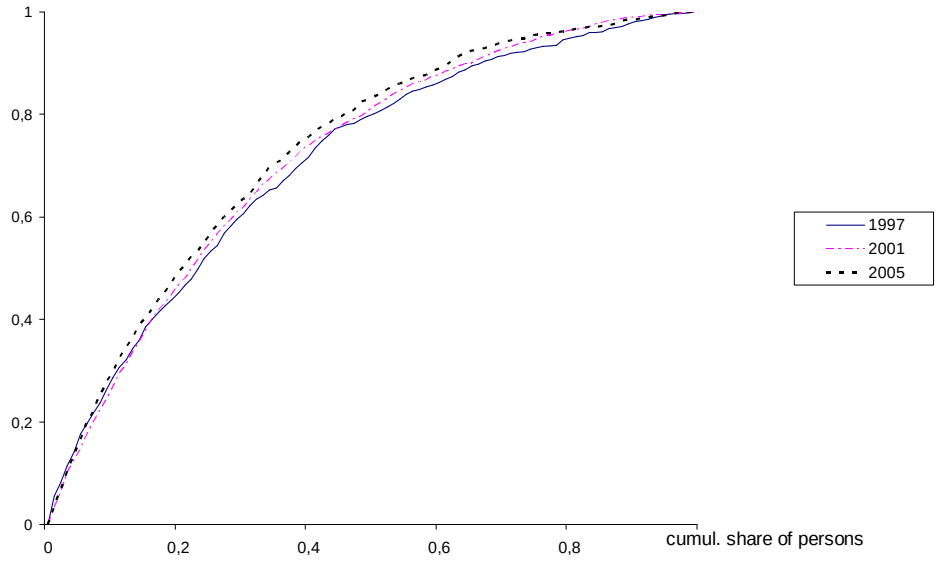
	By equivalent income			By equivalent income minus assistance		
Income decile	1997	2001	2005	1997	2001	2005
1	27.9	22.9	23.4	50.8	43.9	57.6
2	20.4	19.5	22.0	17.2	21.0	19.0
3	13.6	16.7	16.8	10.5	12.3	8.9
4	11.3	13.0	13.1	6.9	8.1	5.8
5	9.4	9.5	7.0	4.7	5.5	3.6
6-10	17.5	18.2	17.8	9.4	9.1	5.2
Total	100	100	100	100	100	100

Source: Author's calculations based on the HBS data

Distribution of the social assistance across deciles based on household income may be misleading, to some extent, as the total income include also the social assistance. Some recipient households may move to higher deciles, which would be reported as an "inclusion error". Comparison of the abovementioned results with the distribution across deciles of pre-transfer income demonstrate that this is the case for Poland. The share of the social assistance received by the first pre-transfer income decile roughly doubled, comparing to the distribution based on post-transfer deciles. On one hand, it demonstrates that targeting (ignoring behavioural responses from the recipients[5]) is better than the post-transfer distribution suggests, on the other hand it is evidence of some type of discrimination of the poor not receiving the assistance (the "exclusion errors" and "discrimination profiles" are analysed in the succeeding section).

[5] This issue is analysed in Section 8.

Fig. 1. Concentration curves for the social assistance.



5.2. Pro-poor but to what degree?

Though the social assistance in Poland is mainly addresses to the low income individuals, the degree to what the social transfer are pro-poor is another question. This issue is rarely analysed in a formal way in the economic literature. The question "what is pro-poor" and "how it should be measured" gained wider interest in the economic growth context. There is relatively large literature on this topic, probably being one of the consequences of declaring the Millenium Development Goals. This literature is used in the present study as a theoretical point of departure. Technically, social transfers are equivalent to growth in average income. The main differences is empirical: for none of the individuals in the sample the change is negative.

The growth may be defined as pro-poor if it results in poverty reduction, however such a definition is too general to give a guidance to its evaluation. It may be termed as a weak definition. Kakwani et al (2004) introduced also the strong definition which requires that the poor benefit relatively more than the non-poor. Formally, it is equivalent to reduction not only in absolute poverty but also in inequality. Moreover, Kakwani et al (2004) classify studies into two categories with respect to whether or not they provide a single measure. The full approach, which always results in a conclusive indicator, requires specifying a poverty line as

well as a poverty measure. The partial approach, though can provide conclusive results under certain conditions only, is valid for any poverty line. The abovementioned problems are less critical when social assistance is the object of interest. As it usually results in reduction of poverty and inequality, application of the strong definition of growth is not restrictive in fact. Moreover, as the social assistance holds stochastic dominance conditions, both partial and full approach can provide conclusive results. However, this is not necessarily true for comparisons between years, which constitute the main goal of the present study. The partial approach is embedded here in some curves based on cumulative distribution functions, being equivalent to the growth incidence curves. The full approach is represented by comparisons of poverty indices. Moreover, the attempt to unify both approaches is made by means of the Relative Advantage Indicator defined below.

Another important issue in the pro-poor growth measurement is what axioms should be satisfied. Ravallion and Chen (2003) demonstrated that the Watts poverty index is the only one that is consistent with standard axioms for measuring poverty. However, Kakwani et al. (2004) pointed out that Watts index is not a monotonically decreasing function of a pro-poor grow rate (in other words, it does not satisfy the monotonicity axiom). Duclos (2009) also found some theoretically implausible properties of the Watts index. Moreover, he proposed the graphical methods for testing whether growth is pro-poor, satisfying several axioms of poverty measurement, including the growth income curves. The latter concept is utilised in the present research

The main purpose of this part of the present study is to make comparisons between years rather than to produce a measure for a single year. Moreover, it is not necessary to obtain conclusive results for the whole domain of the income, for example for the individuals well above median value. Therefore, some critics of the methods presented above may be relaxed at that point. The attempt to unify the partial and the full approach is based on some graphical methods that also result in a single indicator but does not require setting the poverty line. The respective function, called here Relative Advantage Indicator (RAI), is calculated for income y as follows:

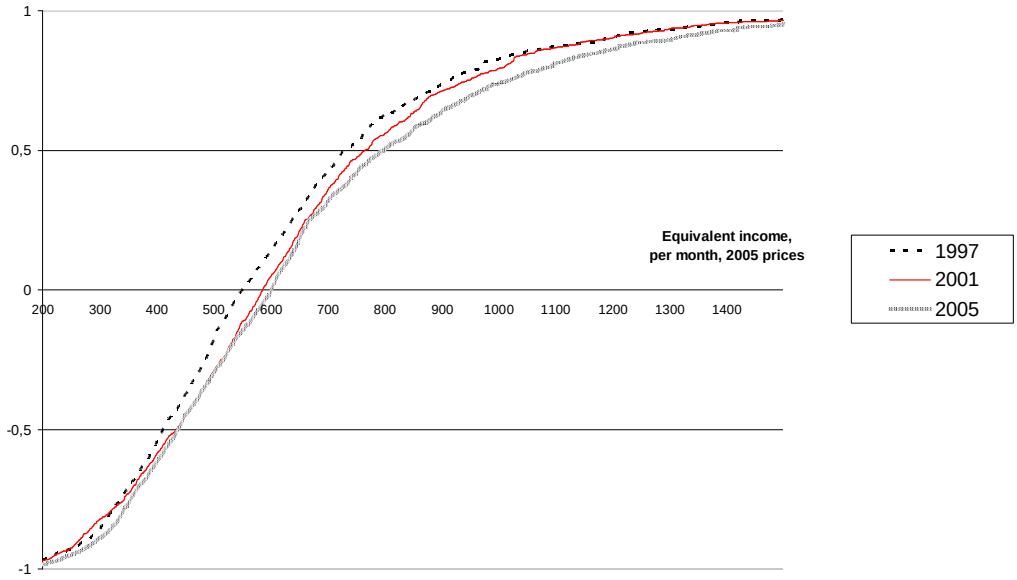
$$RAI(y) = \frac{\sum_{i:y_i<y} y_{ai} - \sum_{i:y_i \geq y} y_{ai}}{\sum_{i=1}^{n} y_{ai}} \qquad (2)$$

where y_{ai} stands for a social assistance (or, more generally, any transfer) received by *i-th* household. RAI is a relative difference between the sum of assistance received by the individuals with incomes below *y* and received by the remaining ones (respectively, the poor and the non-poor if y is equal to the poverty line). RAI may be used for construction of curves to compare pro-poor distributions over the whole domain or selected range of incomes. It is also possible to obtain a single measure, say I, by solving the equation:

$$RAI(I) = 0$$

Indicator I is an income threshold at which the "poor" and the "non-poor" receive, on total, equal amounts of assistance. The smaller I, the higher degree of pro-poor distribution. It may be used in absolute or relative form, as a certain proportion of median or mean income. It is possible to apply weighting incomes to ensure: i/ giving higher weights to the poorest and/or ii/ satisfying certain axioms. The empirical results are displayed in Figure 2. There is no dominance of any curve that might be observed for the whole range of equivalent income. Nevertheless, 1997 curve dominates two remaining ones for incomes between, roughly, 5^{th} centile in 1997 distribution (in 2005 prices) and 2005 mean. Moreover, for 1997 RAI reaches zero for the lowest income value (550,5 PLN versus 585,5 PLN in 2001 and 600,5 PLN in 2005). However, this can be at least partly attributed to the increases in mean/median income over the investigated period (see Tab. 1). As compared to mean/median equivalent income, the lowest value may be observed for 1997 and the highest for 2001, though the differences between the years investigated are not large.

Figure 2 Relative Advantage Curve for 1997, 2001 and 2005.



1997: RAC(550.5)=RAC(0.696·median)=RAC(0,600·mean)=0

2001: RAC(585.5)=RAC(0.722·median)=RAC(0,621·mean)=0

2005: RAC(600.5)=RAC(0.711·median)=RAC(0,597·mean)=0

Ravallion and Chen (2003) proposed "growth incidence curves" (GIC) as a tool for checking whether the growth is pro-poor. They are defined over the range of poverty rates as a relative difference between incomes yielding the same poverty rate for the initial and after-growth (here: pre-transfer and after-transfer, indexed 1 and 2, respectively) distributions:

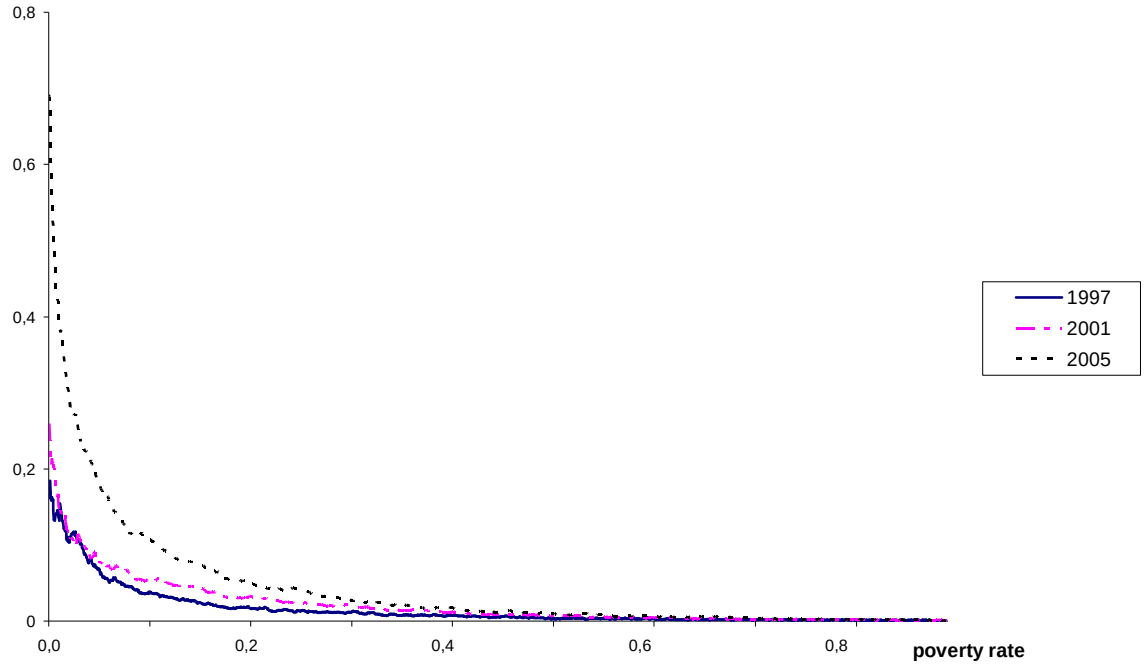
$$\Gamma(p) = \frac{Q_2(p) - Q_1(p)}{Q_1(p)} \qquad (3)$$

where p is a poverty rate and $Q_i(p)$ is the inverse of cumulative distribution function for the *i-th* (i=1,2) distribution. Duclos (2009) termed the change first-order pro-poor if for certain range of poverty rates p $\Gamma(p)$ is positive, which is definitely passed for the social assistance in Poland. Moreover, he demonstrated that such a judgement satisfies several axioms of the pro-poor growth measurement.

In Figure 3 GICs for three years under comparison are displayed. Though GIC is defined in relative terms, it evaluates also amount of the transfer. As might be expected, 2005 curve

dominates two remaining ones, especially at lower range of incomes, which means that impact of the assistance on poverty was the highest in 2005, irrespectively to poverty line level. There is also dominance, though to the lower extent, of 2001 curve over that of 1997.

Figure 3. Growth Incidence Curves for 1997, 2001 and 2005.



5.3. Gini index decomposition by income sources

The distribution analysis presented in the previous sub-section allowed joint measurement of changes in targeting of the transfers and their amounts. Decomposition of Gini index by income sources (components) allows separate evaluation of both factors. Formally, it can give an answer to the question how much changes in particular income component would change the overall inequality measured by Gini index. Social assistance should have strong equalising effect on income, as well as most of other social benefits if the targeting is well-addressed and the amount is large enough.

The algorithm employed here was proposed by Lerman and Yitzhaki (1985). They decomposed Gini index into three components: Gini index for the income from k-th source

(G_k) , the share of this income in the total income (S_k) and its correlation with the total income (R_k). Furthermore, Gini Income Elasticities (GIE) for k-th component of income can be calculated using the formula:

$$GIE_k = \frac{S_k G_k R_k}{G} - S_k \qquad (4)$$

where $R_k = \frac{\text{cov}[y_k, F(y)]}{\text{cov}[y, F(y)]}$, y_k is per capita income from *k-th* source and F stands for a cumulative density function. GIE is a measure of a change in overall Gini due to (prospective) increase of income from *k-th* source that is identical for all households. As GIE is a product of k-th benefit's share S_k and $\frac{G_k R_k}{G} - 1$, the total effect may be split into the effect of amount of the transfer (S_k) and the effect of targeting.

Gini Income Elasticities were estimated using the STATA algorithm written by Lopez-Feldman (2006). They were obtained for the social assistance and, for comparative purposes, for family and unemployment benefits. The results are reported in Table 4. It is rational to expect that simulated increases in all types of transfers would decrease overall inequality. This is confirmed by the empirical results: GIEs for all types of benefit are strongly negative. All values decreased between 1997 and 2005 and the highest decrease was observed for the social assistance, for which GIE absolute value more than tripled. As a result, this type of benefit in 2005 appeared to be more equalising than two other ones. In that year proportional increase of the social assistance by 1%, all other incomes unchanged, would result in decrease in overall Gini index by 3%. This happened not only since the highest increase in its share in total income (S_k) but also due to systematic improvement of targeting, as might be observed by permanent growth of $\frac{G_k R_k}{G} - 1$. The last finding seems to stand in opposition to the analyses of the decile distribution (Section 5.1) and the inclusion errors (Section 6.1). However, those evaluations focused on the lowest deciles only, while Gini Income Elasticities took into account the whole range of the income distribution. One could conclude therefore that the increase of the system "leakage" reported in the next section was more favourable for the "non-poor" who are close to the poverty line than for those in upper income deciles.

Table 4. Gini Income Elasticity for 1997, 2001 and 2005.

Income decile	1997	2001	2005
Gini Income Elasticity			
family	-0.0119	-0.0096	-0.0210
unemployment	-0.0021	-0.0118	-0.0143
social assistance	-0.0094	-0.0143	-0.0300
Share of k-th benefit, % (S_k)			
family	1.5	1.4	2.3
unemployment	1.7	1.0	1.1
social assistance	0.6	0.9	1.8
$\frac{G_k R_k}{G} - 1$ (*targeting evaluation*)			
family	-0.9973	-0.9960	-0.9978
unemployment	-1.0055	-1.0023	-1.0029
social assistance	-1.0031	-1.0053	-1.0121

Source: Author's calculations based on the HBS data

6. MISTARGETING OF THE SOCIAL ASSISTANCE

The social assistance is a means tested benefit, however the eligibility income threshold for a single person in 2005 was by 15% higher than the first income decile, serving here as the extreme poverty line. Moreover, as it is assigned to the individuals it may undervalue incomes of other household members. Hence, it is not surprising that the social assistance is being received also by persons living in the households with incomes higher than first decile (the extreme poverty line) or even quartile. To evaluate mistargeting of the social assistance two types of errors are calculated. Error of the first type – exclusion error is measured by a proportion of the

poor who do not receive any assistance. Proportion of the non-poor who receive the assistance defines the inclusion error which is a measure of the system "leakage".

6.1. Exclusion and inclusion errors

Exclusion errors are calculated using percentile poverty lines calculated for each year separately. As mentioned above, the eligibility threshold for the social assistance is higher than the extreme poverty line, therefore resulting exclusion errors should not be large when this type of (extreme) poverty line is applied. Much higher errors may be expected when poverty line is set at the first quartile. For similar reasons, inclusion errors should be considerably smaller when higher poverty line is employed. The empirical results are reported in Table 5. The general conclusions are similar to those derived from distribution across income deciles. Bearing in mind increasing number of recipients and mean value of social assistance during the period observed, the decrease in exclusion error hardly surprises. For the same reason, increase of the inclusion error over the time may be observed.

Exclusion error equal 7.3% (in 2005) means that 73% of the persons with incomes below the extreme poverty line live in households which do not receive any social assistance. If income and expenditure are taken into account jointly, this indicators significantly decreases, ranging from 3.7% (1997 and 2005) to 3.9% (2001). This suggests that assigning individuals to social assistance is based on a criterion broader than the current income. It should be also noted that some people may be reluctant to apply for assistance for psychological or bureaucratic reasons. One more explanation for relatively high proportion of the poor not covered by the social assistance is in some type of "discrimination" of families against single persons. Eligibility threshold for two persons is only by 37% higher than for the one, while the OECD equivalence scales applied in the present study assume increase in the cost of living by 70% (for adults) or by 50% (for children). This "discrimination" may be explained by eligibility of multi-person households to other forms of allowance, especially to family benefits. In the succeeding sub-section a probit regression is used to find which household attributes are correlated with the high probability of exclusion error.

Table 5 Exclusion and inclusion errors (%)

Poverty line	1997		2001		2005	
	Exclusion	Inclusion	Exclusion	Inclusion	Exclusion	Inclusion
Income						
1st decile	8.3	4.8	7.7	7.1	7.3	7.8
1st quartile	21.3	2.9	20.0	4.3	19.1	4.6
Income and consumption						
1st decile	3.7	5.4	3.9	7.7	3.7	8.7
1st quartile	13.1	3.8	13.1	5.3	12.4	5.9

Source: Author's calculations based on the HBS data

Inclusion errors increased over the period of observation, which coincide with the serious increase of the number of recipients. The absolute values of those errors may be considered low – even in 2005 only 9.7% of the people above the extreme poverty line and 7.9% of the people above the poverty line received social assistance, which is consistent with the results of decile analysis which demonstrated that major part of such transfers were received by the lowest deciles. The World Bank (2004) reported much higher "leakage" of the system of social security transfers, however that analysis captured other transfers, that are not means tested.

6.2. Econometric profiles of the recipients and the excluded from receiving social assistance

Using a probit or logit regression for constructing socio-economic profiles is more reliable than simple disaggregation of the mean national index, like poverty rate or share of recipients. For instance, rural households are, on average, headed by less educated persons than urban ones. As both these attributes are likely to be significant correlates of poverty, it would be impossible to check by means of simple decomposition whether a rural location itself is a "determinant" of poverty. In probit (or logit) models the regression is run on all variables simultaneously allowing estimation of, informally speaking, pure effects of regressors since controlling for all remaining variables.

The dependent variables in the probit models estimated here equals 1 if the household receives social assistance and 0 otherwise. The results of the regression analysis of the social assistance recipients can hardly surprise. Positive correlates of binary variable indicating receiving such transfers generally are also positive correlates of poverty (see Szulc, 2006, 2008), however two notable exceptions occur. Rural residence and receiving family or unemployment benefits decreases significantly probability of receiving social assistance (see Appendix Table A1). Similar conclusions may be also derived from the estimates of the model in which the social assistance amount is the dependent variable. Estimates are generally positive for poverty correlates, with the same two exception.

Probit model is also applied for analysing the exclusion error distribution. However, in some cases using a standard probit regression for a subsample (here: for the extremely poor) may result in biased estimates due to self-selected sample (some determinants of poverty may be also determinants of not receiving assistance) which results in correlation between the residuals of the regression and the selection equations. To check whether this is the present case, the Heckman (1979) selection model is also employed. The procedure consists in simultaneous estimation of two equations:

$$EP = f_1(X_1) + e_{1i} \quad \textit{selection equation}$$

$$EE = f_2(X_2) + e_{2i}, \quad X_2 \neq X_1 \quad \textit{exclusion error equation} \qquad (5)$$

where *EP* stands for extreme poverty, *EE* represents exclusion error, while X_1 and X_2 are sets of attributes supposed to have an impact on extreme poverty and exclusion error, respectively. Assigning to the poverty zone was based on two well-being indicators: income and income combined with expenditure. For all years and both indicators correlation between the residuals of the regression and selection equations was statistically significant, therefore Heckman regression appeared to be more appropriate than standard probit. Regressions were run on households, with weights proportional to household size, as large part of information is collected at the household level only. The general conclusions (see Appendix Tables A2 and A3) may be found surprising as most of households at high risk of poverty (see Szulc, 2006, 2008) or supposed to be less flexible (households with handicapped persons and those headed by low educated or aged persons) are less likely to be exposed to exclusion error. And vice versa, the risk of exclusion error is higher than average for households less likely to fall into poverty. Rural households are the only exception from that rule. The abovementioned results

suggest that for many of the poor not receiving social assistance may be their own choice but also may be caused by applying non-income criterions for assigning the assistance.

7. IMPACT OF THE SOCIAL ASSISTANCE ON POVERTY.

Reduction of poverty, especially extreme poverty, constitutes the main goal of the social assistance system. In this section some simulations are performed to evaluate its impact on poverty indices. The simplest methods consists in comparing two values of poverty indices: calculated with the use of actual incomes and of simulated incomes from which social transfers were subtracted. Such a procedure is applied in construction of Laeken index of social cohesion (see Atkinson et al, 2002). Identical concept has been applied in this study to the social assistance and two poverty indices: the poverty rate and the poverty depth. Measuring poverty incidence only might give a biased view of efficiency of anti-poverty policy. If transfers are directed to the poorest, their incomes may remain below the poverty line after receiving the transfer, in spite of improving their economic situation. Hence, in such a case poverty incidence index would remain unchanged. For that reason, impact of the social assistance on the poverty depth index (eqn 1) is also examined. In Table 7 values of two aforementioned indices are compared, using actual incomes and incomes without social assistance.

Higher growth of poverty incidence due to subtraction of the social assistance, which means higher effectiveness of the social assistance, is observed when the lower poverty line is employed. This is true both in relative and in absolute terms. This difference enlarged for each year observed, as compared to the previous one. General conclusions obtained by means of poverty depth indices are similar, though the scale of impact is higher. Moreover, for those indices the difference between 2001 and 2005 is more than double difference between 1997 and 2001. These results may be interpreted as considerable improvement in effectiveness of the social assistance. Considering the previous findings one could conclude that this result has been attained by enlargement of social assistance amounts rather than by considerable improvement in targeting, though also in the latter field some progress was made in 2005, as compared to 2001 (apart from slight enlargement of the inclusion errors that did not have effect on poverty indices). Similar calculations may be derived also using Foster-Greer-Thorbecke poverty indices (of rank 1 and 2).

Table 7 Poverty indices: before and after receiving social assistance

	1997		2001		2005	
	before	after	before	after	before	after
Incidence						
extreme poverty	11.1	10.0	11.5	10.0	12.7	10.0
poverty	25.8	25.0	26.4	25.0	27.1	25.0
Gap						
extreme poverty	28.4	25.9	29.3	26.6	31.7	25.2
poverty	29.3	27.5	30.9	28.8	33.1	28.5

Source: Author's calculations based on the HBS data

The abovementioned results are not robust to the poverty threshold. Figures 4a and 4b display the curves representing the difference between actual and simulated poverty rates and gaps, respectively. In spite of considerably strongest reducing poverty effects for 2005 and the weakest for 1997, there is no dominance of the previous curve referring to the poverty rate for the whole domain. 1997 curve dominates 2005 curve if the poverty line is higher than 94% of 2005 median. It also dominates 2001 curve for the poverty rate higher than 83% of 2005 median. 2005 curve referring to the poverty gap dominates two remaining ones for the whole range of poverty lines, however 1997 curve dominates 2001 one if the poverty rate is higher than 56% of 2005 median.

Figure 4 a. Differences between pre-transfer and post-transfer poverty rates, poverty line in 2005 prices

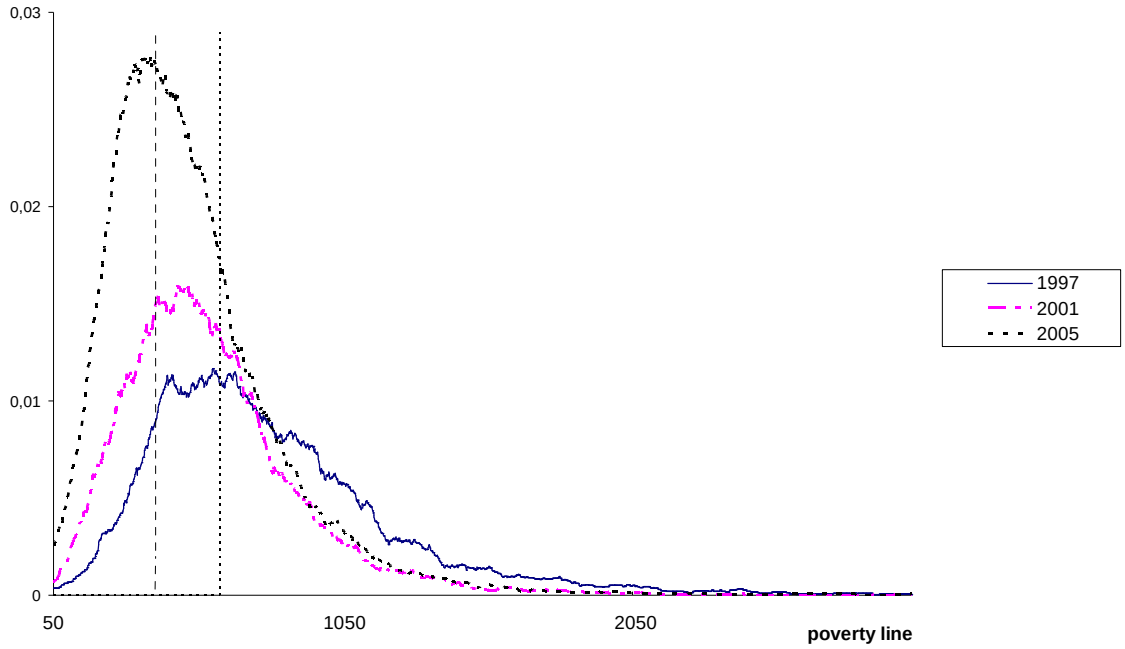
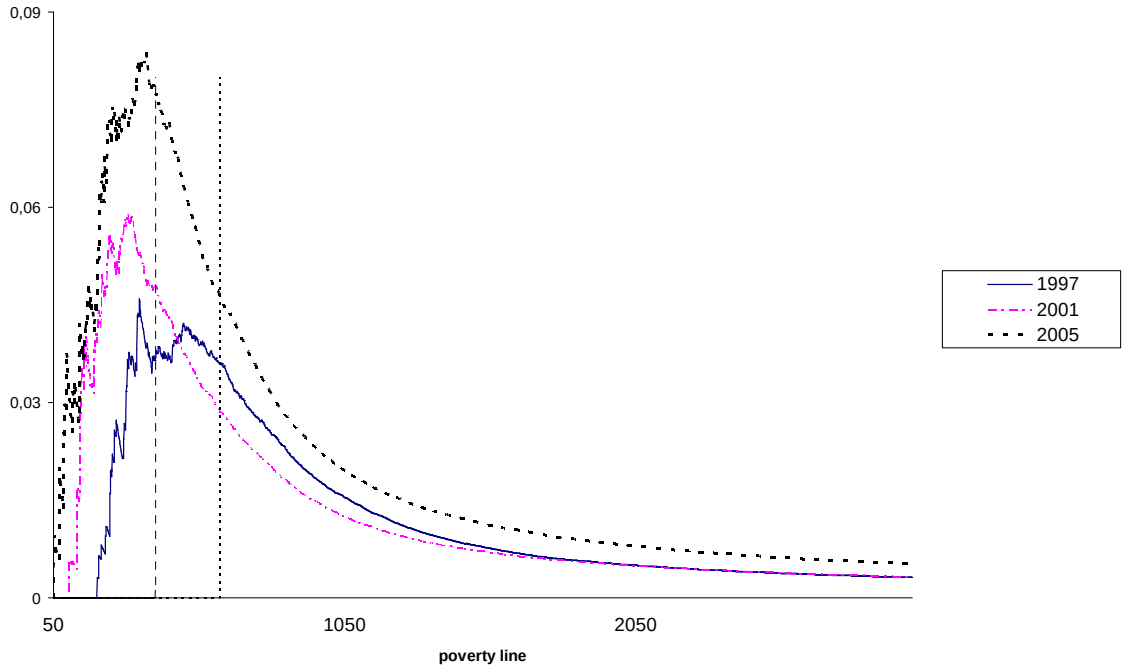


Figure 4 b. Differences between pre-transfer and post-transfer poverty gaps, poverty line in 2005 prices



(vertical dotted lines: first decile and first quartile in 2005 distribution)

Tables 8a and 8b display transitions between poverty and non-poverty zones, for 2000-2001 period, for both poverty lines. Table 8a demonstrates relatively high mobility of income poverty based on poverty line set at the 2000 first quartile. Though the drop of the poverty rate was modest (by 0.9 percentage point), 35.6% of the 2000 poor became non-poor in 2001. At the same time 10.8% of the initially non-poor became poor. Even higher mobility may be observed when the extreme poverty line is applied (Table 8b). More than half of the poor in 2000 (54%) escaped from the poverty zone in 2001.

Table 8a. Actual joint distribution, poverty line at first quartile

2000	2001		Total
	Non-poor (%)	Poor (%)	
Non-Poor	66.9 (89.2)	8.1 (10.8)	75.0 (100)
Poor	8.9 (35.6)	16.1 (64.4)	25.0 (100)
Total	75.9	24.1	100

Table 8b. Actual joint distribution, poverty line at first decile

2000	2001		Total
	Non-poor (%)	Poor (%)	
Non-Poor	85.4 (94.9)	4.6 (5.1)	90.0 (100)
Poor	5.4 (54.0)	4.6 (46.0)	10.0 (100)
Total	90.8	9.2	100

In parentheses: transition probabilities, in %

Source: Author's calculations based on the HBS data

Table 9a. Joint distribution, transfers subtracted, poverty line at first quartile

2000	2001		Total
	Non-poor (%)	Poor (%)	
Non-Poor	65.7 (89.1)	8.0 (10.9)	73.7 (100)
Poor	8.7 (33.1)	17.6 (66.9)	26.3 (100)
Total	75.9	24.1	100

In parentheses: transition probabilities, in %

PROT=[10.9-10.8]/10.8 = 1% PROM=[35.6-33.1]/35.6 = 7.0%

Table 9b. Joint distribution, transfers subtracted, poverty line at first decile

2000	2001		Total
	Non-poor (%)	Poor (%)	
Non-Poor	83.9 (94.7)	4.7 (5.3)	88.6 (100)
Poor	5.4 (47.4)	6.0 (52.6)	11.4 (100)
Total	90.8	9.2	100

In parentheses: transition probabilities, in %

PROT=[5.3-5.1]/5.1=3.9% PROM=[54.0-47.4/54.0] = 11.7%

Source: Author's calculations based on the HBS data

To evaluate impact of the social assistance on transitions two relative rates ("probabilities") are compared. The first ones are the actual rates of individuals who changed their poverty status (see Tables 8a – 8b), the second ones are obtained with the use of (simulated) incomes without social assistance (Tables 9a and 9b). If those transfers work well, the rate of the simulated "new poor" is higher than actual rate and the rate of the poor who escaped from the

poverty zone is lower. The results, displayed in Tables 9a and 9b, demonstrate that the social assistance works much better as a promotion tool. The respective probabilities of leaving the poverty zone decreases after removing assistance by 7.0% and by 12.2% for the "high" and "low" poverty rates, respectively. Increases in protection rates are much lower in the absolute values: 1% and 3.9%. This may be partly caused by the changes in the initial rates of the poor (increase) and non-poor (decrease) which gives a ground for higher or lower, respectively, increases in absolute values. As in the previous calculations, the social assistance appears to be more effective when extreme poverty rates are employed.

The next simulation is intended to answer the question: how much better targeting could improve the effects? It is examined by simulation in which the whole amount of the social assistance is distributed uniformly through the poor only (without producing "new poor" due to deducting social assistance from incomes of the non-poor) and comparing the simulated transition probabilities with actual ones. The results are displayed in Tables 10a and 10b. In this case a negative promotion effect may be observed when extreme poverty line is applied. The relative rate of the people who escaped from poverty is lower than the actual one. The possible explanation is in much lower (by 22%) initial poverty rate - this decrease was obtained by removing "the richest poor" from the sub-sample. In the remaining cases the effects are stronger than in the previous simulation. This is especially true for the protection effect and the extreme poverty line – retargeting the social assistance would almost eliminate appearing of "new-poor". Generally, these results prove that there is still room for improving efficiency of the social assistance in Poland by better targeting.

Table 10a. Joint distribution, uniform allocation of transfers to the poor only, poverty line at first quartile

2000	2001		Total
	Non-poor (%)	Poor (%)	
Non-Poor	69.8 (90.2)	7.7 (9.9)	77.4 (100)
Poor	8.6 (38.1)	14.0 (61.9)	22.6 (100)
Total	78.4	21.6	100

In parentheses: transition probabilities in %

PROT=[10.8-9.9]/10.8 (8.3%) PROM=[38.1-35.6]/35.6 = 7.0%

Table 10b. Joint distribution uniform allocation of transfers to the poor only, poverty line at first decile

2000	2001		Total
	Non-poor (%)	Poor (%)	
Non-Poor	91.9 (99.7)	0.3 (0.3)	92.2 (100)
Poor	4.1 (52.6)	3.7 (47.4)	7.8 (100)
Total	96.0	4.0	100

In parentheses: transition probabilities in %

PROT=[5.1-0.3]/5.1 (94.4%) PROM=[52.6-54.0]/54 (-2.6%)

Source: Author's calculations based on the HBS data

8. TESTING THE BEHAVIOURAL IMPACT OF THE BENEFITS

In analyses of social benefits the researcher usually makes an assumption that after receiving those transfers the household does not retard other economic activities. Consequently, in

simulations yielding estimates of impact of social assistance on poverty and inequality the whole amount of transfer is subtracted. Such an approach is questioned by some authors. Kraus (2004, pp. 434-435) provided a brief review of the literature devoted to negative aspects of means tested social transfers, especially their discouraging effects. Ravallion et al (1995) and Van de Walle (2002) estimated such effects empirically using household data for Hungary and Viet Nam, respectively. Applying regression models of consumption they estimated net gains[6] from social incomes. In other words, receiving one unit of social income would increase household consumption by half of the unit only. Another method of estimation of efficiency (net gains) of social income is based on matching estimation (see Imbens, 2004 for a review). In this approach two groups of individuals are compared: receiving and not receiving particular type of benefit (or treatment, in medical experiments). Both groups should be identical (ideally) or similar with all other attributes. Provided a large number of such characteristics it is necessary to use an aggregator function which is minimised in order to reach highest possible similarity between them. Propensity score matching applies probability of receiving a benefit for that purpose. This probability is estimated by means of probit or logit model utilising information on household (or individuals') characteristics. Propensity score matching may be considered an equivalent of randomised experiment. Jalan and Ravallion (2003) used this method to calculate net gains from participation in anti-poverty ("workfare") program in Argentina. The results were highly sensitive to the details of the method, however most of them demonstrated high proportion of income "lost".

In the regression method applied to evaluate impact of social assistance (and other social incomes) the panel data of 2000 and 2001 were used. The following equation modelling change in consumption of i-th household (ΔY_i) is estimated:

$$\Delta Y_i = a + \mathbf{b}\Delta\mathbf{T_i} + \mathbf{c}\Delta\mathbf{X_i} + e_i \qquad (6)$$

where $\Delta\mathbf{T}_i$ denotes a vector of changes in particular social incomes, $\Delta\mathbf{X_i}$ vector of changes in household characteristics (in the present study they include also some "non-social"

[6] Growth of consumption minus consumption lost due to retarding some other activities after receiving social transfers.

incomes) and e_i stands for a residual. Estimates of parameters **b** inform what is a net expenditure effect of the transfers. If the estimate is below 1, it may be interpreted that receiving respective transfers would result, on average, in increase of consumption that is smaller than amount of the transfer. Using incomes instead of expenditures would not be plausible since significant correlation between residuals and incomes on the right-hand side and scarcity of good potential instruments. The estimation was performed on the sub-sample of the social assistance recipients. The components of income applied as explanatory variables include: social assistance, family and unemployment benefits (as one variable), labour income, self-employment income. Two latter incomes are included into the equation for comparative purposes, as those supposed to have highest impacts on consumption. The results are reported in Appendix Table A.5 The estimate for social assistance is 0.48, which coincide with findings by Ravallion et al (1995) and Van de Walle (2002). However, the results are highly sensitive to selection of variables. Moreover, the reliability of estimates obtained for other types of income is problematic. The highest value was obtained for labour income, but the estimate is 0.5 only. The estimate for other social incomes is 0.39 (which seems to be rational) but for the self-employment income is 0.28. Such rather unreliable value may result form the fact that the sample is confined to the households of recipients of the social assistance only while it provides the estimates for all types of incomes. Therefore, the next technique, based on the propensity score matching, seems to be more plausible.

In this method the impact of social assistance is estimated by comparing households that are similar on all observable characteristics but social assistance. If the difference between their incomes is smaller than the mean value of assistance, it means that some portion of received benefit is foregone due to retarding some other economic activities. The estimation was made on panel component of the data covering 2000 and 2001. This gives an opportunity to utilise some household characteristics taken from the supplementary year. Receiving social assistance is one of important variables of this type, as it is highly correlated with probability of receiving assistance in another year. Except typical socio-economic attributes of the households the variables included also a dummy indicating receiving family or unemployment benefits.

Formally, the goal is to estimate an average effect of "treatment" A (here: receiving assistance) on household income X, conditional on the vector of attributes **Z**:

$$ATE = E[E(X \mid A = 1, \mathbf{Z}) - E(X \mid A = 0, \mathbf{Z})] \qquad (7)$$

This cannot be done directly as there are no households that at the same time receive and no receive treatment. Hence, one of these values is simulated from the results obtained for similar households. The households are matched on common or similar values of probability of receiving the "treatment" which is at the first stage estimated by probit or logit regression using attributes **Z** as explanatory variables. In this study two algorithms were utilised. Both employs STATA modules written by Becker and Ichino (2002): nearest neighbour matching and kernel matching. In the first method all "treated" households are matched with the closest counterpart and each one may be used more than once (this may make the set of matched units quite small and this is the case in the present study). In the second method all households of the control ("untreated") group are used as matches, with weights inversely proportional to the distance between propensity scores. In the first method standard errors are calculated analytically, in the second are estimated by bootstrap methods[7].

Table 11 Average Treatment Effect of the social assistance in 2001

Method	ATE (in PLN)*	No. of treated	No. of matched	Std. error	t-statistic
Nearest neighbour	145.6 (62%)	482	279	77.609	1.876
Kernel	124.6 (53%)	482	4000	75.539	1.649

* Percent of mean social assistance per recipient in parentheses

Source: Author's calculations based on the HBS data

The results are much more robust to the selection of covariates **Z** on which propensity score is estimated than in the case of the previous method. Quite large differences can be observed between the results obtained by both methods of estimation. The mean value of social assistance received per recipient household is 235 PLN, while the difference estimated by matching

[7] Some authors have reservations about validity of bootstrap in propensity matching (Abadie and Imbens, 2006) however this method has no alternative.

methods are 146 PLN (62%) and 125 PLN (53%), for neighbour matching and kernel matching, respectively. These results are not far from the estimate obtained by the method based on regression but, naturally, they cannot be compared directly.

9. CONCLUDING REMARKS

The system of social assistance in Poland underwent serious transformation between 1997 and 2005. It was characterised by considerable increases in the amount of assistance received per recipient (by 51%) and even higher increases of number of recipients (by 62%). The total sum of the social assistance in the last year of observation was sufficient to close 59% of the extreme poverty gap (if the poverty line is set at the first equivalent income decile), comparing it to 22% in 1997. Those increases resulted in relatively stable absolute poverty rates in spite of significant growth of relative poverty and inequality. Expanding social assistance did not result in growth of share of expenditures on social protection in GDP estimated at the macrolevel, which remained relatively stable and lower than the European Union average by 5-6 percentage points (on the other hand, it was the highest among the post-communist countries joining the EU in 2004, except Slovenia). However, some serious discrepancies between trends in social expenditures (especially, unemployment and family benefits) at the micro and macro levels could be observed.

Analysis of targeting of the social assistance did not yield a clear picture. Its share received by the lowest decile was the highest in 1997 and the lowest in 2001. However those results were not necessarily consistent with those obtained by the other methods. Calculation of the Gini Income Elasticities demonstrated continuous improvement in targeting over the period investigated, while other techniques did not yield robust conclusions. The results depend strongly of the range of incomes being the object of interest. This is especially evident when the concentration curves and Relative Advantage Curves are produced. The latter method yielded also the indicators demonstrating that the degree to which the assistance distribution is pro-poor lowered over the period investigated. However, this result was mainly due to increases in average incomes.

Considerable increases of the social assistance amounts resulted in moderate increase in the system “leakage”. The percentage of non-poor recipients (inclusion error) increased over the period of observation. It should be noted, however, that the share of the extremely poor not

receiving any social assistance (exclusion error) decreased from 83% to 73%. Those shares are much lower (more than twice in 1997 and by less extent in 2001 and 2005) when combined income and expenditure are applied instead of income. Exclusion profiles, constructed by means of probit regression (with Heckman correction, when necessary) demonstrated that households at high risk of poverty were more likely to receive social assistance than those belonging to less vulnerable groups but poor. There are two exceptions from that rule: rural households and invalid pensioners. They are both at higher than average risk of poverty and also higher risk of exclusion from social assistance.

The evaluations of the total impact of social assistance on poverty have to take into consideration both its targeting and amounts. This may be examined in several ways. The simplest method was based on comparisons of actual poverty with those using incomes from which these benefits were subtracted. Not surprisingly, the impact of the social assistance on poverty reduction was the lowest in 1997 and the highest in 2005. The impact is higher when the extreme poverty line is applied. Second method employed panel data and dynamic analysis. It demonstrated that the social assistance increased probability of transition from extreme poverty to non-poverty by 12% and decreased probability of transition in opposite direction by 4%. Such gains are less influential when the higher poverty rate is applied, i. e. set at the first quartile. The alternative method does not depend on poverty line values. Growth incidence curves were used for comparison of the changes in distribution due to social transfers. As might be expected, 2005 curve dominates two remaining ones, especially at lower range of incomes, which means that impact of the assistance on poverty was the highest in 2005, irrespectively to poverty line level. There is also dominance, though to the lower extent, of 2001 curve over that of 1997.

Finally, behavioural response to receiving social assistance was analysed by running the regression of consumption on various types of income and by propensity score matching. The results are highly sensitive to the method but all of them showed relatively high (on average, roughly about 50%) portion of income or consumption foregone due to retarding other economic activities.

Generally, it is possible to find some relationship between changes in the social assistance system that might be attributed to the results of 2001 election which resulted in switching from the right-wing to the left-wing government. The growth of volume of the social assistance was higher after 2001. Moreover the sum of unemployment and family benefits

declined in real terms between 1997 and 2001. This trend was reversed under the succeeding government. Impact of political changes on targeting of the social assistance is less evident.

References

Abadie, A. and G. W. Imbens, (2006), On the failure of the bootstrap for matching estimators, NBER Technical Working Paper 325.

http://www.nber.org/papers/T0325

Atkinson, T., B. Cantillon, E. Marlier and B. Nolan, (2002). *Social Indicators: The EU and Social Inclusion*, Oxford, Oxford University Press.

Becker, S. O. and A. Ichino, (2002), Estimation of average treatment effects based on propensity scores, *The Stata Journal*, 2, 358–377.

Commander, S. and L. Une, (1998), How does public policy affect the income distribution? Evidence from Russia, 1992-1996", *EBRD manuscript* (quoted after Keane and Prasad, 2002).

Duclos, J-Y, (2009), What is "Pro-Poor", *Social Choice and Welfare*, Vol. 32, 1, pp. 37-58.

Eurostat EU Economic Data Pocketbook, 2-2007, (2007), The Eurostat website.

Garner, T. and K. Terrel, (1998), A Gini decomposition of inequality in the Czech and Slovak Republics during the transition, *Economics of Transition*, vol. 6, pp.23-46.

Ravallion, M., D. van de Walle and M. Gautam, (1995) Testing a social safety net, *Journal of Public Economics*, vol. 57, pp. 175-199.

Heckman, J. (1979), Sample selection bias as a specification error, *Econometrica*, vol. 47, pp. 153-161

Household Budget Survey (2007). The Central Statistical Office, Warsaw.

Imbens, G. W. (2004), Nonparametric estimation of average treatment effects under exogeneity: a review, *Review of Economics and Statistics*, 86, pp. 4-29.

Jalan, J. and M. Ravallion (2003), Estimating the Benefit Incidence of Antipoverty Program by Propensity-Score Matching, *Journal of Business and Economic Statistics*, 21 (1), pp. 19-30

Kakwani, N., S. Khandker and H. H. Son (2004), Pro-poor Growth: Concepts and Measurement with Country Case Studies, International Poverty Centre Working Paper Nr. 1, UNDP.

Keane, M. and E. Prasad, (2002), Inequality, Transfers and Growth: New Evidence from the Economic Transition in Poland, *Review of Economics and Statistics*, 84(3), pp. 324-341.

Kraus, M. (2004) Social security strategies and redistributive effects in European social transfer systems, *Review of Income and Wealth*, Series 50, pp. 431-457

Kordos, J., B. Lednicki and M. Zyra, (2002). 'The household sample surveys in Poland', *Statistics in Transition*, nr. 5, pp. 555-589.

Lerman, R. I. and S. Yitzhaki, (1985), Income Inequality Effects by Income Source: A New Approach and Application to the U. S., *Review of Economics and Statistics*, vol. 67, pp. 151-156.

Lopez-Feldman, A. (2006), Decomposing inequality and obtaining marginal effects, *The Stata Journal*, vol. 6, 106-111.

Milanovic, B. (2000), Social Transfers and Social Assistance: An Empirical Analysis Using Latvian Household Survey Data, *The World Bank Working Paper*.

Ravallion, M. and S. Chen (2003), Measuring pro-poor growth, *Economics Letters* 78, pp. 93-99.

Szulc, A. (2006), Poverty in Poland during the 1990s: are the results robust?", *Review of Income and Wealth*, Series 52, pp. 423-448.

Szulc, A. (2008), Checking the consistency of poverty in Poland: 1997 – 2005 evidence, *The Post-Communist Economies*, vol. 20, pp. 33-55.

van de Walle, D. (2002), The Static and Dynamic Incidence of Vietnam's Public Safety Net, Policy Research Working Paper 2791, The World Bank.

The World Bank (2004), *Growth, Employment and Living Standards in Pre-Accession Poland*, Poverty Reduction and Economic Management Unit, Europe and Central Asia Region, Report No. 28233-POL.

APPENDIX

Variables description for Tables A1 – A4

hh_size – household size
hh_size2 – household size squared
kids – number of children below 16
fem_head – dummy for female head
household head education:
- edu1 – university degree
- edu2 - secondary
- edu3 – vocational

type of residence:
- res1 – large cities
- res2 – medium cities
- res3 – small cities

dummies for main source of household income:
- employee - employmnent
- farmer - agriculture
- self_emp – self-employment
- retired – retirement pension
- inv_pens – invalidity pension
- blue_coll – employment, blue collar
- cptl_inc – capital income

unemp – at least one unemployed in household
other_sc – dummy for receiving unemployment or family benefits
invalid – at least one handicaped person in household, inv_pens = 0
age – househld head age
age2 – househld head age squared

Tab. A2 and A3:

povsubL: self-assesment of household income ‘bad’ or ‘rather bad’

Tab A4

cred – sum of credit purchases
sale –sale of households assets to pay current expenses

Tab. A1 Probit estimation, dependent variable: receiving the social assistance, 2005

```
Probit regression                                 Number of obs   =      34327
                                                  Wald chi2(22)   =    2819.90
                                                  Prob > chi2     =     0.0000
Log pseudolikelihood = -8879.7352                 Pseudo R2       =     0.2309

------------------------------------------------------------------------------
             |               Robust
      assist |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     hh_size |   .0521498   .0353982     1.47   0.141    -.0172294    .1215291
    hh_size2 |  -.0008539   .0035458    -0.24   0.810    -.0078036    .0060959
        kids |   1.664564   .0775566    21.46   0.000     1.512556    1.816572
    fem_head |   .1823818   .0271926     6.71   0.000     .1290854    .2356783
        edu1 |  -.8472366    .066974   -12.65   0.000    -.9785033     -.71597
        edu2 |  -.4544375   .0399606   -11.37   0.000    -.5327588   -.3761163
        edu3 |  -.1905909   .0356783    -5.34   0.000    -.2605191   -.1206627
        res1 |   .4545129   .0378999    11.99   0.000     .3802305    .5287953
        res2 |   .4966448   .0333222    14.90   0.000     .4313344    .5619551
        res3 |   .4597236   .0411441    11.17   0.000     .3790826    .5403645
    employee |   -.890001   .0550382   -16.17   0.000     -.997874    -.782128
      farmer |  -1.035369   .0784993   -13.19   0.000    -1.189224   -.8815129
    self_emp |  -1.045136   .0697788   -14.98   0.000      -1.1819    -.908372
     retired |  -.7948173   .0567375   -14.01   0.000    -.9060208   -.6836137
    inv_pens |  -.1825002   .0546191    -3.34   0.001    -.2895516   -.0754487
   blue_coll |   .2905383   .0444091     6.54   0.000     .2034981    .3775784
    cptl_inc |  -.9653805   .3181241    -3.03   0.002    -1.588892   -.3418688
       unemp |   .3748733   .0214577    17.47   0.000      .332817    .4169296
    other_sc |  -.1830008   .0490282    -3.73   0.000    -.2790943   -.0869072
     invalid |   .2428228   .0329825     7.36   0.000     .1781783    .3074672
         age |    .042928   .0060818     7.06   0.000      .031008    .0548481
        age2 |  -.0004584   .0000629    -7.29   0.000    -.0005816   -.0003351
       _cons |  -2.490825   .1585735   -15.71   0.000    -2.801623   -2.180027
------------------------------------------------------------------------------
```

Tab. A2 Probit estimation with Heckman correction, dependent variable: exclusion error, extreme poverty line, income, 2005

```
Probit model with sample selection              Number of obs      =     34327
                                                Censored obs       =     31668
                                                Uncensored obs     =      2659

                                                Wald chi2(22)      =    142.92
Log pseudolikelihood = -30355.57                Prob > chi2        =    0.0000

------------------------------------------------------------------------------
             |               Robust
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     hh_size |  -.0497625   .0598495    -0.83   0.406    -.1670654    .0675405
    hh_size2 |   .0031689   .0048201     0.66   0.511    -.0062784    .0126161
        kids |  -.6447288   .2188344    -2.95   0.003    -1.073636   -.2158212
    fem_head |  -.0353076   .0657456    -0.54   0.591    -.1641667    .0935514
        edu1 |   .6889086   .3498954     1.97   0.049     .0031263    1.374691
        edu2 |   .2762147   .0958758     2.88   0.004     .0883016    .4641277
        edu3 |   .1952252   .0695548     2.81   0.005     .0589004    .3315501
        res1 |  -.4749322   .1083141    -4.38   0.000    -.6872239   -.2626405
        res2 |  -.4940073    .079861    -6.19   0.000     -.650532   -.3374826
        res3 |  -.3543415   .0922785    -3.84   0.000    -.5352041   -.1734789
    employee |   .6046837   .1804802     3.35   0.001     .2509491    .9584183
      farmer |   .8616699   .1398393     6.16   0.000     .5875899     1.13575
    self_emp |   .6218848   .1633552     3.81   0.000     .3017145     .942055
     retired |   .4685119   .1516505     3.09   0.002     .1712824    .7657414
    inv_pens |   .2012603   .1058716     1.90   0.057    -.0062443    .4087648
   blue_coll |  -.2760533   .1679496    -1.64   0.100    -.6052284    .0531219
    cptl_inc |   .1123175   .5117884     0.22   0.826    -.8907693    1.115404
       unemp |   .0202145   .0560718     0.36   0.718    -.0896843    .1301133
    other_sc |   .1386528    .103615     1.34   0.181    -.0644288    .3417344
     invalid |  -.1545581   .0829925    -1.86   0.063    -.3172204    .0081042
         age |  -.0739336   .0174455    -4.24   0.000    -.1081262    -.039741
        age2 |   .0008132   .0001948     4.17   0.000     .0004313    .0011951
       _cons |   1.616385   .4857377     3.33   0.001     .6643569    2.568414
-------------+----------------------------------------------------------------
povincL      |
     povsubL |   .7995265   .0308647    25.90   0.000     .7390327    .8600202
    fem_head |  -.0857632   .0273118    -3.14   0.002    -.1392934    -.032233
        kids |   1.269115   .0547766    23.17   0.000     1.161755    1.376475
       unemp |   .5142062   .0196527    26.16   0.000     .4756877    .5527247
        edu3 |   .2398628    .027296     8.79   0.000     .1863636    .2933619
        res3 |  -.0504088   .0382897    -1.32   0.188    -.1254553    .0246377
   blue_coll |  -.1084661   .0291384    -3.72   0.000    -.1655764   -.0513559
       _cons |  -2.019159   .0256721   -78.65   0.000    -2.069476   -1.968843
-------------+----------------------------------------------------------------
     /athrho |   .5176843   .1086299     4.77   0.000     .3047737     .730595
-------------+----------------------------------------------------------------
         rho |   .4759108   .0840262                      .2956751    .6234292
------------------------------------------------------------------------------
Wald test of indep. eqns. (rho = 0): chi2(1) =    22.71   Prob > chi2 = 0.0000
------------------------------------------------------------------------------
```

Tab. A3 Probit estimation with Heckman correction, dependent variable: exclusion error, extreme poverty line, income & expenditure, 2005

```
Probit model with sample selection              Number of obs      =     34327
                                                Censored obs       =     32673
                                                Uncensored obs     =      1654

                                                Wald chi2(22)      =    101.61
Log pseudolikelihood = -21458.04                Prob > chi2        =    0.0000

------------------------------------------------------------------------------
             |               Robust
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     hh_size |  -.0605914   .0742286    -0.82   0.414    -.2060767    .0848939
    hh_size2 |   .0038922   .0058103     0.67   0.503    -.0074958    .0152801
        kids |  -.7184851   .2615377    -2.75   0.006    -1.231089   -.2058807
    fem_head |   .0500884   .0824481     0.61   0.544     -.111507    .2116838
        edu1 |   .5713639   .5662358     1.01   0.313     -.538438    1.681166
        edu2 |    .205293   .1262014     1.63   0.104    -.0420572    .4526432
        edu3 |    .143627   .0834772     1.72   0.085    -.0199854    .3072394
        res1 |  -.4786023   .1389295    -3.44   0.001    -.7508991   -.2063054
        res2 |  -.5136778   .0975909    -5.26   0.000    -.7049525   -.3224032
        res3 |  -.3306626   .1158985    -2.85   0.004    -.5578196   -.1035057
    employee |   .6315902   .2760742     2.29   0.022     .0904947    1.172686
      farmer |   .8454636   .1767123     4.78   0.000     .4991138    1.191813
    self_emp |   .5107978   .1969737     2.59   0.010     .1247363    .8968592
     retired |   .7143076   .2016927     3.54   0.000     .3189973    1.109618
    inv_pens |   .3014006     .13062     2.31   0.021     .0453902     .557411
   blue_coll |   -.147435   .2644802    -0.56   0.577    -.6658067    .3709367
    cptl_inc |  -.4467405   .7778587    -0.57   0.566    -1.971316    1.077835
       unemp |  -.0123301   .0655275    -0.19   0.851    -.1407616    .1161014
    other_sc |   .1585815   .1254175     1.26   0.206    -.0872323    .4043953
     invalid |  -.2050543   .1048351    -1.96   0.050    -.4105274    .0004188
         age |  -.0823236   .0221782    -3.71   0.000    -.1257921   -.0388552
        age2 |   .0009052   .0002485     3.64   0.000     .0004181    .0013923
       _cons |   1.880023   .6029098     3.12   0.002     .6983416    3.061705
-------------+----------------------------------------------------------------
povexinL     |
     povsubL |   .8769252   .0349593    25.08   0.000     .8084062    .9454442
    fem_head |  -.0550677   .0329309    -1.67   0.094    -.1196111    .0094757
        kids |   1.342858   .0659951    20.35   0.000      1.21351    1.472206
       unemp |   .5444043   .0218242    24.94   0.000     .5016296    .5871789
        edu3 |   .1855011    .032806     5.65   0.000     .1212026    .2497997
        res3 |   -.014451   .0456749    -0.32   0.752    -.1039722    .0750702
   blue_coll |  -.0023203   .0341703    -0.07   0.946    -.0692928    .0646522
       _cons |   -2.40225   .0325011   -73.91   0.000    -2.465951   -2.338549
-------------+----------------------------------------------------------------
     /athrho |   .3628408   .1153482     3.15   0.002     .1367625    .5889192
-------------+----------------------------------------------------------------
         rho |   .3477138   .1014021                      .1359161    .5291178
------------------------------------------------------------------------------
Wald test of indep. eqns. (rho = 0): chi2(1) =     9.89   Prob > chi2 = 0.0017
------------------------------------------------------------------------------
```

Tab. A4 LSQ model, dependent variable: change in consumption, 2000-2001

Δconsump	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
Δassist	**.4767793**	**.1293673**	**3.685**	**0.000**	**.222748**	**.7308106**
assist	.5349835	.1491293	3.587	0.000	.2421468	.8278201
cons	-.7069841	.0679622	-10.403	0.000	-.8404375	-.5735306
self-inc	.6178883	.2072092	2.982	0.003	.2110034	1.024773
Δself-inc	.282787	.144032	1.963	0.050	-.0000404	.5656143
labor-inc	.4651926	.0817716	5.689	0.000	.3046224	.6257628
Δlab-inc	.4965554	.062793	7.908	0.000	.3732524	.6198585
oth_soc_inc	.3721288	.2609065	1.426	0.154	-.1401985	.884456
Δot_soc_in	.3862673	.1422509	2.715	0.007	.1069374	.6655972
Δpriv_tran	.4680595	.1395723	3.354	0.001	.1939893	.7421297
priv_tran	.3941464	.12464	3.162	0.002	.1493979	.6388949
Δkids	-41.71708	70.38859	-0.593	0.554	-179.9351	96.50099
hh_size	126.177	43.73216	2.885	0.004	40.30264	212.0514
hh_size^2	-6.548587	3.664097	-1.787	0.074	-13.74357	.6463919
Δhh_size	162.8926	59.50572	2.737	0.006	46.04457	279.7405
emploee	-23.76956	105.695	-0.225	0.822	-231.3169	183.7777
farempl	-43.65834	170.0863	-0.257	0.798	-377.6471	290.3304
farmer	324.5796	163.9242	1.980	0.048	2.690977	646.4682
self-emp	-210.6377	335.0869	-0.629	0.530	-868.6287	447.3534
retiree	452.4483	110.7039	4.087	0.000	235.0654	669.8311
invalid	241.7517	64.91444	3.724	0.000	114.283	369.2205
blue_coll	27.66892	87.9381	0.315	0.753	-145.0101	200.348
one_parent	22.86725	63.61595	0.359	0.719	-102.0518	147.7863
Δunempl	22.21907	6.015139	3.694	0.000	10.40749	34.03066
Δinvalid	60.97321	90.15169	0.676	0.499	-116.0525	237.9989
Δnoincome	23.29307	19.58396	1.189	0.235	-15.16284	61.74897
age	8.225962	9.871676	0.833	0.405	-11.15849	27.61041
age^2	-.0772293	.097571	-0.792	0.429	-.2688238	.1143653
no. pens	227.5645	82.20996	2.768	0.006	66.13352	388.9955
Δcred	.2982954	.2152585	1.386	0.166	-.1243955	.7209862
cred0	.2081282	.2362703	0.881	0.379	-.2558224	.6720787
sale0	2.316624	.9895863	2.341	0.020	.37343	4.259818
Δsale	.882712	.4794232	1.841	0.066	-.0587041	1.824128
_cons	-155.0313	298.1734	-0.520	0.603	-740.5374	430.4749

Note: 'Δvar' stands for a change, other variables: value at the base period