Distributional Change, Reference Groups and the Measurement of Relative Deprivation

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Abstract

In economics, measures of relative deprivation have traditionally focused on measuring endowments and rank within one dimension (income) and one reference group (population). More recently, contributions across the social sciences stressed the importance of context specific goods and reference groups in determining expectations and feelings of deprivation. The paper expands on recent contributions to propose a measure of relative deprivation that allows for the selection of the reference group and is additively decomposable into structural mobility (redistribution) and exchange mobility (re-ranking). An illustration of the index based on data from Moldova shows how the index may be better suited than conventional measures to treat problems such as relative deprivation across genders or to trace real changes of subjective deprivation over time.

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> "I have become increasingly convinced that relative deprivation actually has little to do with envy. Rather, it is fundamentally about the link between context and evaluation."
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> Robert H. Frank, From the Preface to *Falling Behind. How Rising Inequality Harms the Middle Class,* University of California Press, 2007.

I) Introduction:

In *The Wealth of Nations* Adam Smith (1776) wrote that "By necessaries I understand not only the commodities which are indispensably necessary for the support of life, but whatever the custom of the country renders it indecent for creditable people, even of the lowest order, to be without". More recently Robert Frank (2007) writes that "Evidence suggests that, relative to the mix of goods that would maximize our health and happiness, we spend too much on context-sensitive goods and too little on goods that are relatively insensitive to context".

In emphasizing context rather than envy Frank stresses in fact the importance of the concept of "reference group". He thus writes that "…a house of a given size is more likely to be viewed as spacious the larger it is relative to other houses in the same local environment" (Frank, 2007). Marx (1847) himself wrote that "A house may be large or small; as long as the neighboring houses are likewise small, it satisfies all social requirement for a residence. But let there arise next to the little house a palace, and the little house shrinks to a hut. The little house now makes it clear that its inmate has no social position at all to maintain, or but a very insignificant one; and however high it may shoot up in the course of civilization, if the neighboring palace rises in equal of even in greater measure, the occupant of the relatively little house will always find himself more uncomfortable, more dissatisfied, more cramped within his four walls". This point was also stressed by Runciman (1966) who structured in a theory of social justice an idea initially put forward by Stouffer et al. (1949). Thus Runciman (1966) wrote that "The questions to ask are first, to what group is a comparison being made? Second, what is the allegedly less well-placed group to which the person feels that he belongs?". In the latter quotation Runciman clearly

does not limit the concept of relative deprivation to that of "context" since he considers that an individual sees himself as belonging to a group but also as making a comparison with the situation of some other group(s). Economists (e.g. Yitzhaki, 1979, Hey and Lambert, 1980) seem however to have translated Runciman's ideas in a rather narrow way which amounts more or less to identify relative deprivation with envy (with respect to individuals with a higher income) although sometimes (see, Berrebi and Silber, 1985) both the feeling of deprivation with respect to those with a higher income and that of satisfaction with respect to those with a lower income are taken into account. Also Bossert and D'Ambrosio (2006) noted that the reference group considered by Yitzhaki (1979) can be seen as a subset of a larger reference group that includes all individuals: "The reference group includes all agents the individual compares itself to in general (and, thus, not only when considering matters of deprivation), whereas the comparison group is the subset of this set containing those who are richer." Whatever the specific way in which relative deprivation is measured (on this topic see also, Kakwani, 1984) economists clearly did not devote much attention to the concept of "reference group".

The purpose of this paper is precisely to explicitly integrate the idea of reference group when measuring relative deprivation, following recent attempts to integrate in the notion of reference group other dimensions in addition to welfare (Clark and Oswald 1996, Verme and Izem, 2008). We will assume that in assessing her situation in society an individual compares himself with individuals whose environment can be considered as being similar to hers. By environment we mean not only what Frank (2007) called "local environment" in one of the quotations given previously but also other aspects such as the "professional environment" of an individual or his "family environment" (background). As stressed by Schaefer (2008) "relative deprivation is the conscious experience of a negative discrepancy between legitimate expectations and present actualities". We believe that a good proxy for these "legitimate expectations", that is, for the reference group of an individual, is the set of people with a similar set of observable characteristics such as human capital, household attributes and location. We therefore propose to measure relative deprivation by comparing the actual income of an individual with the one he could have expected on the basis of the level of these characteristics. Ferrer-i-Carbonell (2005) took somehow a similar approach when she defined an individual's reference group as all the individuals who belong to the same age group, have similar education and live in the same region. We

however aggregate these individual comparisons by computing an index of "distributional change" that compares, on a non-anonymous basis, the distributions of the actual and "expected" incomes. At the difference of other approaches to relative deprivation our measures takes into account not only the difference between the actual and "expected" individual incomes but also that between the actual and "expected" individual ranks. We applied our approach to Moldova, the poorest country in Europe, using a survey which covered a period of six years (from 2000 to 2005). We then observed that our measure of deprivation, when compared to other possible measures of deprivation, had a higher correlation with the answers given by individuals in the survey we used to a question on their assessment of their housing living conditions (a higher number corresponding to a worse subjective situation). It should be interesting to note that if relative deprivation is indeed a function of the gap between actual and "expected" individual incomes, the latter being somehow formed "in relation to standards for allocating rewards" (Shepelak and Alwin, 1986), we may be led to accept Berger et al.'s (1972) statement according to which "as a consequence of beliefs about what is typically the case, expectations…come to be formed about what one can legitimately claim ought to be the case". A similar idea was indeed formulated earlier by Heider (1958) who argued that "tradition represents the existing reality made solid by a long history in which it becomes identified with the just, the ethical the 'should be'…and the 'is' takes on the character of the 'ought' ". Such a view certainly goes in the direction of our findings that stress that it is not the existing income inequality that matters for relative deprivation feelings but the comparison of actual with "expected" incomes.

The paper is organized as follows. Section II defines our new measure of relative deprivation. Section III gives an empirical illustration based on data for Moldova while section IV offers concluding comments.

II) A New Approach to Measuring Relative Deprivation:

Assume y_i is the income of individual i, X_i a vector of her personal characteristics. We may then write that

$$y_i = \alpha + \beta X_i + \varepsilon_i \qquad (1)$$

where ε_i includes the effect of unobserved factors on the income of individual i as well as the impact of measurement errors.

Let us now define the "predicted" or "expected" income y_{Pi} of individual i as

$$y_{Pi} = \hat{\alpha} + \hat{\beta} X_i \qquad (2)$$

where $\hat{\alpha}$ and $\hat{\beta}$ are estimates of α and β.

Call now s_i and v_i the shares of individual i in the total actual and expected income of the society. However given that $E(\varepsilon_i) = 0$, the average incomes $\bar{y}_i$ and $\bar{y}_{Pi}$ are identical and hence so are the total values of the actual and expected incomes. Using an algorithm originally proposed by Silber (1989), we may compute the Gini indices $I_{G,\{y_i\}}$ and $I_{G,\{y_{Pi}\}}$ of the sets of incomes $\{y_i\}$ and $\{y_{Pi}\}$ as

$$I_{G,\{y_i\}} = [...(1/n)...]' G [...(s_i)...] \qquad (3)$$

$$I_{G,\{y_{Pi}\}} = [...(1/n)...]' G [...(v_i)...] \qquad (4)$$

where $[...(1/n)...]'$ is a row vector of "population shares" whose elements are all equal to $(1/n)$, the share of each individual in the whole population, and $[...(s_i)...]$ and $[...(v_i)...]$ are respectively column vectors whose typical elements are respectively the shares of individual i in the total amount of actual and expected incomes.

Finally the term G in (3) and (4), called G-matrix by Silber (1989), is a n by n square matrix whose typical element g_{hk} is equal to 0 if $h = k$, to -1 if $h \succ k$ and to +1 if $h \prec k$.

Note that in (3) and (4) the shares s_i and v_i have to be ranked by decreasing values (decreasing incomes).

Call now w_i the share in the total amount of expected incomes that individual i would have obtained, had his rank in the distribution of the "expected" incomes ($\{y_{Pi}\}$) been the same as his rank in the distribution of the actual incomes ($\{y_i\}$).

Following earlier work by Cowell (1985) on the concept of distributional change, Silber (1994) suggested then to measure the degree of "distributional change"[1] between the distributions $\{y_i\}$ and $\{y_{Pi}\}$ as

$$J_{GP} = \{[...(1/n)...]'G[...(s_i)...]\} - \{[...(1/n)...]'G[...(w_i)...]\} \qquad (5)$$

The subindices G and P in J_{GP} indicate that this index first is derived from the Gini index, second that it is "population-weighted" since each individual receives the same weight $(1/n)$.

Given the linearity of the G-matrix operator, Silber (1994) then showed that (5) could be also expressed as

$$\begin{aligned} J_{GP} = & \{\{[...(1/n)...]'G[...(s_i)...]\} - \{[...(1/n)...]'G[...(v_i)...]\}\} \\ & + \{\{[...(1/n)...]'G[...(v_i)...]\} - \{[...(1/n)...]'G[...(w_i)...]\}\} \end{aligned} \qquad (6)$$

Expression (6) indicates clearly that the index J_{GP} is an index measuring somehow the degree of income mobility of the individuals between their actual situation in the distribution $\{y_i\}$ and their hypothetical situation in the distribution $\{y_{Pi}\}$. More precisely J_{GP} includes two components. The first one is called "structural mobility" (the first expression on the R.H.S. of (6)) and it measures the difference between the inequality (Gini index) of the distribution of the actual incomes ($\{y_i\}$) and that of the "predicted" incomes ($\{y_{Pi}\}$).[2] The second component called "exchange mobility" (the second term on the R.H.S. of (6)) measures the amount of "re-ranking" that takes place when one compares the position of the individuals in the distribution of the actual and predicted incomes (for more details on these two concepts of income mobility, see, Fields and Ok, 1999)[3].

[1] When the two distributions to be compared are income distributions at two different time periods, "distributional change" is in fact another name for "income mobility".

[2] Note that the structural mobility component is equivalent to the index proposed by Verme and Izem (2008) divided by mean income.

[3] We could have also used an alternative breakdown where the first term would have been the re-ranking component comparing the actual ranking in the distribution $\{y_i\}$ with that the individual would have had in the distribution $\{y_i\}$ had he kept his ranking in the distribution $\{y_{Pi}\}$. A Shapley

Silber (1994) defined also what he called an "income-weighted" measure of distributional change expressed as:

$$J_{GI} = [...(s_i)...]'G[...(w_i)...] \qquad (7)$$

the shares s_i and w_i in (7) being ranked this time by decreasing values of the ratios (w_i / s_i).

As indicated by Silber (1994) a graphical interpretation of the index J_{GI} may be obtained by plotting the cumulative values of the shares s_i and w_i, respectively on the horizontal and vertical axes. Here in plotting these cumulative values one has to rank the individuals by increasing, rather than decreasing, values of the ratios (w_i / s_i). The graph obtained is in fact what Kakwani (1980) has called a relative concentration curve, whose slope, like that of a Lorenz curve, is non decreasing. Note that it is easy to prove that the index J_{GI} is in fact equal to twice the area lying between this relative concentration curve and the diagonal.

The J_{gp} index can be interpreted as a measure of the distributional change observed when comparing the actual income of the individuals with that predicted on the basis of their personal characteristics. This distributional change is a function first of the difference between the inequality based on the actual incomes and that computed on the basis of the predicted incomes, second of the difference between the ranking of the individuals according to their actual income and that derived from their predicted income. However, as the explanatory power of the regression for the predicted values increases two effects are at work. On the one hand, the Gini index of the incomes y_i will get closer to that of the predicted incomes y_{Pi} and this will reduce J_{GP}. On the other hand, the correlation between the incomes y_i and y_{Pi} will also increase and with it the correlation between the rank of y_i and that of y_{Pi}, thus reducing the re-ranking effect, and hence the second component of J_{GP} on the R.H.S. of (6). It can be shown (see, Silber, 1995) that the distributional change index J_{GP} will be greater the greater the number of income swaps (leading to re-ranking) between individuals and

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type decomposition procedure (see, Shorrocks, 1999, and Sastre and Trannoy, 2002, for more details on this procedure) would take into account the two possible breakdowns.

the impact of an income swap on J_{GP} will be greater, the greater the difference between the swapped incomes as well as between the ranks of the individuals who swap their income (this is the exchange mobility component of J_{GP}). Similarly the index J_{GP} increases with the number of transfers having taken place between a richer and a poorer individual (assuming no re-ranking) and the impact of such a transfer will be greater, the greater the amount transferred (this is the structural mobility component of J_{GP})

III) An Empirical Illustration:

Data sources

To illustrate the indexes proposed we use the Moldova Household Budget Survey (MHBS). Moldova stands out in Europe as the country that experienced the deepest recession of the post-war period with a combined loss in output of over 60% between 1990 and 1996. The recession has also been accompanied by a rapid growth in poverty and inequality. The World Bank (2004) estimated that in 1999 about 71% of the population was below the poverty line while the Gini coefficient rose from an estimated figure of 0.24 in 1988 to 0.37 in 1997 (World Bank, 1999). Not surprisingly, if one takes the World Values Surveys database that covers the period 1981-2004[4] and estimates average life satisfaction by country and year, one will find that the lowest life satisfaction scores ever recorded by the surveys worldwide were those of Moldova in 1996.

Since 2000, Moldova has reversed its fortunes and enjoyed sustained output growth estimated at around 7% per year on average. This has contributed to reduce poverty to a headcount ratio below 30% of the population by 2004 while inequality continued to remain relatively high with a Gini coefficient pivoting around a value of 0.35. Such epochal swings in output, poverty and inequality are expected to be reflected in significant changes in the subjective evaluation of living conditions and make of Moldova a unique case for the study of relative deprivation.

[4] Wired at http://www.jdsurvey.net

The MHBS is administered by the National Bureau of Statistics (NBS) of the Republic of Moldova. The survey initiated in 1997, it is the product of a joint effort of the Moldovan NBS and the World Bank, it has been revised and improved on several occasions and today is considered as one of the most comprehensive and reliable surveys available for transitional economies. Out of a population of 3.6 m. people, the MHBS covers 6,000 households every year interviewed in monthly blocks of 500 households each. The sample is a rotating sample and includes a panel component of about 25% of households with a tenure per household of four years. The questionnaire is very rich and comparable to the World Bank Living Standards Measurement Surveys (LSMS). It also includes questions on subjective estimations of living conditions that can be used to assess the performance of the relative deprivation indexes proposed.

A simple example

As a first illustration of the indexes proposed, we restrict the sample to male heads of households, aged 25 to 55 in 2006 (2,248 observations) and focus on one indicator of welfare, household per capita consumption (y_i). Predicted values (y_{Pi}) are estimated with an OLS regression based on a set of regressors that we thought define well the reference group. These are age (years), education level (dummies for each level[5]), marital status (dummies for each category[6]), social group (dummies for each category[7]), district (dummies for each district) and urban and rural areas (dummy for urban areas). By selecting these variables, we are implicitly assuming that individuals select the reference group based on the characteristics described by the listed variables and they are able to observe all and only these characteristics. This is evidently a normative choice made by the researcher and based on the knowledge of the local population.

Table 1 reports the estimations of the two indexes together with their components, including structural and exchange mobility. Bootstrap standard errors and confidence

[5] Categories include: 1) Higher education; 2) Technical colleges; 3) Completed secondary; 4) Incomplete secondary; 5) Primary; 6) No primary; 7) Illiterate. The classification changed slightly in 2005 and 2006. The classification above was reconstructed using homogeneous categories.

[6] Categories include: 1) Never married; 2) Married; 3) Widow; 4) Divorced or separated. The classification changed in 2004 and the classification above takes changes into account.

[7] Categories include: 1) Farmers; 2) Hired workers in agriculture; 3) Hired workers in non-agriculture; 4) Self-employed; 5) Pensioners; 6) Others.

intervals are also reported.[8] Relative deprivation for male heads of household in 2006 is estimated at around 23%. The greatest part is explained by structural mobility contributing for about 59% of the index while re-ranking (exchange mobility) contributes for the remaining part. Both components are evidently important in determining relative deprivation. The Silber (1994) income weighted measure of distributional change (J_{GI}) provides a higher estimate of relative deprivation for the same group of people.

[8] The question of estimation of the standard error for the Gini index has received considerable attention in recent years and several methods have been proposed. One possibility is to use the 'Delta' method based on the central limit theorem. This is used for example by the statistical package DAD (see Duclos and Araar 2006 for a description of possible applications to distributional indexes) and could potentially be extended to the first of our two indexes but it is unclear how it could be used for the second index. A second method is the one proposed by Giles (2004) who shows that the standard deviation of the Gini can be obtained by simply estimating the weighted least squares regression of $i = \theta + v_i$ where *i*=rank and $\theta = \sum_{i=1}^{n} iy_i / \sum_{i=1}^{n} y_i$ (the Gini index stripped of its constants). This method cannot be applied to our indexes because the weighted least square regression implies taking the square root of the unit values which in our case can be negative. A third possibility is to use bootstrap or jackknife estimations. These are simple to estimate and most statistical packages dispose of ready-made routines but they are computationally heavy. Very recently, Davidson (2008) reviewed the various methodologies and proposed an alternative method. This last paper also finds the bootstrap method to be a rather efficient estimator as compared to other methods.
Based on the findings of this recent literature and on a small test we opted to use a bootstrap method. Using our sample, we tested bootstrapping on the Gini index comparing the outcome of this method with the one of the Delta method in-built in the Stata DASP package prepared by Duclos and Araar (2006). We found bootstrapping to reach a very close approximation of the standard deviation derived from the delta method after only 50 replications and we finally decided to settle for this method. Naturally, this result applies to our sample, which is quite large. The estimation of the standard error of the indexes proposed for small samples should be reconsidered in the light of the discussion offered by Davidson (2008).

Table 1 – Relative Deprivation Indexes and their Components

		Index	Bootstrap Std. Err.	z	Normal based [95% Conf.	Interval]
GY	Gini y	0.3537	0.0064	54.9	0.3410	0.3663
GYP	Gini yp (predicted y)	0.2183	0.0035	62.4	0.2114	0.2252
GW	Gini w (Gini yp with yp sorted by y)	0.1240	0.0049	25.4	0.1145	0.1336
FGP	Structural mobility (GY-GYP)	0.1354	0.0066	20.5	0.1224	0.1483
PERM	Exchange mobility (GYP-GW)	0.0943	0.0032	29.1	0.0879	0.1006
JGP	**Distributional Change (FGP+PERM)**	0.2296	0.0069	33.2	0.2161	0.2432
JGI	**Distributional Change Income weighted**	0.2971	0.0058	50.9	0.2857	0.3086

Source: MHBS 2006. Sample: Men head of household in age 25-55. Welfare measure: Household consumption per capita per month.

The Gini of the incomes y_i - which is the equivalent of the Yitzhaki (1979) measure of relative deprivation (divided by the mean) - provides the highest estimate of relative deprivation. As already discussed, this is due to the construction of the other two indexes. This is illustrated in Table 2 where we test (by removing one regressor at the time) how the J_{GP} and J_{GI} indexes behave as the explanatory power of the regression for the estimation of the predicted values decreases. As anticipated, both indexes converge towards the Gini of the incomes y_i.

Table 2 – Relative Deprivation Indexes with Reduced Equations for the Estimation of the Predicted Values

	R2	JGP	JGI
reg1: "y=age+educat+marital+soc_group+territ+urb_rur"	0.2536	0.2296	0.2971
reg2: "y=age+educat+marital+soc_group+territ"	0.2534	0.2298	0.2972
reg3: "y=age+educat+marital+soc_group"	0.0981	0.2980	0.3284
reg4: "y=age+educat+marital"	0.0749	0.3112	0.3343
reg5: "y=age+educat"	0.0686	0.3136	0.3352
reg6: "y=age"	0.0000	0.3538	0.3537

Source: MHBS 2006. Sample: Men heads of household in age 25-55. Welfare measure (y): Household consumption per capita per month. Age=years; Educat=Dummies for: 1) Higher education; 2) Technical colleges; 3) Completed secondary; 4) Incomplete secondary; 5) Primary; 6) No primary; 7) Illiterate; Marital=Dummies for: 1) Never married; 2) Married; 3) Widow; 4) Divorced or separated; Soc_group=Dummies for: 1) Farmers; 2) Hired workers in agriculture; 3) Hired workers in non-agriculture; 4) Self-employed; 5) Pensioners; 6) Others; Territ=Dummies for administrative districts: Urb_rur=Dummies for urban areas.

Relative deprivation by population subgroup

In this second example, we restrict the sample to men and women in working age (1,737 men and 1,548 women in age 25-55) and we consider as a measure of welfare individual wages. The purpose is to show the application of the indexes to the study of gender bias in terms of wage deprivation.

The introduction of the notion of reference group through the estimation of the predicted values allows the researcher to model empirically alternative assumptions

about the identification of the reference group. For example, we could estimate relative deprivation based on the assumption that both men and women consider as a reference group both genders (joint predictions) and estimate the predicted values with one equation for both genders. Alternatively, we could assume that individuals compare themselves only with their own gender and estimate the predicted values separately for men and women (separate predictions). In table 3, we report the estimations of the J_{GP} and J_{GI} indexes with the respective standard errors, z-scores and confidence interval under the two assumptions described.

According to the population-weighted index (J_{GP}), males are more deprived than females and this is true whether we consider the joint or separate predictions. However, the gender gap (estimated as a ratio between the male and female indexes) is much higher if predictions are made jointly (13.2%) than separately (3.4%). In fact, if estimations are made jointly, the lower and upper bounds of the estimates for men and women are non-overlapping providing a rather strong indication that the gender difference is very significant. Instead the relative deprivation indices of the two genders are not significantly different when separate predictions are made, since the actual value of the index for one of the genders falls within the confidence interval of the index for the other gender.

According to the income-weighted index (J_{gi}), men are also more deprived than women but the difference this time is significant in both cases, that of joint and separate predictions, since the actual value of the index for one of the genders falls always outside the bounds of the confidence interval of the index for the other gender.

What this exercise shows is that making different assumptions about gender selection of the reference group can lead to quite different estimates of relative deprivation. And making difference assumptions about the selection of the reference group is economically justified by the nature of the society under study. For example, it could be more appropriate to assume that in very conservative societies with low levels of female education and labor market participation each gender derives its proper sense of deprivation from the comparison with members of the same gender. On the contrary, in modern societies with equal labor force participation across genders it could be more appropriate to assume that men and women compare themselves with both genders. Ignoring considerations about the self-selection mechanism of the reference group could lead to very bias estimates of relative deprivation.

Table 3 – Relative Deprivation by Gender

	Index	Boostrap Std. Err.	z	Normal based [95% Conf. Interval]		"Deprivation gap" (IndexM/IndexF*100-100)
Jgp						
Males - Joint predictions	0.253	0.006	40.86	0.241	0.265	13.2
Females - Joint predictions	0.223	0.009	25.2	0.206	0.241	
Males - Separate predictions	0.229	0.007	32.28	0.215	0.243	3.4
Females - Separate predictions	0.222	0.007	31.24	0.208	0.236	
Jgi						
Males - Joint predictions	0.325	0.007	48.24	0.311	0.338	5.6
Females - Joint predictions	0.308	0.006	48.75	0.295	0.320	
Males - Separate predictions	0.316	0.006	50.6	0.304	0.329	6.7
Females - Separate predictions	0.296	0.007	39.52	0.282	0.311	

Source: MHBS 2006. Sample: Men and women in age 25-55 with salary>0. Welfare measure=Monthly salary. No. of observations: 1,548 males and 1,737 females.

Relative deprivation over time

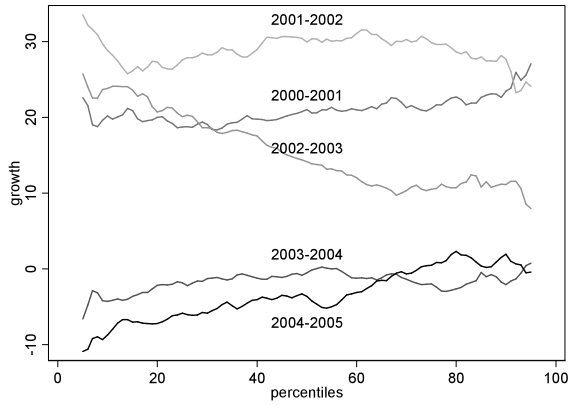
In this section, we look closer at the developments in welfare and inequality in Moldova between 2000 and 2005 and then check how the indexes proposed behave in describing changes in relative deprivation induced by changes in welfare and inequality.

As already described, between 2000 and 2005, Moldova experienced rapid output growth estimated at around 7% per year on average. This growth has clearly translated in improved household living conditions and a sharp reduction in poverty

between 2000 and 2003. However, starting from 2003, poverty reduction has stalled and household mean income has not improved in line with output. This is explained by a combination of pro-rich growth patterns combined with a lack of growth in labor-intensive sectors and by a decrease in public and private transfers as compared to the period 2001-2003.[9]

The growth incidence curves (Ravallion and Chen, 2003)[10] depicted in Figure 1 show well how growth in household consumption turned from positive values across the distribution during the period 2000-2003 to negative and pro-rich values during the period 2003-2005. Between 2000 and 2001, all households have enjoyed strong growth in consumption and this growth has been rather evenly distributed. In this case, we should not expect major changes in inequality although relative positions in welfare and rank within the reference group may have changed leading to a change in relative deprivation. Between 2002 and 2003 the growth incidence curve has turned pro-poor and inequality has declined while relative deprivation may have followed a different path depending on how relative rank and consumption have changed within the reference groups. Moreover, the self-definition of reference group may also be mobile over time causing a further effect on relative deprivation. From 2003 onwards the growth incidence curve becomes pro-rich and growth rates are for the quasi totality of the distribution negative. During this period inequality increases and average household consumption decreases.

Figure 1 - Growth Incidence Curve - Household Expenditure per Capita (2000-2005)



Source: Constructed from MHBS (2000-2005)

[9] For a discussion of welfare trends in Moldova during the period considered see Verme (2008)

[10] The growth incidence curve plots the growth rate in household consumption by quantile with consumption sorted in ascending order.

Consider now table 4 where we report our population weighted measure (J_{GP}), its structural (F_{GP}) and exchange (PERM) mobility components, the income weighted measure (J_{GI}) and the Gini of y_i (G_{y_i}) - which is the Yitzhaki measure divided by the mean of y - for the period 2000-2005.[11] We use the same population group and welfare measure of the first example (men head of household in age 25-55 and household consumption per capita).

In Table 4 we also report average real consumption per capita in real terms and the average response to a question contained in the MHBS on living conditions that asked respondents: "*How do you assess your household living conditions*?". Replies to this question included a one to five scale where one corresponded to "*very good*" and five to "*very bad*". Due to the small number of observations for the answer "very good" we grouped replies into three answers: 1) Good or very good; 2) Satisfactory; 3) Bad or very bad. We then calculated the annual average of this measure and reported it in Table 4 under the heading 'DEPR'. This average can be considered as a measure of average actual deprivation with increasing values depicting increasing deprivation.

As it can be seen from Table 4 and in line with Figure 1, real household consumption per capita increases between 2000 and 2003 very significantly and declines from 2003 onwards. These changes together with the distributional changes observed in Figure 1 are well captured by the Yitzhaki measure of relative deprivation which declines between 2000 and 2003 and increases between 2003 and 2005. However, the actual measure of deprivation (DEPR) follows a very different path. The subjective measure of deprivation with living conditions declines continuously throughout the period, before and after 2003. Moreover, this measure does not seem to follow closely the intensity of changes in real consumption per capita with a rather constant annual reduction of 2-3 percentage points. Clearly, people's judgment of its own living conditions is affected by other factors in addition to changes in real consumption.

With one exception in one year, both the J_{GP} and J_{GI} indexes follow the subjective deprivation measure (DEPR) better than the Yitzhaki index and this seems to indicate that using only a measure of welfare when measuring deprivation may lead to very biased estimates of the subjective deprivation felt by individuals.

[11] Standard errors and confidence intervals for all measures are reported in Annex 1.

IV) Concluding Comments:

This paper proposed a new approach to the measurement of relative deprivation. It suggested to link the extent of individual relative deprivation to the gap existing between individual actual and "expected" incomes, the latter being defined on the basis of basic individual characteristics such as age, education, marital status, the region where one lives, …These gaps between actual and "expected" incomes were then aggregated via a measure of distributional change that takes into account not only differences between actual and expected individual incomes but also differences between actual and expected individual ranks. When we applied this approach to surveys that were conducted in Moldova during the 2000-2005 period, we found that our measure of relative deprivation seemed to be better correlated with the answers given by individuals to a question on their subjective assessment of household living conditions. Such findings may vindicate Wegener's statement (1991) when he wrote that "the deepest disturbance is likely to be experienced by the person who knows that he or she has invested in vain". In his study of relative deprivation and social mobility Wegener (1991) cited in fact Cohen (1986) who argued that justice has to do with comparisons and with the feeling that one is entitled to something. Such a view clearly calls for a link between happiness and the concept of inequality of opportunity rather than between happiness and the inequality of outcomes.

Table 4 – Relative Deprivation over Time

	Real Cons. (Lei*)	DEPR	F_{GP}	PERM	J_{GP}	J_{GI}	G_{y_i}	Number of observations.
2000	165	2.443	0.124	0.116	0.241	0.335	0.392	2531
2001	197	2.367	0.134	0.104	0.237	0.322	0.387	2465
2002	248	2.292	0.153	0.096	0.249	0.311	0.369	2322
2003	286	2.201	0.142	0.100	0.242	0.308	0.355	2273
2004	282	2.181	0.135	0.093	0.228	0.302	0.364	2182
2005	266	2.145	0.136	0.087	0.223	0.307	0.382	2083

2000=100

	Real Cons.	DEPR	F_{GP}	PERM	J_{GP}	J_{GI}	G_{y_i}	Number of observations.
2000	100.0	100.0	51.7	48.3	100.0	100.0	100.0	2531
2001	119.2	96.9	56.3	43.7	98.6	96.3	98.8	2465
2002	150.1	93.8	61.6	38.4	103.3	93.0	94.1	2322
2003	173.3	90.1	58.6	41.4	100.6	92.1	90.5	2273
2004	171.1	89.3	59.3	40.7	94.6	90.1	93.0	2182
2005	161.1	87.8	61.1	38.9	92.7	91.7	97.5	2083

Source: MHBS 2000-2005. Sample: Males head of household in age 25-55. Welfare measure: Household real consumption per capita per month. (*) 'Lei' is the local currency of Moldova.

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Annex 1 – Relative Deprivation Indexes (Table 4)

	Coef.	Bootstr. Std. Err.	z	Normal-based 95% conf.int.	
F_{GP}					
2000	0.124	0.011	11.08	0.102	0.146
2001	0.134	0.007	18.26	0.119	0.148
2002	0.153	0.007	22.94	0.140	0.166
2003	0.142	0.006	22.41	0.129	0.154
2004	0.135	0.007	19.04	0.121	0.149
2005	0.136	0.008	16.59	0.120	0.152
PERM					
2000	0.116	0.004	28.29	0.108	0.124
2001	0.104	0.003	36.83	0.098	0.109
2002	0.096	0.003	29.23	0.089	0.102
2003	0.100	0.004	24.21	0.092	0.108
2004	0.093	0.003	30.33	0.087	0.099
2005	0.087	0.003	29.14	0.081	0.093
J_{GP}					
2000	0.241	0.009	26.34	0.223	0.259
2001	0.237	0.007	32.94	0.223	0.251
2002	0.249	0.007	37.03	0.235	0.262
2003	0.242	0.007	33.31	0.228	0.256
2004	0.228	0.010	23.82	0.209	0.246
2005	0.223	0.009	25.05	0.206	0.241
J_{GI}					
2000	0.335	0.010	33.33	0.315	0.354
2001	0.322	0.008	42.18	0.307	0.337
2002	0.311	0.007	44.46	0.297	0.325
2003	0.308	0.006	47.75	0.296	0.321
2004	0.302	0.007	42.6	0.288	0.315
2005	0.307	0.009	34.3	0.289	0.324
G_{y_i}					
2000	0.392	0.010	38.76	0.372	0.411
2001	0.387	0.007	52.46	0.373	0.402
2002	0.369	0.008	48.69	0.354	0.384
2003	0.355	0.008	45.16	0.339	0.370
2004	0.364	0.008	46.73	0.349	0.380
2005	0.382	0.008	46.11	0.366	0.398