African Development Bank Group

Working paper series

Assessing Absolute and Relative Pro-Poor Growth: An Application to the MENA Region

Sami Bibi, Jean-Yves Duclos and Audrey Verdier-Chouchane

WPS

Working Paper Series

AFRICAN DEVELOPMENT BANK GROUP

Assessing Absolute and Relative Pro-Poor Growth:
An Application to the MENA Region

Sami Bibi, Jean-Yves Duclos and Audrey Verdier-Chouchane[1]

Working Paper No. 111

July 2010

_____

Office of the Chief Economist

Abstract

Sami Bibi, Jean-Yves Duclos and Audrey Verdier-Chouchane

This paper proposes a multidimensional test for a partial ordering over absolute and relative pro-poor judgements. It also investigates whether poverty comparisons can be made over classes of indices that incorporate both absolute and relative poverty standards. Besides being robust to whether pro-poor judgements should be absolute or relative, the partial ordering is also robust to choosing over a class of weights to aggregate the impact of growth on the poor, as well as over ranges of absolute and relative poverty lines. The test is applied to recent distributional changes in nine Middle-Eastern and North-African (MENA) countries that have witnessed different impacts of growth in the last two decades.

1.   Introduction

The assessment of whether distributional changes are "pro-poor" has become increasingly important in the last decade (See *inter alia*, Bourguignon 2003; Dollar and Kraay 2002; Eastwood and Lipton 2001; Ravallion 2001; United Nations 2000; and the World Bank 2002).

Doing this calls for the fixing of the concept of pro-poorness, which is usually related to the idea that the poor get "more" from growth than some predefined benchmark. An important issue is whether this benchmark should be absolute or relative. Another issue is whether pro-poor judgements should use distributional weights that vary across the poor, and where to draw the poverty line (in absolute or in relative terms).

In carrying out such an exercise, caution is needed for several reasons. First, the link between growth and changes in poverty can be sensitive to the choice of poverty lines and poverty indices. For instance, even if the incomes of the poor always increased in line with average growth in the economy, the impact of growth on the headcount ratio (a popular choice among many possible poverty indices) would depend on the income density around the poverty line, and thus on the choice of that poverty line. Other poverty indices will almost always vary quantitatively from the headcount, and they may sometimes also move in a qualitatively opposite direction.

Secondly, the impact of growth on absolute poverty is often different from its impact on relative poverty and relative inequality. Indeed, although positive income growth usually reduces the absolute incomes of the poor, it does not have a systematic effect on their shares in total income. This can have immediate repercussions on whether growth can be unambiguously considered to be pro-poor. The reason is that the two leading views on how to make judgements of pro-poorness differ radically as to whether growth should be expected to change the incomes of the poor by at least some absolute amount — for absolute pro-poor views — or by at least some proportional amount — for relative pro-poor views.

For instance, the absolute pro-poor view will judge as equally pro-poor, the following two changes in an income distribution: 1) The first one shows an increase of $1 in the incomes of everyone; 2) the second one shows an increase of $1 in the incomes of the poor and an increase of $10,000 in the incomes of everyone else. This is because the absolute pro-poor view attaches no weight to the relative impact of growth. Conversely, the relative pro-poor view will judge as equally pro-poor, two changes in an income distribution, a first one in which everyone sees his income fall by 50 percent, and a second one in which everyone sees his income increase by 50 percent. This is because the relative pro-poor view only considers the relative impact of growth.

To assess whether growth is pro-poor, previous literature have often first distinguished between absolute and relative pro-poorness, and then focused on summary pro-poor measures with fixed poverty lines and with separate absolute and relative settings. Recent influential examples include Dollar and Kraay (2002), Kakwani, Khandker, and Son

(2003), Kakwani and Pernia (2000), Klasen (2004), and Ravallion and Chen (2003). See also Araar, Duclos, Audet, and Makdissi (forthcoming) for a review.

This paper follows a different route by investigating how pro-poor judgements can be made robust to the choice of pro-poor evaluation functions and to the choice of poverty lines, in a joint absolute and relative setting. This is in the spirit of Sen's (1981) view that it may not be desirable to choose between the two settings, and that the two may be useful to assess whether development is being pro-poor or not:

> *"Indeed, there is an irreducible core of absolute deprivation in our idea of poverty, which translates reports of starvation, malnutrition and visible hardship into a diagnosis of poverty without having to ascertain first the relative picture. Thus, the approach of relative deprivation supplements rather than supplants the analysis of poverty in terms of absolute dispossession." (Sen 1981, p.17)*

We investigate absolute and relative pro-poorness by considering *classes* of pro-poor evaluation functions that can show varying distribution-sensitivity to the assessment of the impact of growth, be it in an absolute or in a relative setting. This is done in the spirit of the poverty dominance literature, and it also allows for the consideration of the *ranges* of possible poverty frontiers within which to define the sets of the poor, absolutely and relatively.

The rest of the paper runs as follows. Section 2 formalises this paper's assessment of the pro-poorness of growth, using both relative and absolute standards. Section 3 applies the techniques. Section 4 concludes.

2.   Assessing Absolute and Relative Pro-Poorness

We start Section 2.1 by drawing from the structure and the results of Duclos, Sahn, and Younger (2006) on making general poverty comparisons based on multidimensional indicators of welfare. Section 2.2 then describes how this general framework can be adapted to the important special case of comparing absolute and relative poverty using monetary indicators such as income or consumption. Section 2.3 provides a graphical discussion of the results.

2.1   The General Setting

Let a distribution of absolute (a) and relative (r) welfare indicators be given by $F^j(a, r)$ at time j, $j = A, B$. These indicators can themselves be based on any variable (or combinations of variables) of interest, such as consumption, income, wealth, education or health, on which we would like to assess the impact of growth and distributional changes on poverty. Then denote by:

$$\lambda(a,r):\mathfrak{R}^2 \to \mathfrak{R} \left| \frac{\partial \lambda(a,r)}{\partial a} \ge 0, \frac{\partial \lambda(a,r)}{\partial r} \ge 0 \right.$$

$$(1)$$

This is a summary indicator of the overall degree of joint absolute and relative welfare of an individual with *(a, r)*. Note that the derivative conditions in (1) mean that both absolute and relative welfare can each contribute to increasing overall welfare.

We then assume that we wish to compute an aggregate index of overall deprivation based on the joint distribution of *a* and *r*, and that we wish to focus on those with the greatest degree of overall deprivation. This can be done by drawing a frontier to separate those with lower and greater welfare. We can think of this frontier as a series of points at which overall welfare is kept constant. The frontier is assumed to be defined implicitly by a locus of the form *λ(a, r) = 0*. The set of those over whom we want to aggregate overall deprivation is then obtained as:

$$\Lambda(\lambda) = \{(a, r) \,|\, (\lambda(a, r) \le 0\}$$

$$(2)$$

Consider Figure 1 (*see appendix*) with thresholds z_a and z_r in dimensions of indicators *a* and *r*. $\lambda_1(a, r)$ gives an "intersection" view of joint deprivation. It considers one to be totally deprived only if he/she is deprived in *both* of the dimensions *a* and *r*, and if he/she therefore lies within the dashed rectangle of Figure 1. All of those within that dashed rectangle will then be considered deprived according to that view. Since this measure of deprivation will have an important role to play for testing dominance, we will refer to it as an intersection headcount of joint deprivation, defined jointly over absolute and relative welfare as:

$$H^j(z_a, z_r) = \int I(a \le z_a) I(r \le z_r) dF^j(a,r).$$

$$(3)$$

Thus, $H^j(z_a, z_r)$ expresses the number of those who are deprived in both *a* and *r* as a proportion of *j*'s total population.

Other views and frontiers of joint deprivation can also be applied. $\lambda_2(a, r)$ (the L-shaped dotted line in Figure 1) gives a "union" frontier. It considers an individual to be overall deprived if the person is deprived in either of the two dimensions, and if he/she therefore lies below or to the left of the dotted line. Finally, $\lambda_3(a, r)$ provides an intermediate approach. According to that approach, one can be overall deprived even if $r > z_r$, so long as his/her *a* value is sufficiently low to lie to the left of $\lambda_3(a, r) = 0$.

4

We represent indices of overall deprivation by $P^j(\pi, \lambda,)$ for distribution j. We focus on classes of overall deprivation indices that are additive across individuals. An additive deprivation index that combines the two dimensions of welfare can be defined generally as:

$$P^j(\pi,\lambda) = \iint_{\Lambda(\lambda)} \pi(a,r;\lambda)dF^j(a,r), \tag{4}$$

$\pi(a, r; \lambda)$ is the contribution to overall deprivation of an individual with absolute and relative welfare given by a and r.

We will say that the movement from distribution A to distribution B is pro-poor if and only if $P^A(\pi, \lambda) \geq P^B(\pi, \lambda)$. Clearly, whether the change will be deemed pro-poor will depend on the way in which λ, π, a and r are chosen. One of the main objectives of this paper is indeed to show how assessments of pro-poorness can be robust to some of these choices.

Let us for now assume that a choice of indicators a and r has been made. Assume first for simplicity that π in (4) is left differentiable with respect to a and r. Denote by π^a and π^r, the first-order derivatives (which include the effect of a and r on $\lambda(a, r)$) of $\pi(a, r; \lambda(a, r))$ with respect to a and r. Let π^{ar} be the derivative of π^a with respect to r. We can then define the following classes of joint absolute/relative deprivation indices as:

$$\Pi(\lambda^+) = \left\{ P(\pi,\lambda) \left| \begin{array}{l} \Lambda(\lambda) \subset \Lambda(\lambda^+) \\ \pi(a,r;\lambda) = 0, \text{ whenever } \lambda(a,r) = 0 \\ \pi^a(a,r;\lambda) \leq 0 \text{ and } \pi^r(a,r;\lambda) \leq 0, \forall(a,r) \\ \pi^{ar}(a,r;\lambda) \geq 0, \forall(a,r). \end{array} \right. \right\} \tag{5}$$

The first line of (5) says that an index $P(\pi, \lambda)$ in $\Pi(\lambda^+)$ can add up the deprivation of all possible sets $\Lambda(\lambda)$ of deprived individuals so long as they are part of a larger set $\Lambda(\lambda^+)$. The second line of (5) says that those with (a, r) just at the deprivation frontier $\lambda(a, r) = 0$ do not contribute to total deprivation in the population. Said differently, the measure $\pi(a, r; \lambda)$ is continuous in (a, r) at $\lambda(a, r) = 0$. The third line of (5) says that an increase in either a or r decreases deprivation. Finally, the last line of (5) says that an increase in a increases $\pi^r(a, r; \lambda)$. The greater the value of a, the lower the fall in deprivation that is brought about by an increase in r. This also says that the types of deprivation are "substitutes".

Let $\Delta P(\pi, \lambda) = P^B(\pi, \lambda) - P^A(\pi, \lambda)$ and $\Delta H(z_a, z_r) = H^B(z_a, z_r) - H^A(z_a, z_r)$. Using Duclos, Sahn, and Younger (2006), we can show the following equivalence:

Proposition 1 (Joint absolute and relative pro-poor dominance)

$$\Delta P(\pi, \lambda) < 0, \ \forall P(\pi, \lambda) \in \Pi(\lambda^+)$$
$$iff \Delta H(z_a, z_r) < 0, \forall(z_a, z_r) \in \Lambda(\lambda^+) \tag{6}$$

Proposition 1 says that to be able to conclude that joint absolute/relative deprivation is lower in distribution B than in distribution A for all indices in $\Pi(\lambda^+)$, it is necessary and sufficient that the intersection headcount $H(z_a, z_r)$ be lower in B for all of the possible poverty lines (z_a, z_r) in $\Lambda(\lambda^+)$.

2.2   Absolute and Relative Deprivation in the Income Dimension

The result of Proposition 1 shows how to make pro-poor judgements that are robust to specifications of π and λ. This still leaves open the choice of the a and r indicators. The most popular ways to assess absolute and relative welfare and poverty/deprivation are based on the use of income (or consumption). This is also what will be done in the application section below. Denoting income as y, we can therefore express a and r as functions $a^j(y)$ and $r^j(y)$. The superscripts j expresses the possible dependence of these functions on the distribution j, in which the incomes are observed. $a^j(y)$ and $r^j(y)$ therefore stand for the absolute and relative welfare of someone with income y in a distribution j. We then have:

$$P^j(\pi,\lambda) = \int_{\Lambda(\lambda)} \pi(a^j(y), r^j(y); \lambda) dF^j(y).$$

(7)

In pursuing this route, it is useful to ensure that the aggregation procedure described in (7) incorporates both absolute and relative standards of income deprivation. A formal treatment of such standards is provided in Duclos (2009). It is also sometimes argued that a change is good for the poor if it increases the absolute living standards of the poor (see Ravallion and Chen 2003 for instance). This is the main justification for thinking about incorporating concerns for absolute welfare in the pro-poor judgements. It is also sometimes posited that growth should be judged to be pro-poor only if it benefits more, or harms less, the poor than the non-poor (see Kakwani and Pernia 2000 for instance). This is the main motivation for incorporating relative welfare concerns in the pro-poor judgements.

Take the case of absolute welfare, again captured by the function $a^j(y)$. The following axiom serves to specify it.

Axiom 1 $a^j(y)$ incorporates concerns for absolute welfare if and only if

$$\int \pi(a^j(y), r^j(y); \lambda) dF^j(y) = \int \pi(a^i(y), r^j(y); \lambda) dF^j(y)$$ for all possible distributions $F^i(y)$ and $F^j(y)$.

Axiom 1 says that pro-poor judgements should remain invariant to whether we use $a^i(y)$ or $a^j(y)$ to take into account concerns for absolute welfare in assessing $P^j(\pi, \lambda)$. This is an invariance property that essentially forces the function $a^j(y)$ not to depend on j; said differently, we should have that $a(y) = a^j(y)$. Given the general formulation of the function π, we can, without loss of generality, therefore just set $a^j(y) = y$.

Now take the case of relative welfare, which is captured by the function r^j *(y)*. It will generally take into account the distribution of income F^j *(·)* when it comes to assess the relative welfare of someone with *y* in *j*. That will also allow taking into account the change in the distribution of income when assessing by how much the incomes of the poor must change to "catch up" with the change in the overall distribution of income. Let $F^{j,\gamma}$ *(y) =* F^j *(γy)* and $r^{j,\gamma}$ *(y)* be defined relative to the distribution $F^{j,\gamma}$ *(y)*. $F^{j,\gamma}$ *(y)* is thus obtained by scaling (dividing) the distribution of incomes in *j* by *γ*.

Axiom 2 r^j (y) incorporates relative welfare concerns if and only if, for all γ > 0,

$$\int \pi(y, r^j(y); \lambda) dF^j(y) = \int \pi(\gamma y, r^{j,\gamma}(y); \lambda) dF^{j,\gamma}(y)$$ for all possible distributions F^j (y).

Axiom 2 assesses deprivation in two distributions: One with *j*'s incomes, and the other with *j*'s incomes divided by *γ*. If absolute welfare is adjusted to be the same in the two distributions (by multiplying *y* by *γ*), then Axiom 2 says that deprivation should result in similar judgement in the two distributions. In other words, pro-poor judgements should remain invariant to whether we use F^j *(y)* or $F^{j,\gamma}$ *(y)* for aggregating relative welfare. Scaling incomes up or down should not affect relative welfare. This is an invariance property that essentially also forces the function r^j *(y)* to be homogeneous of degree 0 in *y* and in the distribution of incomes F^j *(·)*.

There are many ways for enforcing this homogeneity. One of the simplest ways is to normalise incomes in r^j *(y)* by a summary statistic of the income distribution *j*, which is homogeneous of degree 1 in the income distribution. The mean is an obvious and common candidate to do this in the context of relative poverty comparisons, though other distribution statistics such as the median or the mode could also be applied. This is what we use in this paper's application in Section 3 in accordance with most of the existing literature on assessing relative pro-poorness. Letting the mean of distribution *j* be $\mu^j = \int y dF^j(y)$, this is formally equivalent to imposing the following axiom.

Axiom 3 r^j (y) is defined as mean-normalised relative welfare if and only if, for all γ > 0,

$$\int \pi(y, r^j(y); \lambda) dF^j(y) = \int \pi(\mu^j y, r(y); \lambda) dF^{j,\mu^j}(y)$$ for all possible distributions F^j (y), and where r(y) is independent of the distribution F^j (·).

Given the general formulation of the function *π*, without loss of generality, we can set r^j *(y) =* y/μ^j. Note that this framework is general enough to accommodate negative as well as positive income growth. This leads to joint absolute/relative indices of the form:

$$P^j(\pi, \lambda) = \int_{\Lambda(\lambda)} \pi(y, y/\mu^j; \lambda) dF^j(y)$$

(8)

2.3   Comparing Absolute and Relative Income Deprivation

Using (3), (8) and Proposition 1, we therefore have that $\Delta P\ (\pi,\ \lambda) < 0,\ \forall P(\pi,\lambda) \in \Pi(\lambda^+)$ (where the P are absolute/relative income deprivation indices) if and only if $\Delta H_*\ (z_a,\ z_r) < 0,\ \forall (z_a, z_r) \in \Lambda(\lambda^+)$, where

$$H_*^j(z_a, z_r) = \int I(y \leq z_a) I(y / \mu^j \leq z_r) dF^j(y) \tag{9}$$

The fact that both a and r depend solely on y leads to a simplification of the general testing procedure described in Proposition 1. To see this, consider Figure 2 (*see appendix*). Absolute income is shown on the horizontal axis (y), and relative income is shown on the vertical one (y/μ). The lines $j = A$ and $j = B$ show where incomes lie for the two distributions. The slope of each line is given by $1/\mu^j$. Testing for joint absolute and relative deprivation amounts to comparing the proportion of individuals lying within a rectangle that starts at $(0, 0)$ and that ends at (z_a, z_r).

First assume that mean income has increased in moving from A to B, as is also implicitly assumed in Figure 2. Because individuals are concentrated on the lines A and B, marginal dominance in each dimension can be quite informative of bivariate dominance. Marginal dominance can be checked by comparing $F^{j,1}\ (z_a)$ at different z_a, for checking absolute welfare dominance, and by comparing $F^{j,\mu j}\ (z_r)$ at various z_r for assessing relative welfare dominance. This leads to some interesting relationships (again, for the case in which $\mu^A < \mu^B$).

1. First assume, as in Figure 2, that $F^{B,\mu B}\ (z_r) \leq F^{A,\mu A}\ (z_r)$ for $z_r \in\ ]0, z^0_r]$. This implies that $F^B\ (\mu^B z^0_r) = F^B\ (z^0_a) \geq F^A\ (\mu^A z^0_r)$. $F^B\ (z^0_a)$ in Figure 2 is the proportion of individuals in population B, who are lying on segment *od*. $F^A\ (z^0_a)$ is the proportion of individuals in population A, who are lying on segment *oc*. Also assume that $F^{B,\mu B}\ (z_r) > F^{A,\mu A}\ (z_r)$ for $z_r > z^0_r$. Then, it must be that $F^B\ (z_a) \leq F^A\ (z_a)$ for $z_a \in\ ]0, \mu^A z^0_r]$, where $\mu^A z^0_r = z^0_a$ in Figure 2. It must indeed also be that $\Delta H_*\ (z_a,\ z_r) < 0$ for all $(z_a,\ z_r)$ in $]0,\ \infty[\ \otimes]0,\ z^0_r]$. Therefore, if a distribution B with a higher mean than A relatively dominates A, then it must also be that B dominates A over some $\Pi(\lambda)$, which is the dashed area on Figure 2.

2. Suppose in addition that $F^B\ (z_a) \leq F^A\ (z_a)$ for $z_a \in\ ]0, z^1_a]$, and that $F^B\ (z_a) > F^A\ (z_a)$ for $z_a > z^1_a$. By the above, it must be that $z^0_a \leq z^1_a$. It must then also be that $\Delta H_*\ (z_a,\ z_r) < 0$ for all $(z_a,\ z_r)$ in $]0, z^0_a]\ \otimes]0,\ \infty]$. In this case, $\Lambda(\lambda)$ is the dotted area on Figure 2.

3. Under the above setting, there is also an area between z^0_a and z^1_a, where $\Delta H_*\ (z_a,\ z_r) < 0$. This is the shaded area on Figure 2. It is bounded to the right by the line that links point d to point e.

4. To sum up, if $\mu^A < \mu^B$ and if for some z^0_r we have that $F^{B,\mu B}(z_r) \leq F^{A,\mu A}(z_r)$ for $z_r \in]0, z^0_r]$, we also have that $\Delta H_*(z_a, z_r) < 0$, over the area $\Lambda(\lambda^+)$, shown jointly by the dashed, the dotted, and the shaded areas in Figure 2. This also says that all of the indices that are members of the absolute/relative class $\Pi(\lambda)$ will necessarily declare a movement from A to B to be pro-poor.

A similar and symmetric reasoning applies to the case in which the movement from A to B generates a fall in average income. That is if $\mu^A > \mu^B$. If a distribution A with a higher mean than B relatively dominates B, then it must also be that A dominates B over some absolute/relative poverty indices $\Pi(\lambda^+)$. This also says that all of the indices that are members of the absolute/relative class $\Pi(\lambda^+)$ will declare the movement from A to B to be anti-poor.

3. Application

3.1 Data

The methodology presented above is applied to relatively recent distributional changes in nine Middle-Eastern and North-African (MENA) countries[i]. The welfare distributions are obtained by reconstructing individual expenditure observations from information on cumulative expenditure shares, namely Lorenz curve coordinates. Most of these cumulative expenditure shares are available on the World Bank's PovCalNet web site (http://iresearch.worldbank.org/PovcalNet/jsp). Lorenz curve ordinates have also been obtained from three other sources: El-Laithy and Abu-Ismail (2005) for Syria in 1997 and 2003; Ministère des Affaires Economiques et du Développement (Ministry of Economic Affairs and Development) (2006) for the 2004 Mauritanian expenditure distribution; and Institut National de la Statistique (National Institue of Statistics) (2007) for 2005 Tunisian cumulative expenditure shares.

The procedure followed is that suggested by Shorrocks and Wan (2008) which, in contrast to several alternative methods, ensures that the characteristics of the reconstructed samples match exactly the Lorenz curve ordinates that are used[ii]. The procedure is applied to nine countries that have experienced different patterns of growth and poverty changes. These countries are Egypt, Iran, Jordan, Mauritania, Morocco, Syria, Tunisia, Turkey, and Yemen. The covered periods range from 1993 to 2007.

To compare poverty across time and countries, we need measurement units that are comparable across time and space. This is readily provided by the PovCalNet data. For the *per capita* expenditure data obtained from sources other than PovcalNet, we

---

[i] Mauritania and Turkey are not part of the MENA region in the World Bank's classification of countries. Other institutions do, however, sometimes include these two countries in the list of MENA countries since they are geographically close to the region. For example, Mauritania is classified as a North African country by the African Development Bank.

[ii] For this purpose, we have used the latest version of the Distributive Analysis Stata Package (DASP) of Araar and Duclos (2007), which readily applies this procedure.

transform them into 2005 prices using the consumer price indices published by the national authorities of each country. We then convert these expenditures into 2005 US dollars using the 2005 purchasing power parities (PPP) found in PovcalNet for Mauritania and in World Bank (2008) for Syria and Tunisia. PPP are commonly used for comparing absolute poverty and social welfare. Such cross-country comparisons should nonetheless be interpreted with caution since they can be sensitive to marginal changes in the PPP. Relative poverty comparisons are not, however, sensitive to changes in national PPP[iii].

3.2 Descriptive Statistics

Table 1 (*see Appendix*) provides descriptive statistics on average daily per capita expenditures across the countries, the incidence of absolute poverty $(H_* (z_a, \infty))$ for a poverty line z_a set at "two dollars a day", the incidence of relative poverty $(H_* (\infty, z_r))$ for a poverty line z_r set at half of mean expenditure, and the Gini index. The number of observations generated for the reconstructed samples is 500 in all cases.

Table 1 shows that mean per capita expenditures in Mauritania and Yemen are not far from the conventional "two-dollar-a-day" poverty line. This largely explains the relatively high absolute poverty rates found in these two countries, relative to the others. With the exception of Mauritania, Yemen and Egypt in 2004, the MENA countries shown in Table 1 display moderate levels of absolute poverty rates since 2000, ranging from 7.4 percent of the population in 2005 in Iran, to 13 percent in 2007 in Morocco. These rates are far lower than the incidence of relative poverty.

In most cases, countries have not witnessed a statistically significant change in both absolute and relative poverty. Iran has experienced a reduction of 0.2 points of percentage in the incidence of absolute poverty between 1998 and 2005, and a decline of 7.8 points in the incidence of relative poverty. While the reduction of relative poverty in Iran is statistically significant, that of absolute poverty is not. Tunisia is the only country that has experienced a statistically significant reduction in both relative deprivation (-1.4 points of percentage) and absolute poverty (-11.8 points of percentage). Yemen is the only country that has registered an increase in both absolute and relative poverty.

Egypt, Jordan, Morocco, and Syria have experienced a decrease in their absolute poverty rates. However, their relative poverty rates have risen. The results prevent conventional first-order relative pro-poorness in these countries.

Since the conditions are necessary for joint absolute and relative pro-poor dominance, they also prevent bidimensional pro-poorness over $\Lambda(\lambda^+)$. This is confirmed by the univariate stochastic dominance tests of Figure 13 for Egypt, Figure 15 for Jordan, Figure 17 for Morocco and Figure 19 for Syria. On the left-hand side of each of these figures (*see Appendix*), absolute poverty incidence $H^j (z_a, \infty)$ for country j at each of the two

---

[iii] See for example Chen, Datt, and Ravallion (1994) for a discussion of the use of PPP for international comparisons of poverty.

time periods is drawn at the top for different z_a from 0 to 5 dollars a day, while absolute poverty differences, $\Delta H(z_a)$, are plotted at the bottom for the same range of z_a (along with 95% confidence intervals). On the right-hand side, the relative poverty headcount ($H^j (\infty, z_r)$) is displayed at the top for different z_r, starting from 0 to 100 percent of mean per capita expenditure (μ^j) whereas relative poverty differences ($\Delta H^j (z_a)$) are depicted at the bottom.

3.3 Joint Absolute and Relative Pro-Poorness

The bivariate stochastic dominance tests described in 6 are illustrated in Figure 4 for Tunisia, Figure 6 for Mauritania, Figure 8 for Iran, Figure 10 for Yemen, Figure 12 for Turkey, Figure 14 for Egypt, Figure 16 for Jordan, Figure 18 for Morocco, and Figure 20 for Syria. The front axis shows the range of absolute poverty lines (z_a), while the right axis shows the range of relative poverty lines (z_r). The vertical axis shows the difference in the joint incidence of absolute and relative deprivation $(\Delta H_* (z_a, z_r))$ at the points defined in the $(y, y/\mu^j)$ domain. If $\Delta H_* (z_a, z_r) < 0, \ \forall (z_a, z_r) \in \Lambda(\lambda^+)$, then economic growth has been unambiguously pro-poor in the sense that the change will be deemed pro-poor by any choice of poverty indices and poverty frontiers in the class $\Pi(\lambda^+)$.

On the whole, three sets of countries stand out from the Figures. The first set includes Tunisia and, to a lesser extent, Iran and Mauritania. These countries have witnessed a robust fall in both absolute and relative poverty. The second set regroups Yemen and Turkey, which have experienced a rise in both absolute and relative deprivation. The remaining countries form the third set. They are Egypt, Jordan, Morocco, and Syria. They have witnessed a fall in one of the dimensions of deprivation and a rise in the other.

3.3.1 Pro-poor growth experiences in Iran, Mauritania, and Tunisia

The left-hand side of Figure 3 for Tunisia shows that $\Delta H_* (z_a, \infty)$ lies nowhere above zero (i.e., for $z_a < 5$). Further, for any $z_a > 1$, the negative values of $\Delta H_* (z_a, \infty)$ are statistically different from zero at the five percent level. The economic growth experienced by Tunisia between 1995 and 2005 has thus unambiguously decreased its level of absolute poverty, meaning that there is first-order absolute poverty dominance for Tunisia of 2005 over 1995[iv]. Figure 5 shows that Mauritania has experienced a similar statistically significant fall in absolute poverty.

The right-hand side of Figure 3 for Tunisia and of Figure 5 for Mauritania show that ΔH_* (∞, z_r) is not statistically distinguishable from zero for many of the $z_r \in [0, 1]$. This means that it is not possible to infer relative poverty dominance over all of that range of z_r. However, if we restrict the range of z_r to [0, 0.8] for Tunisia and [0, 0.4] for Mauritania, and we ignore sampling variability, then we can conclude that economic growth has unambiguously decreased relative poverty in Tunisia and Mauritania.

[iv] Poverty and inequality were, however, on the rise in Tunisia during the first half of the 1990s. More details can be found in Bibi and Nabli (2009).

Figure 7 shows a modest fall in Iranian absolute poverty between 1998 and 2005, which is too small for any $z_a \in [0, 2]$ to be confidently declared as statistically significant[v]. The right-hand side of Figure 7 indicates, however, that Iran has experienced a statistically significant fall in relative poverty over the 1998-2005 period. This implies that although absolute poverty dominance cannot be inferred in Iran, the change between 1998 and 2005 has been relatively pro-poor.

The presence of dominance, both in the absolute and in the relative dimensions of welfare, has led to joint pro-poor dominance in Tunisia as Figure 4 shows. $\Delta H_* (z_a, z_r)$ is either nil or negative. It is never positive for any couple of (z_a, z_r) in $[0, 5] \otimes [0, 0.8]$. A similar result applies to Iran and Mauritania, but within a narrower range of z_a for the Iranian case and a narrower range of z_r for Mauritania. Ignoring sampling variability, Figure 8 for Iran indeed shows that there is bivariate pro-poor dominance of 2005 over 1998 for any couple of (z_a, z_r) in $[0, 2] \otimes [0, 0.8]$, while Figure 6 shows that there is bivariate pro-poor dominance in Mauritania for any (z_a, z_r) in $[0, 5] \otimes [0, 0.4]$. Putting it differently, the growth pattern in these three countries has mostly led to a two-edged impact on poverty: Increasing mean income of the poor and reducing income inequality. This has generated a lower degree of joint absolute/relative deprivation as measured by any index within $\Pi(\lambda^+)$.

3.3.2   Anti-poor growth experiences in Turkey and Yemen

Yemen shows a rather dissimilar pattern of distributional change. The severe decrease in mean expenditure per capita experienced by Yemen between 1998 and 2005 has robustly increased both absolute and relative deprivation, as Figure 9 shows. Thus, bivariate pro-poor dominance tests are conclusive, but in the opposite direction, since $\Delta H_* (z_a, z_r)$ in Figure 10 is positive at different values of $H_* (z_a, z_r)$. Yemen's economic recession has hurt the poor in both absolute and also relative terms, more than for the non-poor. This has led to a higher degree of joint absolute/relative deprivation as measured by any index within $\Pi(\lambda^+)$.

Unlike for the case of Yemen, Turkey's mean per capita expenditure, expressed in 2005 PPP US dollars, grew from 6.8 dollars a day in 1994 to 7.8 dollars a day in 2005. Notwithstanding this, the distributional effects of Turkey's growth have been similar to those of Yemen. Figure 11 shows that Turkey has witnessed a statistically significant rise in relative poverty between 1994 and 2005, for values of z_r ranging from 20 to 60 percent of mean income. The change in absolute poverty for any z_a lower than two dollars a day is estimated to be positive, although it is not, however statistically significant. Ignoring sampling variability, the joint effect is a robust rise in joint absolute/relative deprivation in Turkey between 1994 and 2005, as shown in Figure 12.

---

[v] Table 1 shows that the Iranian 0.2 point of percentage decline in the absolute incidence of poverty is not statistically significant.

3.3.3 Inconclusive effects of growth on poverty in Egypt, Jordan, Morocco, and Syria

The left-hand side of Figure 13 for Egypt, Figure 15 for Jordan, Figure 17 for Morocco, and Figure 19 for Syria clearly show that $\Delta H_*\, (z_a, \infty)$ lies nowhere above zero (i.e., for $z_a < 5$) in these four MENA countries. Further, for several, $z_a < 5$, $\Delta H_*\, (z_a, \infty)$ is negative with values that are statistically significant at the five percent level. Economic growth experienced by these countries during the last decade or so, has therefore tended to decrease absolute poverty. However, the right-hand side of these same Figures show that $\Delta H_*\, (\infty, z_r)$ is either nil or (often) statistically greater than 0 for values of z_r within [0, 1]. This indicates that we cannot conclude that the latter period dominates the earlier one in terms of relative poverty.

The absence of first-order dominance in the relative dimension of welfare rules out bivariate pro-poor dominance, as illustrated in Figure 14 for Egypt, Figure 16 for Jordan, Figure 18 for Morocco, and Figure 20 for Syria. $\Delta H_*\, (z_a, z_r)$ shows both positive and negative values, depending on the choice of (z_a, z_r). There is then no robust pro-poor judgment of the evolution of joint absolute and relative deprivation in these four countries, even if we ignore whether the values taken by $\Delta H_*\, (z_a, z_r)$ are statistically different from 0.

4.   Conclusion

Poverty reduction has been brought to the fore of the analysis of the impact of growth on development. There is now a wide consensus that both the rate and the distributional impact of growth are important in assessing its developmental role. This paper offers a method to assess the joint absolute and relative distributive impact of growth through a bivariate test of growth pro-poorness.

Using this method, we are able to reconcile the absolute and relative approaches to assessing poverty and to determine whether distributional changes have been robustly pro-poor or anti-poor in nine MENA countries in the last fifteen years. Some of the MENA countries, such as Tunisia and Mauritania, have seen robust decline in the joint absolute and relative deprivation. The situation is similar for Iran, but is statistically weak. Yemen and Turkey have experienced a rise in joint absolute and relative deprivation. Other countries (Egypt, Jordan, Morocco, and Syria) have witnessed a fall in absolute deprivation accompanied by a rise in relative deprivation. Results are therefore country-specific.

Overall, the paper's results suggest that it is important to focus on individual experiences when analysing the impact of growth. They also show that although economic growth often leads to a robust decline of absolute deprivation, it can also increase it, and that it can also simultaneously increase relative deprivation. In many cases, therefore, whether distributive changes will be deemed to be good for the poor will depend on the manner in which the joint assessment of absolute and relative pro-poorness is performed.

References

Araar, A. and J.-Y. Duclos (2007): "DASP: Distributive Analysis Stata Package," PEP, CIRPEE and World Bank, Université Laval.

Araar, A., J.-Y. Duclos, M. Audet, and P. Makdissi (forthcoming): "Testing for pro-poorness of growth, with an application to Mexico," *Review of Income and Wealth.*

Bibi, S. and M. K. Nabli (2009): "Income Inequality in the Arab Region: Data and Measurement, Patterns and Trends," *Middle East Development Journal*, 1, 1–40.

Bourguignon, F. (2003): "The Poverty-Growth-Inequality Triangle," *Conference on Poverty, Inequality and Growth*, Paris: Agence française de développement.

Chen, S., G. Datt, and M. Ravallion (1994): "Is Poverty Increasing in the Developing World?" *Review of Income and Wealth*, 40, 359–76.

Dollar, D. and A. Kraay (2002): "Growth Is Good for the Poor," *Journal of Economic Growth*, 7, 195–225.

Duclos, J.-Y. (2009): "What is 'Pro-Poor'?" *Social Choice and Welfare*, 32, 37–58.

Duclos, J.-Y., D. E. Sahn, and S. D. Younger (2006): "Robust Multidimensional Poverty Comparison," *Economic Journal*, 113, 113, 943–968.

Eastwood, R. and M. Lipton (2001): "Pro-poor Growth and Pro-Growth Poverty Reduction: What do they Mean? What does the Evidence Mean? What can Policymakers do?" *Asian Development Review*, 19, 1–37.

El-Laithy, H. and K. Abu-Ismail (2005): "Poverty in Syria: 1996-2004. Diagnosis and Pro-Poor Policy Considerations," Technical Report, UNDP, Syria.

Institut National de la Statistique (2007): "Enquête Nationale sur les Dépenses, la Consommation, et le Niveau de Vie des Ménages en 2005," Tech. rep., Ministère du Développement et de la Coopération Internationale, Tunisia.

Kakwani, N., S. Khandker, and H. Son (2003): "Poverty Equivalent Growth Rate: With Applications to Korea and Thailand," Technical Report, Economic Commission for Africa.

Kakwani, N. and E. Pernia (2000): "What is Pro-Poor Growth?" *Asian Development Review*, 18, 1–16.

Klasen, S. (2004): "In Search of the Holy Grail: How to Achieve Pro-Poor Growth?" *Toward Pro Poor Policies-Aid, Institutions, and Globalisation*, ed. by B. Tungodden, N. Stern, and I. Kolstad, New York: Oxford University Press, 63–94.

Ministère des Affaires Economiques et du Developpement (2006): "Profil de la Pauvreté en Mauritanie-2004," Technical Report, Commissariat aux Droits de l'Homme, à la Lutte Contre la Pauvreté et à l'Insertion, Mauritania.

Ravallion, M. (2001): "Growth, Inequality and Poverty: Looking Beyond Averages," *World Development,* 29, 1803–15.

Ravallion, M. and S. Chen (2003): "Measuring Pro-poor Growth," *Economics Letters*, 78, 93–99.

Sen, A. (1981): *Poverty and Famine: An Essay on Entitlement and Deprivation*, Clarendon Press, Oxford University Press.

Shorrocks, A. and G. Wan (2008): "Ungrouping Income Distributions: Synthesising Samples for Inequality and Poverty Analysis," Working paper, UNU-WIDER, http://ideas.repec.org/p/unu/wpaper/rp2008-16.html.

United Nations (2000): *A Better World for All*, New York.

World Bank (2002): "Globalisation, Growth, and Poverty," World Bank Policy Research Report.

World Bank (2008): "Global Purchasing Power Parities and Real Expenditures: 2005 International Comparison Programme," Technical Report, Washington.

Appendix

Figure 1: Deprivation in the space of absolute and relative welfare
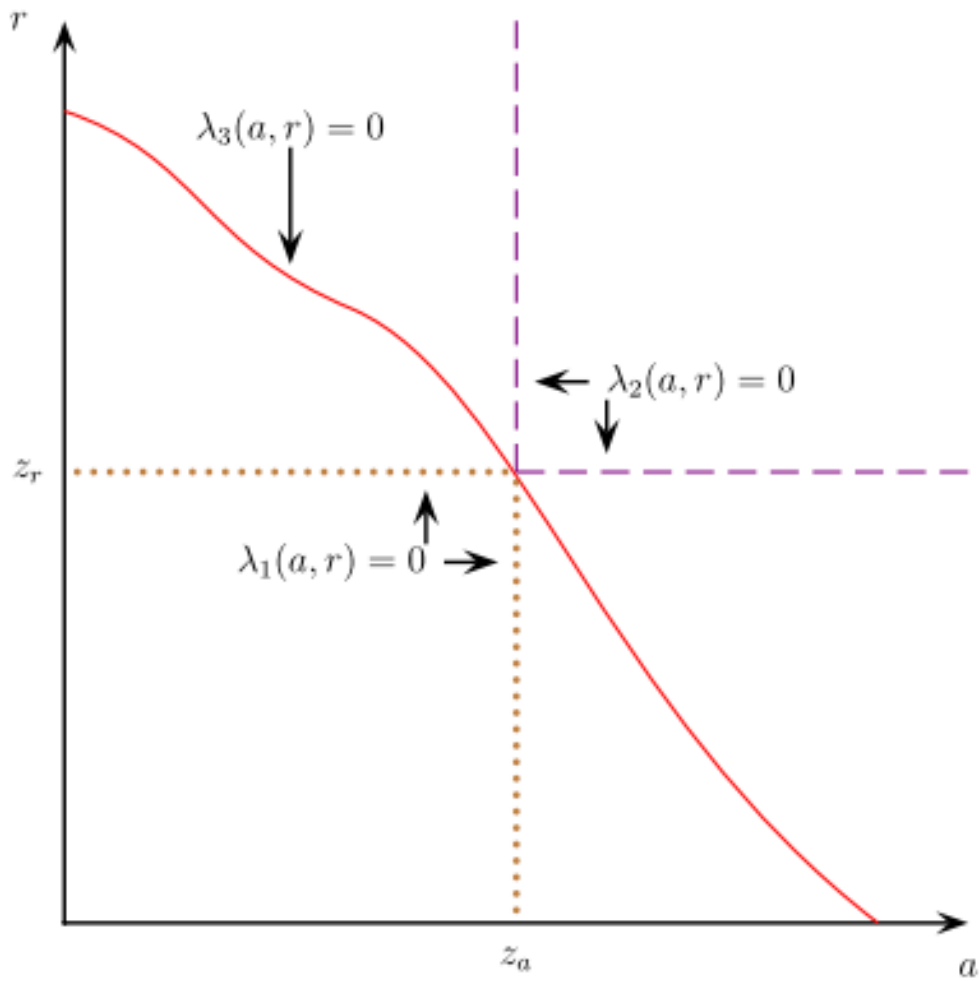
Figure 2: Joint absolute and relative pro-poor growth
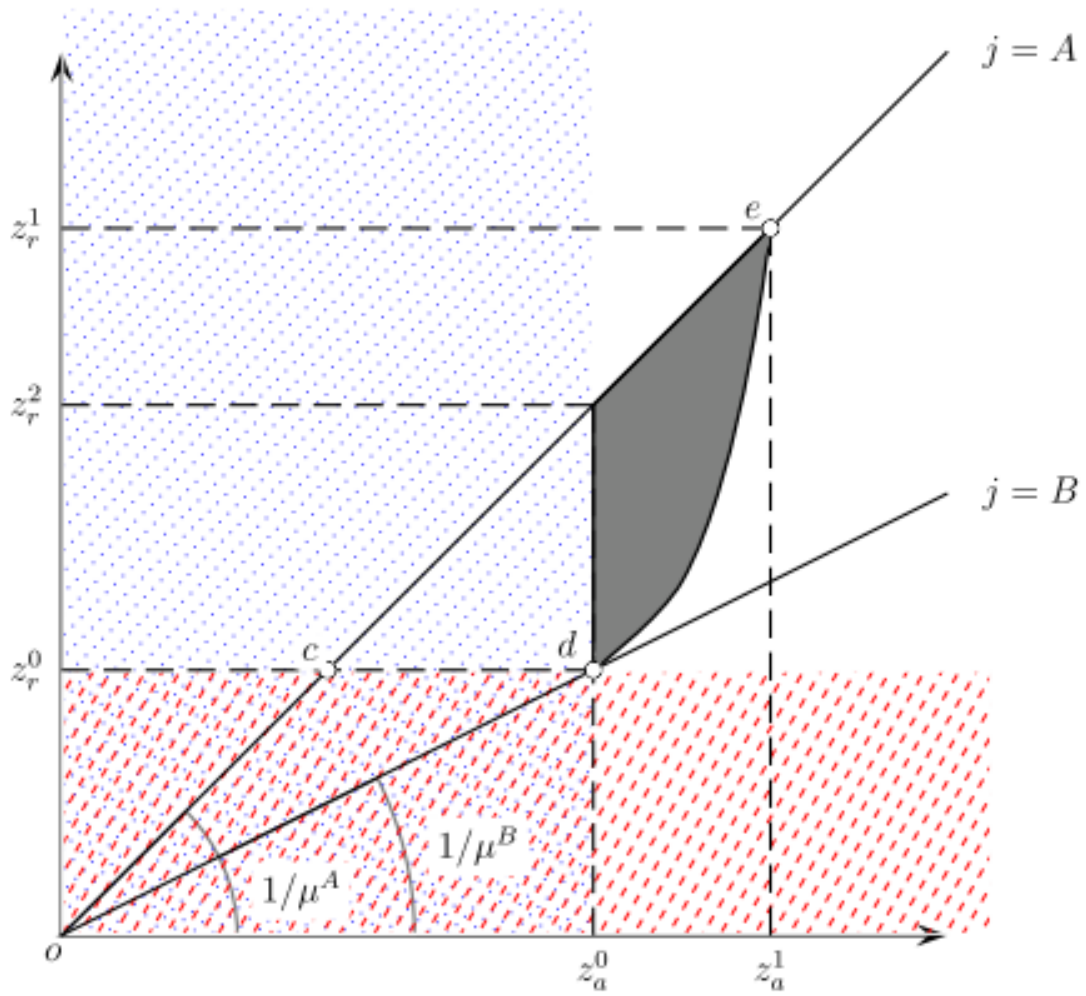
Table 1: Descriptive statistics

	Egypt			Iran			Jordan		
	1995	2004	Δ	1998	2005	Δ	1997	2006	Δ
Mean	3.26	3.75	0.49	8.4	6.6	-1.8	5.05	7	1.95
p.c. expenditure	(0.1)	(0.12)	(0.03)	(0.4)	(0.3)	(0.13)	(0.2)	(0.3)	(0.08)
$H_*(z_a, \infty)$	25.0	17.8	-7.2	7.6	7.4	-0.2	10.4	3.6	-6.8
"$2 a day" rate	(1.9)	(1.7)	(1.2)	(1.2)	(1.2)	(0.2)	(1.4)	(0.8)	(1.1)
$H_*(\infty, z_r)$	11.2	14.0	2.8	33.2	25.4	-7.8	21.0	22.8	1.8
$z_r = 0.5\mu$	(1.6)	(1.8)	(0.7)	(2.1)	(1.9)	(1.2)	(2.1)	(2.1)	(0.6)
Gini	30.0	32.0	2.0	44.0	38.3	-5.7	36.3	37.5	1.2
index	(1.2)	(1.4)	(0.1)	(1.6)	(1.5)	(0.1)	(1.6)	(1.5)	(0.2)

	Mauritania			Morocco			Syria		
	1995	2004	Δ	1998	2007	Δ	1997	2003	Δ
Mean	2.62	3.62	1	4.33	5.38	1.05	5.72	6.51	0.79
p.c. expenditure	(0.1)	(0.2)	(0.08)	(0.2)	(0.2)	(0.06)	(0.2)	(0.3)	(0.06)
$H_*(z_a, \infty)$	48.6	30.6	-18	22.6	13.0	-9.6	5.4	4.6	-0.8
"$2 a day" rate	(2.2)	(2.1)	(1.7)	(1.9)	(1.5)	(1.3)	(1.0)	(0.9)	(0.4)
$H_*(\infty, z_r)$	24.4	24.4	0.0	27.0	27.2	0.2	18.6	23.6	5.0
$z_r = 0.5\mu$	(1.8)	(2.4)	(0.8)	(2.1)	(2.3)	(0.3)	(1.8)	(2.2)	(1.0)
Gini	37.3	39.3	2	39.4	40.5	1.1	33.8	37.4	3.6
index	(1.3)	(2.0)	(0.8)	(1.5)	(1.6)	(0.1)	(3.0)	(1.8)	(0.2)

	Tunisia			Turkey			Yemen		
	1995	2005	Δ	1994	2005	Δ	1998	2005	Δ
Mean	5.14	7.26	2.12	6.79	7.82	1.03	3.01	2.80	-0.21
p.c. expenditure	(0.2)	(0.3)	(0.1)	(0.28)	(0.36)	(0.08)	(0.1)	(0.1)	(0.03)
$H_*(z_a, \infty)$	19.6	7.8	-11.8	9.96	9.96	0	35.0	45.6	10.6
"$2 a day" rate	(1.8)	(1.2)	(1.4)	(1.3)	(1.3)	(0)	(2.1)	(2.2)	(1.4)
$H_*(\infty, z_r)$	30.6	29.2	-1.4	29.4	30.6	1.2	20.0	22.8	2.8
$z_r = 0.5\mu$	(2.0)	(2.1)	(0.5)	(2.0)	(2.1)	(0.5)	(1.7)	(2.2)	(1.1)
Gini	41.6	41.3	-0.3	41.3	43.2	1.9	33.5	37.8	4.3
index	(1.5)	(1.6)	(0.1)	(1.5)	(1.7)	(0.2)	(1.2)	(1.8)	(0.6)

N.B. Standard errors appear within parentheses.

Figure 3: Unidimensional poverty dominance curves using Tunisian Povcal Lorenz ordinates of 1995, Tunisian National Institute of Statistics (2007) Lorenz ordinates of 2005, and the procedure of Shorrocks and Wan (2008) to reconstruct individual data
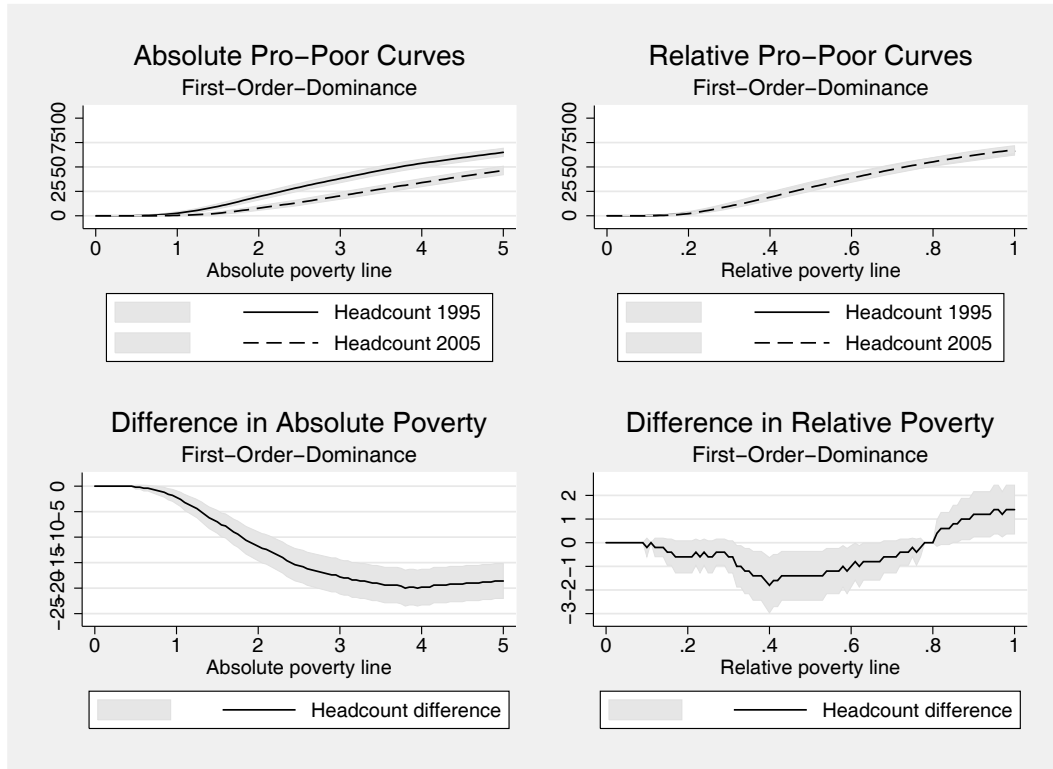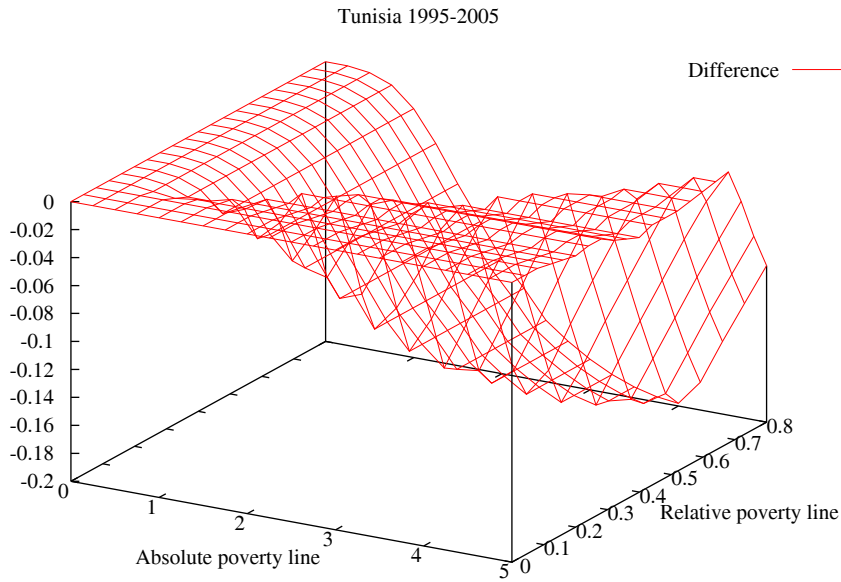
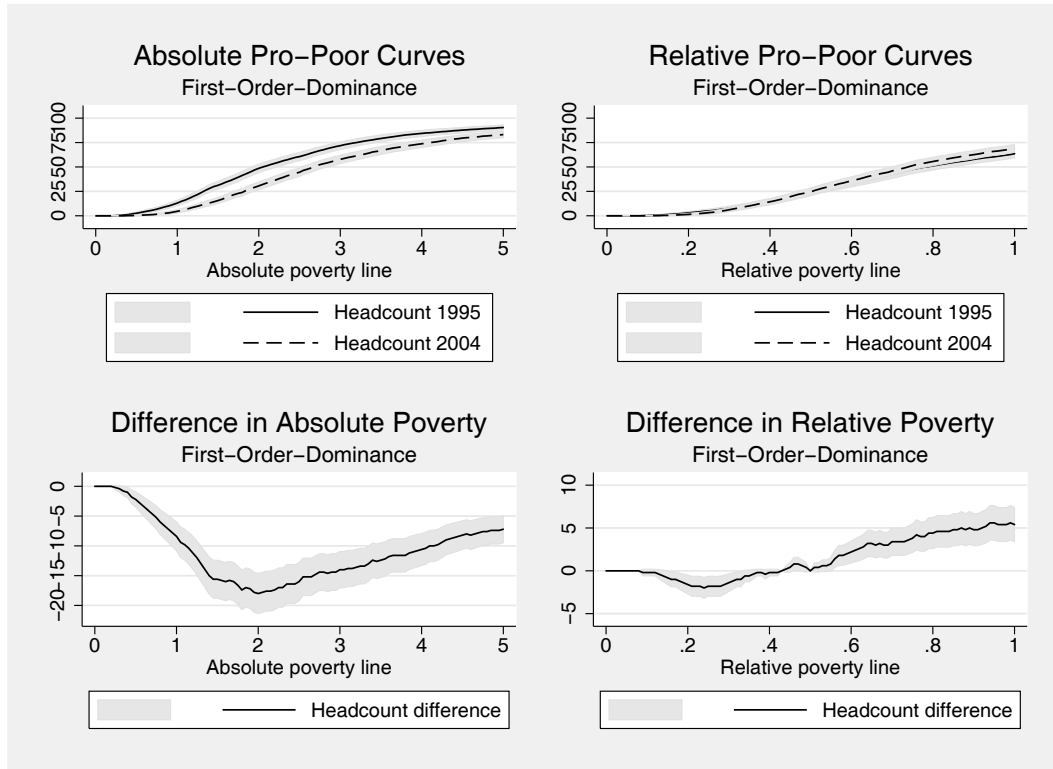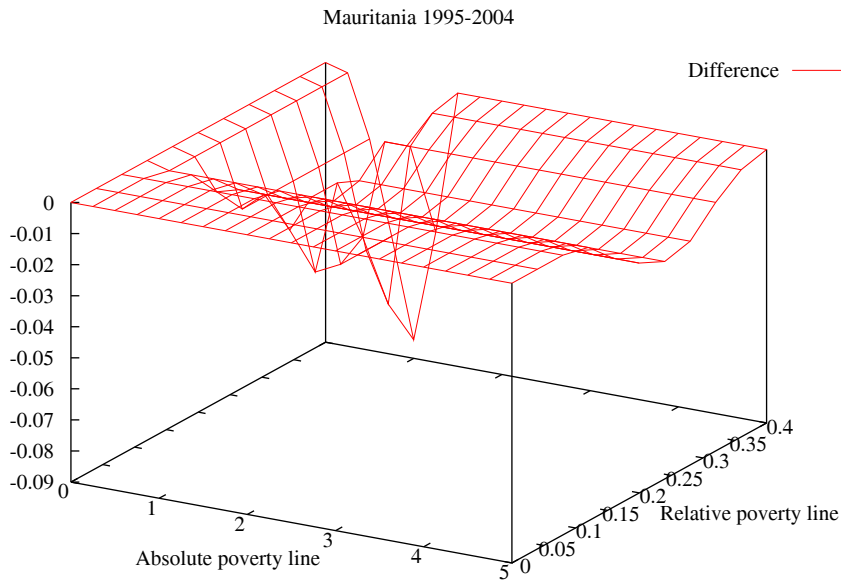Figure 4: Bidimensional growth dominance curves using Tunisian Povcal Lorenz ordinates of 1995, Tunisian National Institute of Statistics (2007) Lorenz ordinates of 2005, and the procedure of Shorrocks and Wan (2008) to reconstruct individual data

Tunisia 1995-2005

Difference ———

Relative poverty line

Absolute poverty line

Figure 5: Unidimensional poverty dominance curves using Mauritanian Povcal Lorenz ordinates of 1995, Mauritanian Ministry of Economics and Development (2006) Lorenz ordinates of 2004, and the procedure of Shorrocks and Wan (2008) to reconstruct individual data

Figure 6: Bidimensional growth dominance curves using Mauritanian Povcal Lorenz ordinates of 1995, Mauritanian Ministry of Economics and Development (2006) Lorenz ordinates of 2004, and the procedure of Shorrocks and Wan (2008) to reconstruct individual data

Figure 7: Unidimensional poverty dominance curves using Iranian Povcal Lorenz ordinates 1998-2005, and the procedure of Shorrocks and Wan (2008) to reconstruct individual data
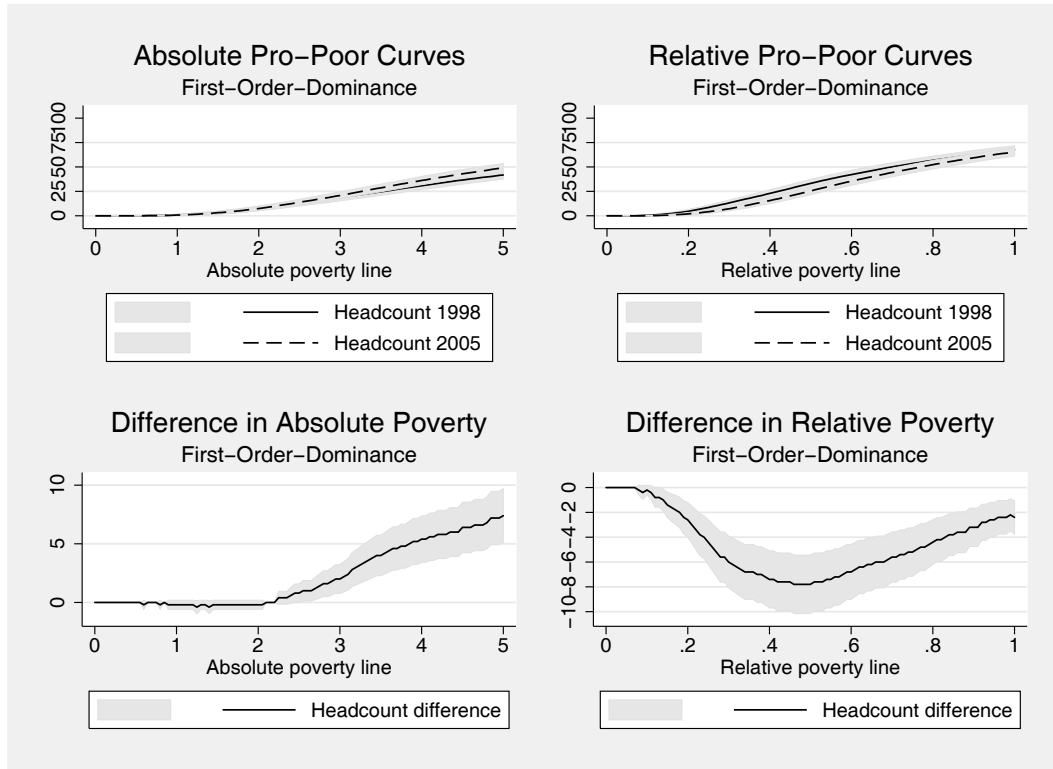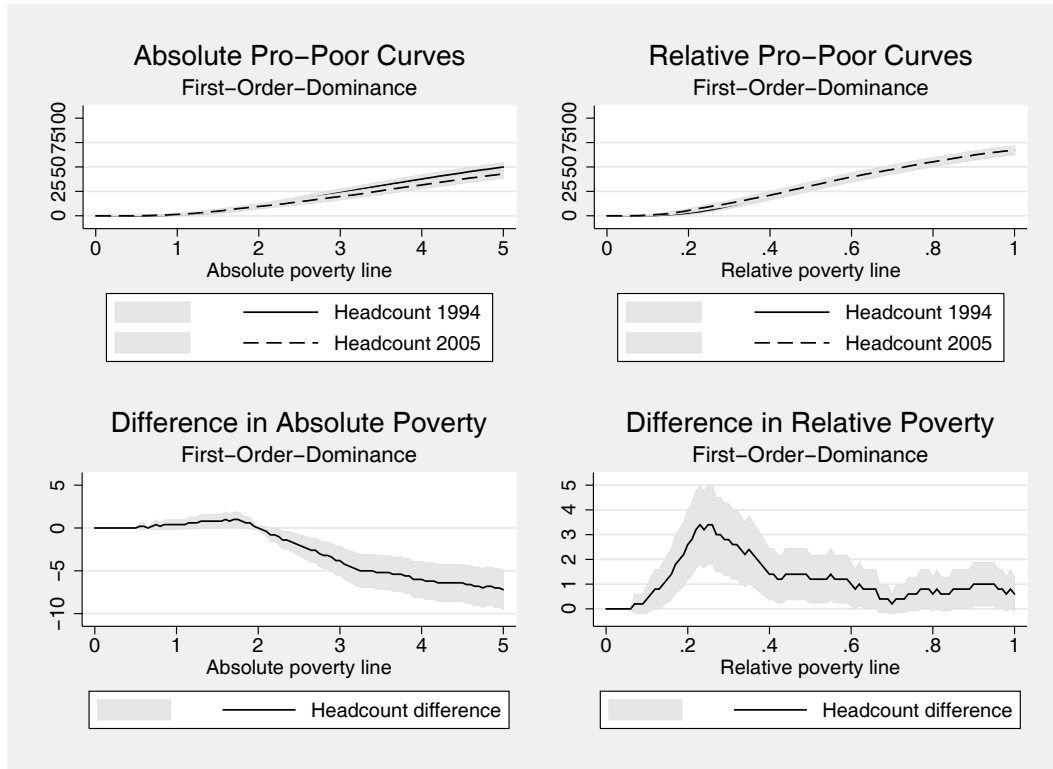
Figure 8: Bidimensional growth dominance curves using Iranian Povcal Lorenz ordinates 1998-2005, and the procedure of Shorrocks and Wan (2008) to reconstruct individual data
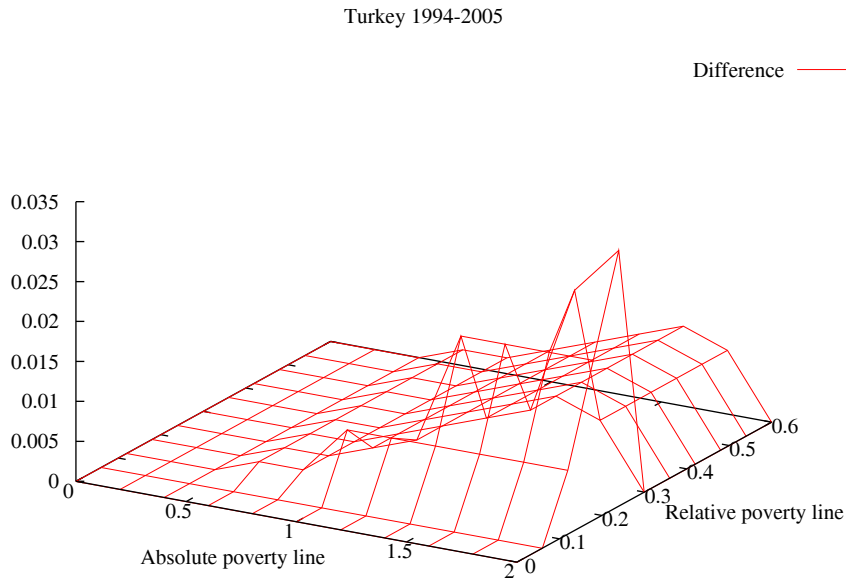

Iran 1998-2005
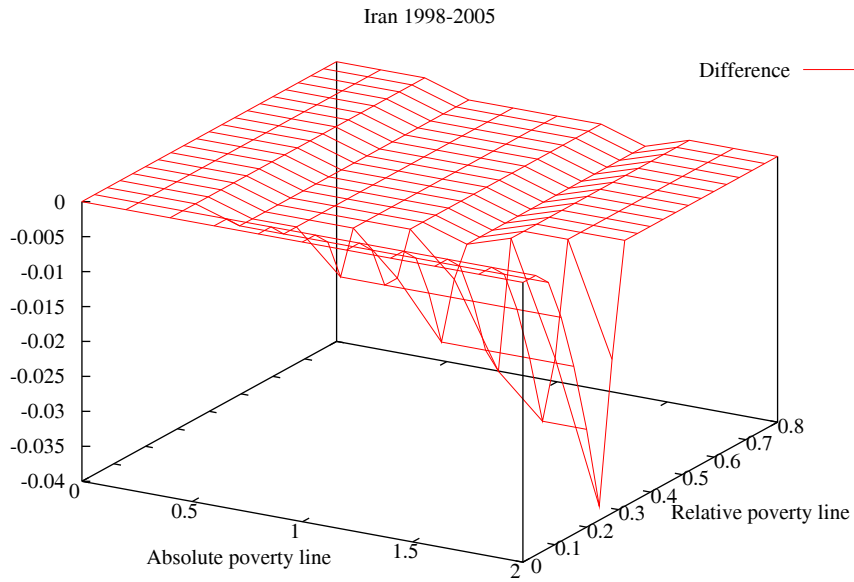
Figure 9: Unidimensional poverty dominance curves using Yemenite Povcal Lorenz ordinates 1998-2005, and the procedure of Shorrocks and Wan (2008) to reconstruct individual data
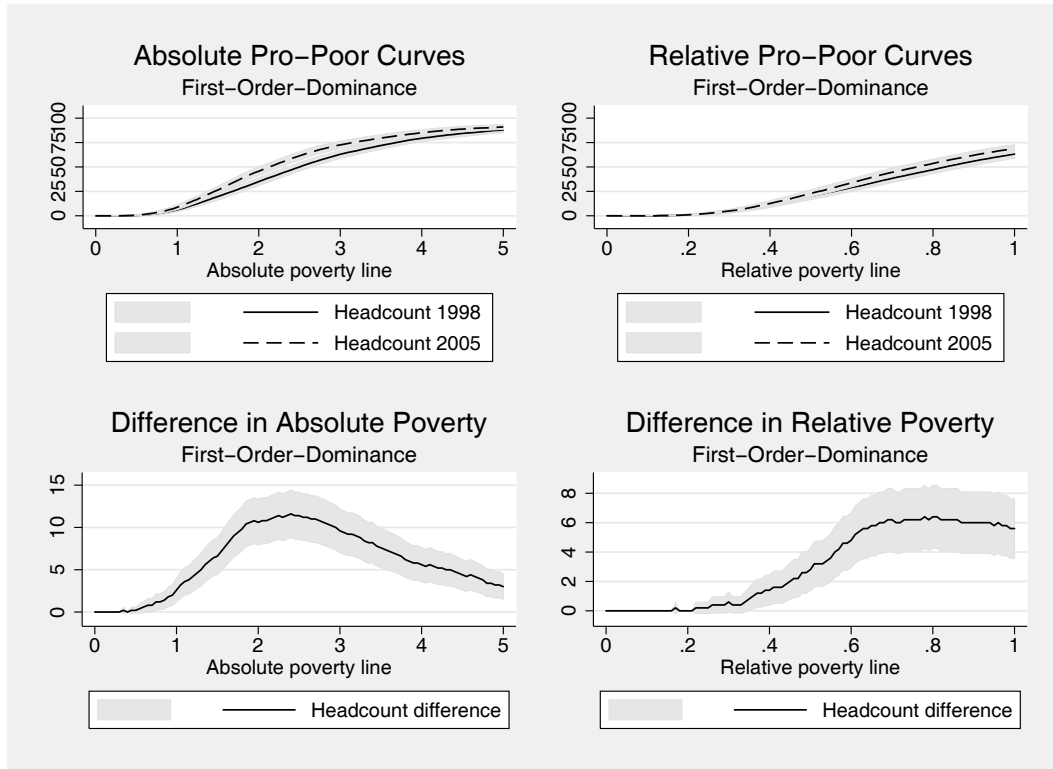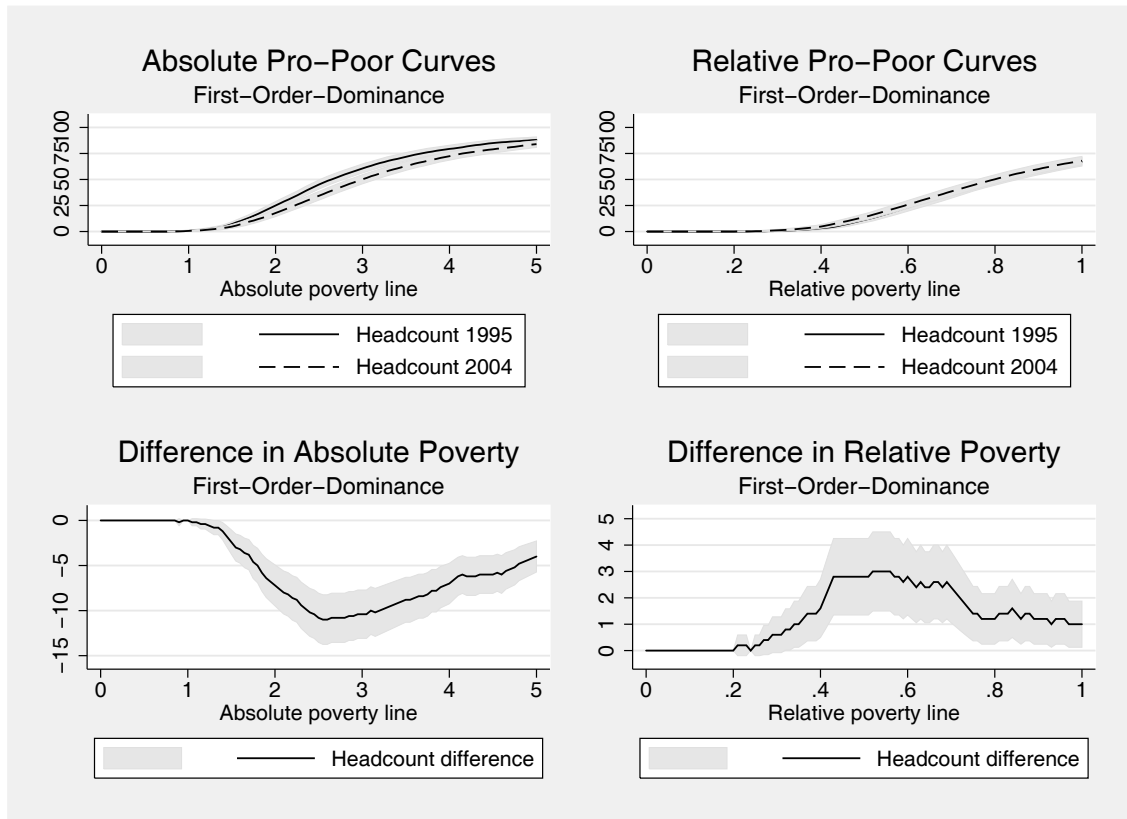
Figure 10: Bidimensional growth dominance curves using Yemenite Povcal Lorenz ordinates 1998-2005, and the procedure of Shorrocks and Wan (2008) to reconstruct individual data
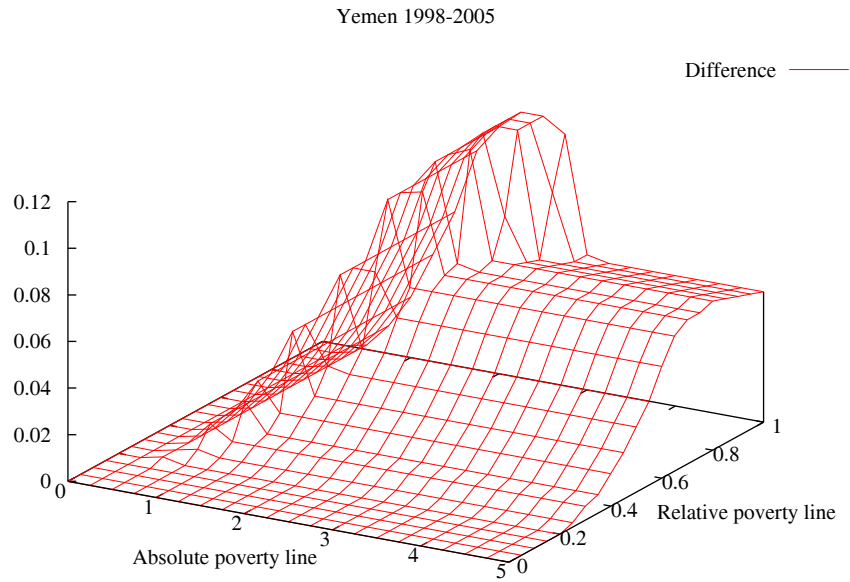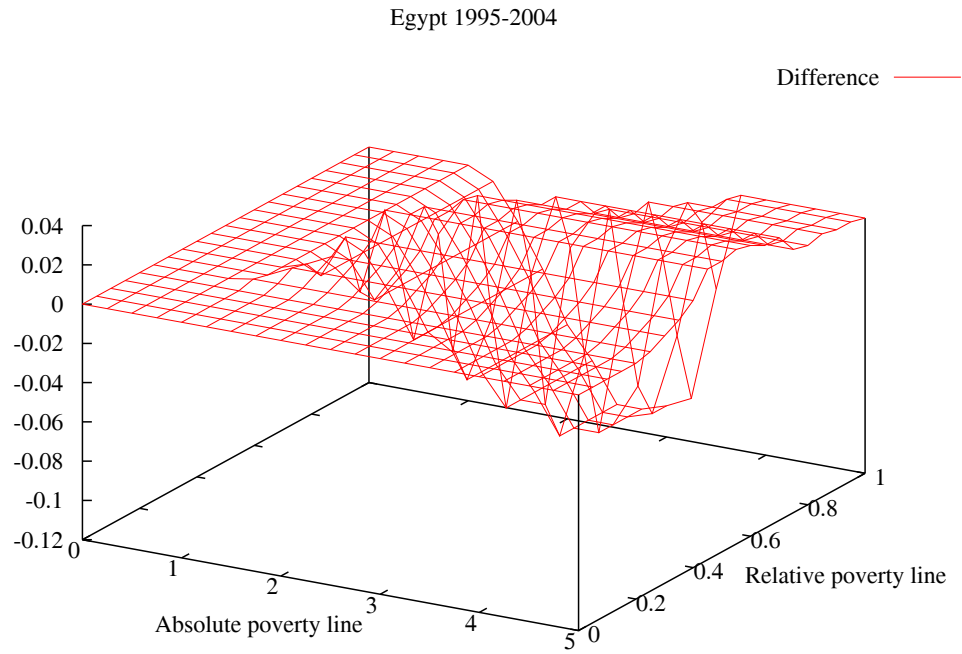
Figure 11: Unidimensional poverty dominance curves using Turkish Povcal Lorenz ordinates 1994-2005, and the procedure of Shorrocks and Wan (2008) to reconstruct individual data

Figure 12: Bidimensional growth dominance curves using Turkish Povcal Lorenz ordinates 1994-2005, and the procedure of Shorrocks and Wan (2008) to reconstruct individual data

Turkey 1994-2005

Figure 13: Unidimensional poverty dominance curves using Egyptian Povcal Lorenz ordinates 1995-2004, and the procedure of Shorrocks and Wan (2008) to reconstruct individual data
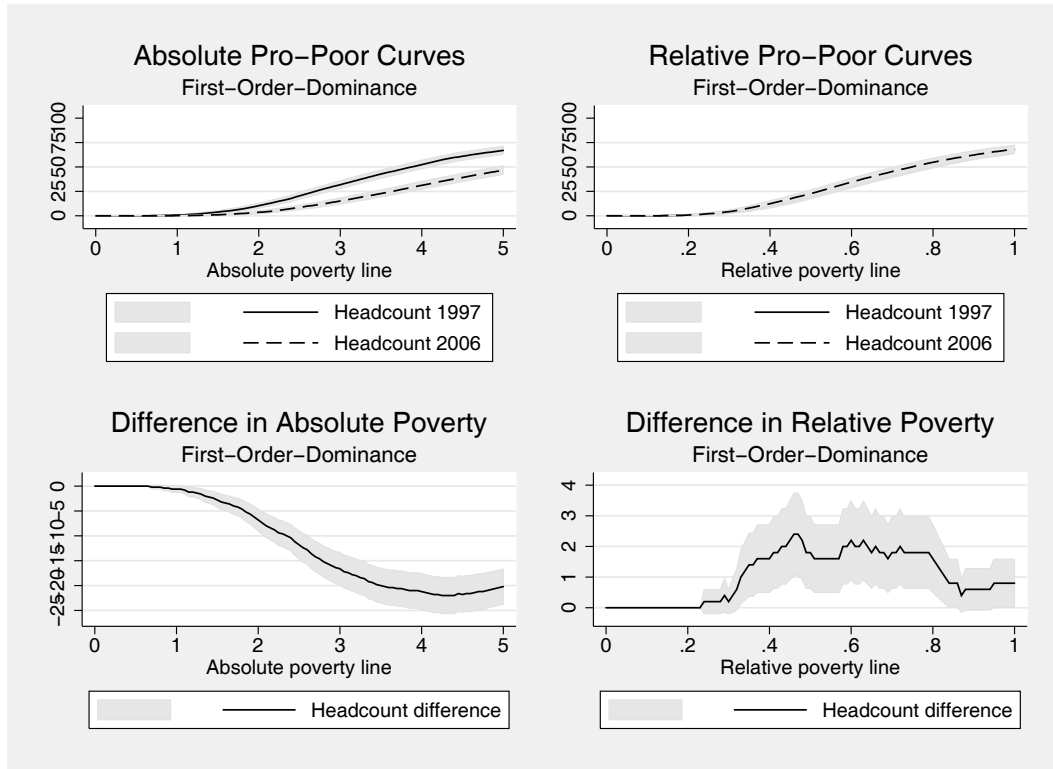
Figure 14: Bidimensional growth dominance curves using Egyptian Povcal Lorenz ordinates 1995-2004, and the procedure of Shorrocks and Wan (2008) to reconstruct individual data

Egypt 1995-2004

Figure 15: Unidimensional poverty dominance curves using Jordanian Povcal Lorenz ordinates 1997-2006, and the procedure of Shorrocks and Wan (2008) to reconstruct individual data

Figure 16: Bidimensional growth dominance curves using Jordanian Povcal Lorenz ordinates 1997-2006, and the procedure of Shorrocks and Wan (2008) to reconstruct individual data
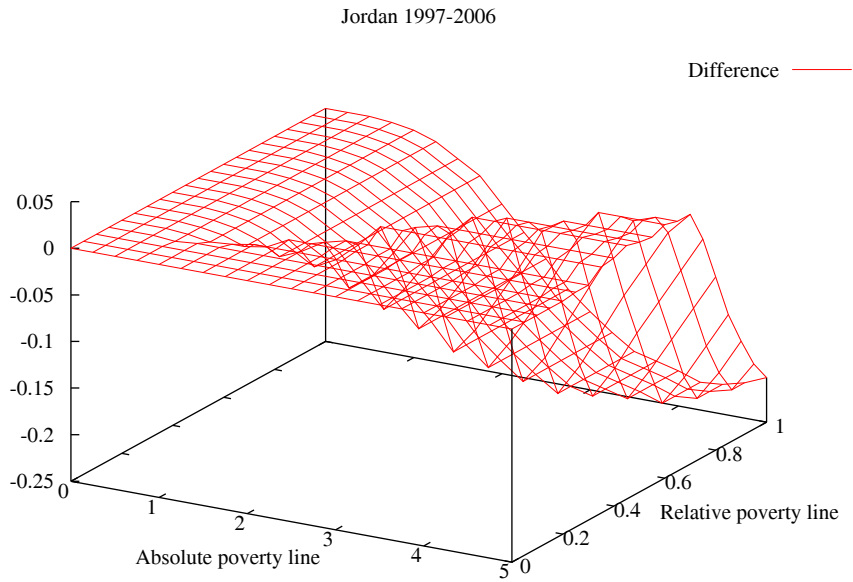

Jordan 1997-2006

Figure 17: Unidimensional poverty dominance curves using Moroccan Povcal Lorenz ordinates 1998-2007, and the procedure of Shorrocks and Wan (2008) to reconstruct individual data
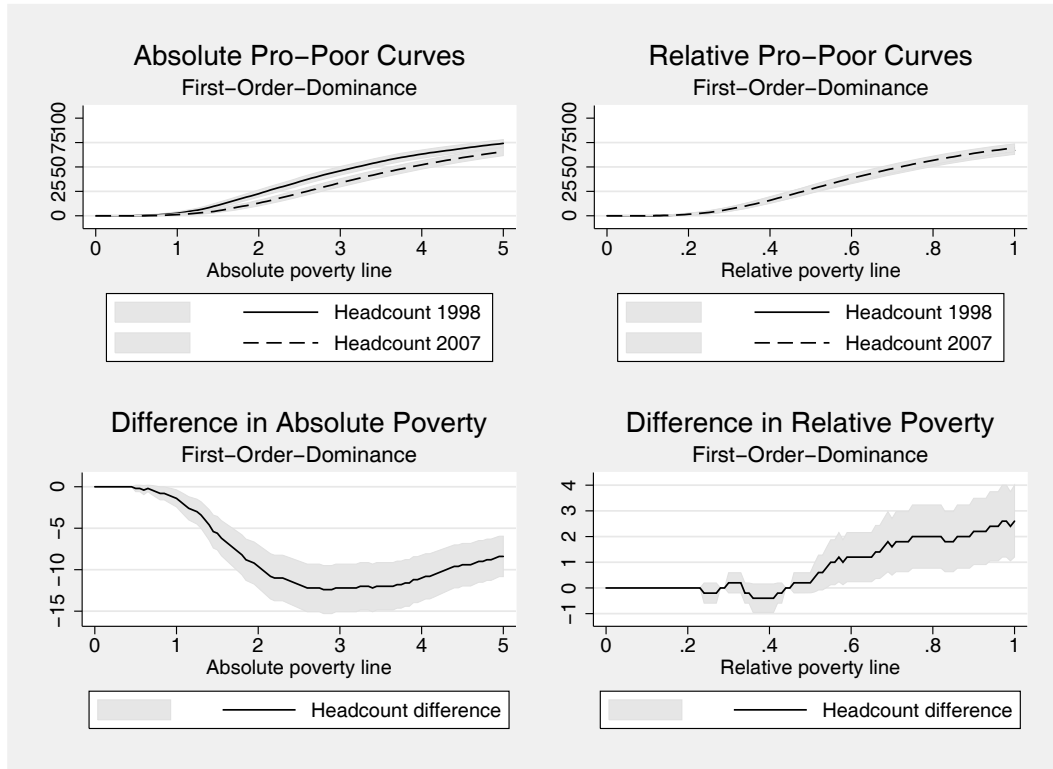
Figure 18: Bidimensional growth dominance curves using Moroccan Povcal Lorenz ordinates 1998-2007, and the procedure of Shorrocks and Wan (2008) to reconstruct individual data

Morocco 1998-2007

Figure 19: Unidimensional poverty dominance curves using Syrian El-Laithy and Abu-Ismail's (2005) Lorenz ordinates 1996/7-2003/4, and the procedure of Shorrocks and Wan (2008) to reconstruct individual data
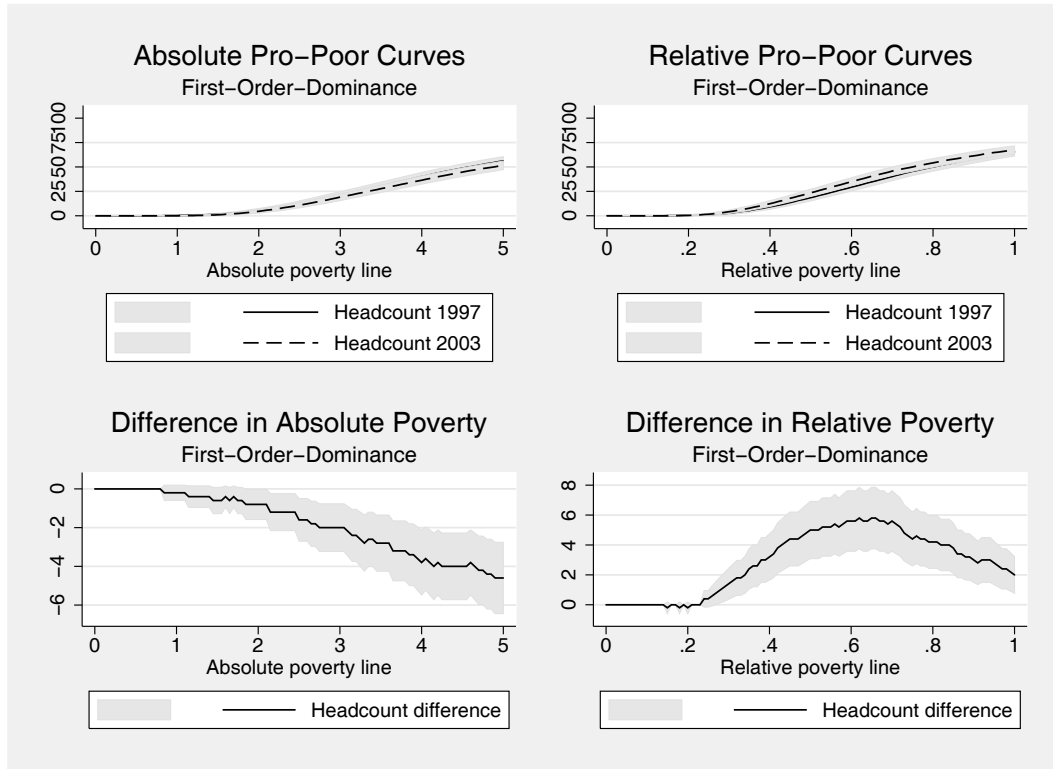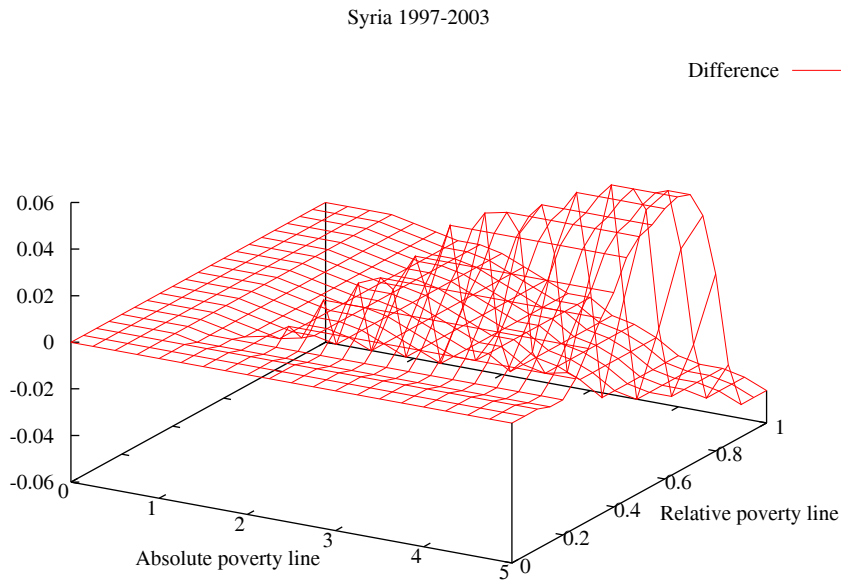
Figure 20: Bidimensional growth dominance curves using Syrian El-Laithy and Abu-Ismail's (2005) Lorenz ordinates 1996/7-2003/4, and the procedure of Shorrocks and Wan (2008) to reconstruct individual data

Syria 1997-2003

Recent Publications in the Series

nº	Year	Author(s)	title
110	2010	Vincent Castel, Martha Phiri and Marco Stampini	Education and Employment in Malawi
109	2010	Vinaye Ancharaz, Tonia Kandiero and Kupukile Mlambo	The First Africa Region Review for EAC/COMESA
108	2010	James Heintz and Léonce Ndikumana	Is there a case for formal inflation targeting in sub-Saharan Africa?
107	2010	Deborah Bräutigam	China, Africa and the International Aid Architecture
106	2010	Ron Leung, Marco Stampini and Désiré Vencatachellum	Does Human Capital Protect Workers against Exogenous Shocks? South Africa in the 2008 – 2009 Crisis
105	2010	Adeleke Salami, Abdul B. Kamara and Zuzana Brixiova	Smallholder Agriculture in East Africa: Trends, Constraints and Opportunities
104	2010	Guy Blaise Nkamleu, Joachim Nyemeck and Jim Gockowski	Technology Gap and Efficiency in Cocoa Production in West and Central Africa: Implications for Cocoa Sector Development
103	2009	Patrick Guillaumont, Sylviane Guillaumont-Jeanneney	Accounting for Vulnerability of African Countries in Performance Based Aid Allocation
102	2009	John Page	Seizing the Day? the Global Economic Crisis and African Manufacturing
101	2009	Ernest Aryeetey	The Global Financial Crisis and Domestic Resource Mobilization in Africa
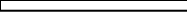
African Development Bank

Angle de l'avenue du Ghana et des rues Pierre
de Coubertin et Hédi Nouira
BP 323 –1002 Tunis Belvédère (Tunisia)
Tel.: +216 71 333 511 – Fax: +216 71 351 933
E-mail: afdb@afdb.org – Internet: www.afdb.org