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DECOMPOSING INCOME INEQUALITY IN THE ARAB REGION

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Abstract

The main objective of this paper is to perform a decomposition analysis of the level of inequality between socioeconomic groups and geopolitical regions of each country to better our understanding of the contribution of each socioeconomic group to overall inequality. This paper will fill in an important gap of knowledge of inequality patterns in the Arab region, by drawing a rough picture of monetary inequality. Our results show that differences in mean income across groups are much larger in Tunisia, Morocco and mainly Yemen and accounts for a much larger proportion of overall inequality.

ملخص

الهدف الرئيسي من هذه الورقة هو إجراء تحليل موجز لمستوى التفاوت الاجتماعي بين الجماعات التي تربطها علاقات اجتماعية و اقتصادية و أيضا المناطق التي تربطها علاقات جغرافية و سياسية في كل دولة بغرض الوصول لفهم أعمق لمساهمة كل مجموعة اجتماعية-اقتصادية في التفاوت الاجتماعي بوجه عام. هذه الورقة سوف تملأ فجوه مهمة جدا في معرفة أنماط التفاوت الاجتماعي في المنطقة العربية من خلال رسم صورة تقريبية لعدم المساواة النقدية. توضح نتائجنا ان الاختلافات في متوسط الدخل بين المجموعات تبدوا اكبر في تونس و المغرب، بل وبشكل أساسي في اليمن التي تمثل نسبة أكبر بكثير من التفاوت الاجتماعي الشامل.

1. Introduction

Decomposing inequality is important for an understanding of what has happened to welfare disparity and for designing effective redistributive policies. Since the path finding paper of Atkinson (1970) on inequality measurement, much has been written on welfare distribution and other related issues. Over the years, the literature of inequality measurement has evolved into three closely connected but distinct branches: the construction of summary inequality statistics, partial inequality orderings, and inequality decomposition. Bibi and El-Lahga (2010a) have presented a rough snapshot of the inequality level in the ACs, using various inequality statistics for the whole population. To go a step further in understanding inequality, we investigate what is behind income distributions by performing decompositions of overall inequality indices by population group.

Decomposition by population group has been the leading approach to quantifying how education, age, etc., affect overall inequality. The approach begins by dividing a representative household sample into discrete categories (such as rural and urban households, households' head with primary schooling level, secondary schooling level, etc.) and then assesses the inequality level within each subgroup and between the means of subgroups. These are linked respectively to the within group components and between-group component of overall inequality.

Inequality decompositions offer a useful tool in describing inequality patterns, and identifying its sources. Indeed, although subgroup decomposition methods are considered as being purely descriptive, many social policies designed to reduce inequality between or within given groups are often based on such exercises. For example, when the between-group component of inequality is less pronounced than the within group component, anti-inequality policies should be focused on equalizing within group outcomes. Such a conclusion does not imply that differences in incomes between-groups have lower policy priority, but simply that these differences are relatively small compared to income inequality within each group.

Despite the fact that empirical studies often show that the contribution of the between-group component is very small compared to within group inequality, disparities between some population groupings are objectionable, however small it they be. Quoting from Kanbur (2006),

"(...) If individual identity flows in part from group membership this may help to explain why it is the ratio of the mean incomes of two racial groups that has socio-political salience..."

Thus, analyzing mean difference between gender or racial groups cannot be easily ruled out from policy makers' agenda. Logically, similar arguments apply for spatial or administrative grouping. One motivation for this is well summarized by Fields (2006):

"Don't worry much about what Lorenz curves, Lorenz-consistent inequality measures, and most other standard inequality measures are telling us. (...) Worry more about inequality between salient groups: male and female workers; children from different social classes; advanced and backward regions; indigenous peoples vs. others; worry even more about inequality of opportunity, especially by socioeconomic origin."

Elbers et al. (2008) note that the level of between-group inequality is sensitive to the number of the groups considered and their relative sizes. More precisely, if the population is subdivided into further subgroups the between-group inequality will increase artificially. This may create some difficulties with interpreting the significance or the importance of between-group inequality when comparing different population groupings. To overcome such limit, Elbers et al. (2008) suggest an alternative measure of the between component defined as the ratio of between-inequality to a counterfactual maximum between-group inequality that could arise with the same number of groups and the same group sizes.

In this paper, we rely on the aforementioned approaches to decompose some inequality measures and analyze the contribution of various socioeconomic groups to overall inequality. The layout of the paper is as follows: section 2 two presents the conventional method to decompose overall inequality; section summarizes the Elbers et al. (2008)'s approach, which yields a better characterization of between-group inequality; section 4 four presents the results ; and section concludes.

2. Conventional Decomposition

Consider a vector $\mathbf{y} = (y_1, y_2, ..., y_n)$ of living standards y_i (income, for short) for a population of n individuals, where y_i are ordered in increasing values, such that $y_1 \leq y_2 ... \leq y_n$.[1]

For the decomposition purpose, we use indices that are members of the Generalized Entropy (henceforth GE) class of inequality measures which fulfill some desirable principles such as the Pigou-Dalton transfer principle and the decomposability principle (Shorrocks, 1980; Cowell 2000).[2] Formally, these indices can be written as

$$I_{GE}(\mathbf{y};\ \theta) = \begin{cases} \frac{1}{\theta^2 - \theta}\left[\frac{1}{n}\sum_{i=1}^{n}\left(\frac{y_i}{\bar{y}}\right)^{\theta} - 1\right], & \forall y_i > 0,\ \theta \neq 0, 1 \\ \frac{1}{n}\sum_{i=1}^{n}\ln\frac{\bar{y}}{y_i}, & \forall y_i > 0,\ \theta = 0 \\ \frac{1}{n}\sum_{i=1}^{n}\frac{y_i}{\bar{y}}\ln\frac{y_i}{\bar{y}}, & \forall y_i > 0,\ \theta = 1 \end{cases} \quad (1)$$

where $\bar{y}$ is the arithmetic mean income.

In contrast to most inequality measures that lie between 0 and 1 (like the Gini index), the values of GE indices range from zero (perfect equality) to infinity (high level of inequality).[3] The parameter θ represents the weight applied to distances between incomes at different parts of the distribution. It can take any non-negative real value. The lower the value of θ, the more society is averse to inequality.

For $\theta = 0$, $I_{GE}(\mathbf{y}; 0)$ is simply the mean log deviation which, in accordance with the transfer sensitivity principle, more sensitive to changes that occur in the bottom distribution. $I_{GE}(\mathbf{y}; 1)$ is the well-known Theil (1967) index. However, for $\theta > 1$, GE measures are more sensitive to changes that affect the upper tail of the distribution which make them, from Rawlsian criterion, less appealing for distributional judgments.[4]

As stated above, one of the typical features of the GE family is that it is additively decomposable by population group. The practical importance of the distinction between

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[1] Although discussion will be made in terms of individuals' income, any alternative indicator of welfare measure (consumption, expenditure, earnings, wages, assets, land, education, health, occupational status index) or recipient unit (households, workers, generations, *per capita*, *per equivalent adult*) could also be used.

[2] Recall that the Pigou-Dalton transfer principle suggests that an appropriate inequality measure should decrease following a progressive transfer from a rich to a poorer person.

[3] However, one may normalize $I_{GE}(\theta)$ by its hypothetic maximum value, obtained when only one person owns all available resources, to make these indices ranging between 0 and 1. This is important for the purpose of an integrated analysis of inequality and social welfare. See Bibi and Nabli (2010) for more details on this.

[4] Quoting from Rawls (1971), "All social primary goods – liberty and opportunity, income and wealth, and the bases of self-respect – are to be distributed equally unless an unequal distribution of any or all of these goods is to the advantage of the least favored." (pp. 303)

individual groups lies partly in the insights that it affords to the underlying economic and social factors' contribution to inequality and in the design of policies influencing it. Further, inequality becomes a more intense political issue when it is perceived to be related to discrimination against particular groups such as regional, gender, ethnic, race, or religious groups. Thus, overall inequality is a simple sum of the between-groups inequality, denoted by $I_{GE}^{Between}$ ($\mathbf{y}$; θ), and within groups inequality, I_{GE}^{within} ($\mathbf{y}$; θ) such that

$$I_{GE}(\mathbf{y};\ \theta) = I_{GE}^{between}(\mathbf{y};\ \theta) + I_{GE}^{within}(\mathbf{y};\ \theta). \tag{2}$$

Bibi and Nabli (2009) suggested that a simple way to shed light on the extent of inequality of opportunities in the ACs is to partition the whole population into some mutual exclusive groups, such that each group includes all individuals with identical circumstances. Examples of circumstances that may be used for such a partition of the whole population include parents schooling, gender, ethnicity, socio-cultural or religious origin, etc. Given that the effort levels are expected to vary within each group, the within-group component of overall inequality could be deemed as the natural outcome of differences in individual efforts. From the inequality of opportunity point of view, we can conclude that within-group inequality should not be the first priority of the redistributive policies as long as we admit that it is the result of individual responsibility, which is outside the scope of justice. However, if we agree that the between-group inequality reflects only the variability of circumstances across individuals, we can use it as an estimate of the inequality of opportunities. According to opportunity egalitarian ethics, since the variability of circumstances are beyond the individuals' responsibility, they are inequitable and should be tackled, through appropriate policies, by society. Since the GE measures are not censured above, one can calculate the ratio of between-inequality to overall inequality to obtain an index of inequality of opportunities, which lies between 0 and 1. If we denote this index by $R^{between}(\mathbf{y})$, it can be calculated as:

$$R_{GE}^{between}(\mathbf{y};\ \theta) = \frac{I_{GE}^{between}(\mathbf{y};\ \theta)}{I_{GE}(\mathbf{y};\ \theta)}. \tag{3}$$

Undeniably, the literature offers more theoretically sound alternatives to study the distribution of opportunities.[5] But the estimation of 3 is easy to implement to fill in an important gap in knowledge of inequality of opportunities since the empirical applications using data sets from the ACs are (to the best of our knowledge) missing.

To describe how this approach can be implemented, let the total population be split into J mutually exclusive subgroups. Let also $\mathbf{y}_j$ be the income distribution of the subgroup j and y_j be the average income of j. The between-inequality is calculated by awarding every person within a group that subgroup's average income, $\overline{y}_j$ $I_{GE}^{Between}$ ($\mathbf{y}$; θ) can then be expressed as:

$$I_{GE}^{between}(\mathbf{y};\ \theta) = I_{GE}^{between}(\overline{y}_1,\ \ldots,\ \overline{y}_J;\ \theta) \tag{4}$$

$$= \frac{1}{\theta^2 - \theta}\left[\sum_{j=1}^{J} f_j \left(\frac{\overline{y}_j}{\overline{y}}\right)^{\theta} - 1\right], \tag{5}$$

where f_j is the population share of the group j. The inequality within each group, $I^{within}(\mathbf{y}_j\ ;\ \theta)$, is calculated using the same formula as that used for $I^{GE}(\mathbf{y};\ \theta)$ (as if the subgroup j with the distribution $\mathbf{y}_j$ was a population in its own right). I_{GE}^{within} ($\mathbf{y}$; θ) is then obtained as a weighted average of $I^{within}(\mathbf{y}_j\ ;\ \theta)$, i.e.,

[5] See for instance Checchi and Peragine (2005), Bourguignon et al. (2007), and Ferreira and Gignoux (2008).

$$I^{within}(\mathrm{y};\ \theta) = \sum_{j=1}^{J} f_j^{1-\theta} s_j^{\theta} I^{within}(\mathrm{y}_j;\ \theta) \text{ where } s_j = \frac{f_j \bar{y}_j}{\bar{y}} \tag{6}$$

Clearly however, the weights assigned to $I^{within}(\mathbf{y}_j\ ;\ \theta)$ do not necessarily sum to 1 with the notable exceptions of θ equals either to 0 (the mean log deviation index) or 1 (the Theil's index). In the former case, $\theta = 0$, the weighting system is given by the population share of each subgroup (f_j) while in the latter, $\theta = 1$, the weighting system is given by the income share of each subgroup in the total income (s_j). Cowell and Jenkins (1995) show that the between-group component is analogue of the R^2 coefficient used in regression analysis to measure the amount of inequality that can be 'explained' by the factor (or factors) used for grouping the population (gender, education level, ...etc.).

Note that if the same approach is applied to a non-decomposable inequality index, for instance the Gini coefficient which is largely used in the inequality literature, a residual term emerges:

$$I(\mathrm{y}) = I^{between}(\mathrm{y}) + I^{within}(\mathrm{y}) + Residual \tag{7}$$

It is well-known that for the Gini index, the residual term reflects the overlapping components between income groups. To remove the residual term, one can estimate by how much inequality would be reduced if the between-inequality or the within-inequality is removed.

Take for instance the calculation of the between-inequality. The first estimate would naturally be given by granting each individual the mean income of the group to which he belongs, i.e., $I(\bar{y}_1, \ldots,\ \bar{y}_J)$. The second estimate would be given by the difference between the initial (overall) inequality and inequality which would be given by a counterfactual distribution, call it $\mathbf{y}^*$, where between-inequality is removed and all that there is left is within-inequality. This could be done by adjusting each observation by the ratio $\frac{\bar{y}}{\bar{y}_j}$ so that mean income of each group becomes $\bar{y}$ Except for the GE indices which are decomposable, these two estimates will differ when the groups' distribution of welfare overlaps. Since it is usually arbitrary to prefer one estimate to the other, we use the Shapley's (1953) rule, which consists of, in the case of two alternatives, to take the average of the two estimates:[6]

$$I^{between}(\mathrm{y}) = 0.5I(\bar{y}_1,\ \ldots,\bar{y}_J) + 0.5\left(I(\mathrm{y})\ -\ I(\mathrm{y}^*)\right). \tag{8}$$

Analogously, the within-inequality can be computed as:

$$I^{within}(\mathrm{y}) = 0.5I(\mathrm{y}^*) + 0.5\left(I(\mathrm{y})\ -\ I(\bar{y}_1,\ \ldots,\bar{y}_J)\right). \tag{9}$$

For the sake of completeness, we present the results of the decomposition of the Gini index into within, between and residual components, along with the GE class of measures.

3. Reinterpreting between-Group Inequality

Developments of section 2 clearly show that conventional decomposition of between-group inequality is sensitive, further to differences in average income across groups (y_j), to the population share of each group (f_j). Since the importance of any pre-defined group often varies across countries, this causes ambiguity when comparing $R^{between}$, i.e., the relative contribution of between-inequality to overall inequality across countries. Quoting from Elbers et al. (2008),

[6] Bibi and Duclos (2010) give the formula of the Shapley (1953) rule in the case of more than two alternatives.

“The conventional between-group share is calculated by taking the ratio of observed between-group inequality to total inequality. Total inequality, however, can be viewed as the between-group inequality that would be observed if every household in the population constituted a separate group. Thus, the conventional practice is equivalent to comparing observed between-group inequality (across a few groups under examination) against a benchmark (across perhaps millions of groups) that is quite extreme — and probably rather unrealistic” Elbers et al. (2008 p.233).

Based on this shortcoming of the usual interpretation of the between-group components, Elbers et al. (2008) suggest a new Benchmark against which between-group inequality is judged. While conventional between-group inequality is calculated as the ratio of between-group component $I^{between}$, to the total inequality I, Elbers et al. (2008) propose the replacement of the denominator with a counterfactual maximum between-group inequality that could be observed, by reassigning individual incomes across the J subgroups in partition Π of size $j(n)$. More specifically, let J be the number of subgroups. For a particular permutation of subgroups $g(j)$, $j = 1, \ldots, J$, we assign the lowest incomes to $g(1)$, then to $g(2)$, and the highest incomes to $g(J)$. The next step is to calculate the corresponding between-group inequality for this counterfactual distribution. The maximum between-group inequality, i.e.,

$$I_{\max}^{between}(\Pi) = \max\{I^{between}|\Pi(j(n), J)\} \tag{10}$$

is defined as the highest between component obtained among all possible $J!$ permutations of subgroups. Thus, the ratio

$$\hat{R}^{between}(\Pi) = \frac{I^{between}(\Pi)}{I_{\max}^{between}(\Pi)} = R^{between}(\Pi)\frac{I(\mathbf{y})}{I_{\max}^{Between}(\Pi)} \tag{6}$$

is used as a complement to the ratio $R^{between}(\Pi) = \frac{I^{between}(\Pi)}{I(\mathbf{y})}$ to assess the extent of population group disparities. The denominator denotes the maximum between-group inequality that could arise by reassigning individuals across the J sub-groups in partition Π of size $j(n)$. The most important features of the index proposed in (11) is that between-inequality does not automatically increase when we consider a finer partition of the population (more sub-groups), because both the numerator and the denominator in (11) change simultaneously with the number of groups considered.

In order to calculate the new index, we need three components: the total inequality measure given by $I(\mathbf{y})$, the usual between-group component $I^{between}(\Pi)$ (obtained by either the mathematical decomposition or, for non-decomposable indices, the Shapley’s rule described by (8)), and maximum between-group inequality $I_{\max}^{between}(\Pi)$. We note that between-inequality attains its maximum when sub-groups income ranges do not overlap. To see how $I_{\max}^{between}(\Pi)$ can be estimated, we consider two population groups j and k. The between-group inequality is maximized when either the richest in j is poorer than the poorest in k or the poorest in j is richer than the richest in k. The procedure to estimate $I_{\max}^{between}(\Pi)$ works then as follows: the $j(n)$ lowest incomes are assigned to the members of group j and the remaining incomes are assigned to the group k. It results a first possibility of between-inequality, call it $I_1^{between}(\Pi)$ Then, the $j(n)$ highest incomes are assigned to the members of group j and the remaining incomes are assigned to the group k. It results in a second possibility of between-inequality, call it $I_2^{between}(\Pi)$. $I_{\max}^{between}(\Pi)$ is therefore equal to max{ $I_1^{between}(\Pi)$, $I_2^{between}(\Pi)$ }. In the case of J sub-groups we can apply the same pattern for all possible permutation $J!$ of population groups.

Elbers et al (2008) note that some re-ordering of groups may imply some counterintuitive counterfactual distribution. For instance, assigning lowest incomes to the white population in the United States or South-Africa is clearly an unrealistic situation. The authors suggest to introduce more structure to the approach proposed and restrict attention to sub-group permutations that respect the 'pecking order' of sub-groups mean incomes. This leads for instance to the exclusion of some situations such that the unskilled or the illiterates are the better-off group. Hence, the maximum possible between-group inequality will be obtained given the current income distribution, relative sub-group sizes, and their rankings by mean incomes.

4. Illustrations to Some Arab Countries

The conventional and Elbers et al.'s (2008) methodologies presented above are illustrated using fourteen nationally representative household surveys from six Arab countries. These are Jordan 1997, Mauritania 2004, Morocco 1991 and 1999, Syria 1997, 2003 and 2007, Tunisia 1980, 1985, 1990, 1995, and 2000, United Arab Emirates 2008, and Yemen 1998. These surveys are multipurpose and provide reliable information on households' consumption expenditure as well as extensive socioeconomic and socio-demographic characteristics (household size and structure, gender of the household head, region of residence, and occupation status) of households and their living conditions (dwelling characteristics, possession of durable goods, etc.).[7]

We use total household expenditure divided by household size for valuing and comparing individual well-being in these data. Observations are weighted by their sample weights multiplied by household size. For most countries having the pertinent data, overall inequality is decomposed according to: gender, educational group, geographical regions and urban rural areas. For the United Arab Emirates, we also decompose inequality by nationality.

Tables 1 to 14 present results of the *conventional* decomposition of the GE family for $\theta = 0, 1$ and 2, respectively. We present also the *conventional* decomposition of the Gini index including the overlap component (7). These results will be completed in Bibi and El-Lahga (2010b) by the use of the Shapley rule described by (8) and (9) to any inequality yardstick.[8] Recall that $I_{GE}(\mathbf{y}; 0)$ known as mean log deviation index, $I_{GE}(\mathbf{y}; 1)$ is simply Theil Entropy measure and $I_{GE}(\mathbf{y}; 2)$ is equivalent to the squared coefficient of variation. Before presenting the results, we note that the choice of population subgroups was constrained by the data availability (not all surveys contain the desired information) and policy pertinence of the comparison between-groups.

Concerning gender disparity, the *conventional* decompositions show that differences in *per capita* expenditures between male headed households and their female counterparts are very small. About 99% of inequality, based on GE family, are observed within each of gender groups. Virtually, the same conclusion applies for Gini based inequality. The main issues seem then to fight within group inequality.

Decomposition of inequality by educational level, reveals that illiterate groups are relatively homogeneous, in the sense that inequality within these groups is relatively lower than that prevailing in groups with secondary or university degrees. Again the between-group component seems very small, where the most important difference was observed in Morocco in 1999.

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[7] More details on theses surveys are in Bibi and El-Lahga (2010a) and Bibi and Nabli (2010).

[8] Bibi and El-Lahga (2010a) use a wide class of inequality indices, including Lorenz- and Bonferroni-consistent inequality statistics, to measure the extent of inequality in the ACs.

All these *conventional* decompositions would suggest that concerns about unequal distribution across groups (and inequality of opportunities, if duality can be assumed) could be ignored, given the low contribution of between-inequality to overall disparity. Any equalizing efforts across individuals should focus on within group inequality. However, such conclusions seem to be unrealistic, it is somewhat difficult to accept a normative argument suggesting an equalizing transfer within the illiterate individuals group rather than one reducing inequality between this group and the rest of the population.

This picture would slightly change when we breakdown the population into urban and rural residents. Conventional decompositions show in this case that, although rural-urban disparity is rather small in some ACs, $I_{GE}^{Between}$ (**y**; 0) attains 13.9% in Tunisia in 2000, 22% in Morocco in 1998 and even 39.8% in Yemen. In line with Bibi and Nabli (2010), between-inequality in this case can be deemed as a proxy of inequality of opportunities. Indeed, urban-rural disparities in terms of access to infrastructure and public services are often important in the ACs.[9] We can then believe that the variability of outcomes between citizens of urban and rural areas reflect more the variability in circumstances rather than the variability in efforts. Since variability in circumstances is beyond individuals' responsibilities, fighting urban-rural disparity should be at the heart of the redistributive policies in the ACs and mainly in Yemen.

Turning now to the illustration of the methodology developed in section (3). The rows of Tables 1 to 14 labeled 'Between Max' show the maximum between-inequality that could be observed. The lines labeled '$\hat{R}^{between}(\mathbf{y})$' present the relative importance of the observed between-group inequality (or inequality of opportunities when duality applies) compared to the counterfactual maximum of between-inequality. While, the new ratio '$\hat{R}^{between}(\mathbf{y})$' is clearly greater than the conventional ratio '$R^{between}(\mathbf{y})$', the importance of the counterfactual between-inequality remain relatively low. In most countries, and for almost all population breakdowns, the ratio $\hat{R}^{between}(\mathbf{y})$ is less than 35%. However, there are two notable exceptions in Yemen 1998 and Morocco 1999. Differences between urban and rural areas seem to be potentially very important where the ratio $\hat{R}^{between}(\mathbf{y})$ is close to 83%. Such results confirm that there would be a huge issue of inequality of opportunities in these countries and an urgent need to reduce such disparities. Similar findings are also obtained for Morocco when we compare different educational groups. The potential between-groups inequality contributes in this case to a near 70% of overall inequality.

5. Conclusion

In this paper, an attempt to decompose overall inequality into within- and between-group inequality is performed using available and accessible household surveys for a set of ACs. To achieve this aim, we have endeavored to overcome usual difficulties in interpreting the between-inequality, by applying an alternative measure of the relative contribution of between-inequality suggested by Elbers et al. (2008). More specifically, the new approach works by calculating the relative contribution of between-inequality against a benchmark of the maximum between-inequality rather than against overall inequality. The new approach yields then a complementary characterization of the importance of the contribution of disparities across socioeconomic groups to the total inequality. This an important advantage of the new procedure as population breakdown sheds light on the extent of inequality of opportunities in the ACs.

Quantitative estimates of the relative importance of between-inequality based upon the Elbers et al.'s (2008) approach are sometimes at odds with those estimates based on conventional decomposition methods. For instance, while at the end of 1990s rural-urban disparity accounts

[9] See for instance Ali and Fan (2007) for more about this.

for 22% of total inequality in Morocco and 39.8% in Yemen, these ratios climb to 37.2% of the maximum between-inequality attainable in Morocco and 77.6% in Yemen. Viewing Yemen through the Elbers et al.'s (2008) approach, and assuming that regional inequalities reflect more the variability in circumstances rather than the variability in efforts, policymakers concerned with regional development and inequality of opportunities would place the emphasis on regional inequality in devising the Yemenite redistributive policies. Hence, taking between-inequality seriously can have important implications for the design and the understanding of anti-inequality policies.

The inequality measures used in this paper to assess the importance of between-group differences belong principally to the Generalized Entropy (GE) class. One typical feature of the GE class is that their inequality indices are additively decomposable; and this feature makes inequality decomposition according to certain characteristics straightforward. Unfortunately, the GE class is not as large as the β class of inequality measures suggested by Olmedo et al. (2009), which comprises different well-known families of inequality measures. In contrast with the GE class, the β class includes indices that may be focused on any percentile of the distribution, and this percentile does not have to be at one tail of that distribution. The indices of the β class are not, nevertheless, additively decomposable. Using Shapley (1953), it is fortunately possible to perform such decompositions for any non-additively inequality measure of the β class. This could be very relevant as some redistributive policies are designed to reduce within- or between-inequalities in a certain part of the income distribution, and sometimes this part may not be the extreme. This presents the natural extension of this study, which we plan to investigate in our next research study.

References

Ali, A. G. A. and S. Fan. 2007. *Public Policy and Poverty Reduction in the Arab Region*. Arab Planning Institute, Kuwait.

Atkinson, A. B. 1970. "On the Measurement of Inequality". *Journal of Economic Theory*. Vol. 2, pp. 244–263.

Bibi, S, and A. El-Lahga. 2010a. "A Unified Framework to Measuring Inequality in the Arab Countries". *Unpublished paper.* Cairo, Egypt: Economic Research Form.

Bibi, S. and A. El Lahga. 2010b. "Decomposing Inequality in the Arab region: An Unified Framework." *Unpublished manuscript*. University of Tunis

Bibi, S. and J.-Y. Duclos. 2010. "A Comparison of the Poverty Impact of Transfers, Taxes and Market Income across five OECD Countries". Forthcoming in *Bulletin of Economic Research*.

Bibi, S, and M. K. Nabli. 2009. "Income Inequality in the Arab Region: Data and Measurement, Pattern and Trends". *Middle East Development Journal*. Vol. 1, N. 2, pp. 275-314.

Bibi, S. and M. K. Nabli. 2010. "Equity and Inequality in the Arab Region". *ERF Policy Research Report* PPR No 33. Egypt: Economic Research Forum.

Bourguignon, F., F. H. G. Ferreira and M. Menéndez. 2007. "Inequality of Opportunity in Brazil". *Review of Income Wealth*. Vol. 53, N. 4, pp. 585-618.

Checchi, D., and V. Peragine. 2005. "Regional Disparities and Inequality of Opportunity: the Case of Italy". *IZA Discussion Paper* No. 1874/2005.

Cowell, F.A. 2000. "Measurement of Inequality". In *Handbook of Income Distribution,* eds. A.B. Atkinson and F. Bourguignon. North Holland, Amsterdam.

Cowell, F. A. and S. P. Jenkins. 1995. "How Much Inequality Can We Explain? A Methodology and an Application to the USA". *The Economic Journal*. Vol. 105, pp. 421-430.

Elbers, C., P. Lanjouw, J. A. Mistiaen, and B. Ozler. 2008. "Reinterpreting Between-group Iinequality". *Journal of Economic Inequality*. Vol. 6, pp. 231-245.

Ferreira, F.H.G and J. Gignoux. 2008. "The Measurement of Inequality of Opportunity: Theory and an application to Latin America". *Policy Research Working Paper* WPS 4659, The World Bank.

Fields, G. S. 2006. "Why Should We Care About Income Inequality?". *Unpublished document*. Cornell University.

Kanbur, R. 2006. "The Policy Significance of Inequality Decompositions". *Journal of Economic Inequality.* Vol. 4, pp. 367-374

Olmedo I., L. J., Barcena Martin, E. and E. M., Parrado Gallardo. 2009. "A Wide Class of Inequality Measures Based on the Bonferroni Curve". *Paper presented at Cornell*

University/London School of Economics conference on Inequality, September 12-13, 2009: *New Directions*. Cornell University.

Rawls, J. 1971. "*A Theory of Justice*". Cambridge, Massachusetts: Harvard University Press.

Shapley, L. 1953. "A Value for n-Person Games. In: Contributions to the Theory of Games", eds. H.W. Kuhn and A.W. Tucker. *Annals of Mathematics Studies*. Vol. 2, pp. 303-317. Princeton: Princeton University Press.

Shorrocks, A. F. 1980. "The Class of Additively Decomposable Inequality Measures". *Econometrica*. Vol. 48, pp. 613-625

Theil, H. 1967. "*Economics and Information Theory*". Amsterdam: North Holland

Table 1: Decomposition of Inequality Index-Emirate (2008)-Nationality

Group	population share	Entropy index $I_{GE}(y, 0)$	Relative contribution	Entropy index $I_{GE}(y, 1)$	Relative contribution	Entropy index $I_{GE}(y, 2)$	Relative contribution	Gini index	Relative contribution
Expatriate	.682	.264	.728	.290	.678	.580	.587	.397	.459
Nationals	.318	.204	.262	.247	.313	.641	.409	.348	.101
Within	-	.245	.990	.275	.991	.607	.996	.214	.560
Between	-	.002	.010	.003	.009	.002	.004	.034	.088
Overlap	-	-		-	-	-	-	-	.352
$I^{between}_{max}$(II)		.150		.156		.170		.272	
$\hat{R}^{between}$(.)		.016		.016		.014		.124	
Total	1.000	.247	1.000	.278	1.000	.609	1.000	.383	1.000
				Emirate					
Abudhabi	.350	.217	.307	.221	.252	.293	.138	.358	.104
Dubai	.289	.218	.255	.254	.391	.586	.606	.357	.115
Sharjah	.213	.142	.122	.183	.104	.732	.140	.291	.025
Others	.148	.216	.129	.231	.082	.314	.034	.363	.014
Within	-	.201	.813	.230	.829	.559	.918	.099	.258
Between	-	.046	.187	.048	.171	.050	.082	.165	.430
Overlap	-	-	-	-	-	-	-	-	.312
$I^{between}_{max}$(II)		.203		.186		.192		.328	
$\hat{R}^{between}$(.)		.227		.255		.260		.502	
Total	1.000	.247	1.000	.278	1.000	.609	1.000	.383	1.000
				Educational Level					
Illiterate	.096	.337	.131	.582	.172	3.438	.396	.438	.009
Primary	.144	.220	.128	.225	.083	.290	.034	.364	.014
Secondary	.411	.214	.356	.235	.304	.479	.246	.359	.138
University	.350	.198	.280	.210	.346	.284	.279	.348	.145
Within	-	.221	.895	.252	.905	.582	.956	.117	.306
Between	-	.026	.105	.026	.095	.027	.044	.120	.313
Overlap	-	-	-	-	-	-	-	-	.381
$I^{between}_{max}$(II)		.196		.176		.176		.312	
$\hat{R}^{between}$(.)		.133		.150		.152		.384	
Total	1.000	.247	1.000	.278	1.000	.609	1.000	.383	1.000

Table 2: Decomposition of Income Inequality Jordan (1997)-Gender

Group	population share	Entropy index $I_{GE}(y, 0)$	Relative contribution	Entropy index $I_{GE}(y, 1)$	Relative contribution	Entropy index $I_{GE}(y, 2)$	Relative contribution	Gini index	Relative contribution
Male	.942	.247	.927	.268	.913	.429	.904	.38	.868
Female	.058	.297	.069	.323	.083	.481	.093	.42	.004
Within		.250	.995	.272	.996	.435	.997	.335	.873
Between		.001	.005	.001	.004	.001	.003	.012	.031
Overlap									.097
$I_{max}^{between}(\Pi)$		.094		.135		.219		.155	
$\hat{R}^{between}(.)$		.013		.008		.006		.077	
Total	1.000	.251	1.000	.273	1.000	.436	1.000	.384	1.000
				Region					
G1	.495	.273	.540	.303	.612	.502	.707	.402	.286
G2	.305	.205	.250	.219	.212	.321	.169	.345	.073
G3	.199	.232	.184	.225	.152	.280	.109	.365	.035
Within		.244	.974	.266	.976	.429	.985	.151	.394
Between		.007	.026	.007	.024	.007	.015	.060	.155
Overlap									.451
$I_{max}^{between}(\Pi)$		.167		.143		.133		.271	
$\hat{R}^{between}(.)$		.039		.046		.049		.220	
Total	1.000	.251	1.000	.273	1.000	.436	1.000	.384	1.000
				Educational Level					
Illiterate	.171	.215	.146	.217	.106	.287	.069	.355	.021
Primary	.335	.203	.270	.214	.214	.305	.156	.343	.082
Secondary	.396	.216	.342	.236	.354	.357	.346	.358	.151
University	.098	.253	.099	.261	.176	.404	.321	.379	.018
Within		.215	.858	.232	.851	.388	.891	.104	.272
Between		.036	.142	.041	.149	.048	.109	.137	.357
Overlap									.371
$I_{max}^{between}(\Pi)$		.223		.229		.284		.348	
$\hat{R}^{between}(.)$		.160		.178		.168		.393	
Total	1.000	.251	1.000	.273	1.000	.436	1.000	.384	1.000
				Area of residence					
Urban	.737	.265	.778	.287	.834	.457	.892	.395	.601
Rural	.263	.179	.187	.179	.136	.239	.090	.319	.045
Within		.242	.965	.265	.970	.428	.982	.248	.647
Between		.009	.035	.008	.030	.008	.018	.055	.142
Overlap									.211
$I_{max}^{between}(\Pi)$		.117		.089		.073		.168	
$\hat{R}^{between}(.)$		.075		.092		.108		.325	
Total	1.000	.251	1.000	.273	1.000	.436	1.000	.384	1.000

Table 3: Decomposition of Inequality Index-Morocco (1991)-Gender

Group	population share	Entropy index $I_{GE}(y,0)$	Relative contribution	Entropy index $I_{GE}(y,1)$	Relative contribution	Entropy index $I_{GE}(y,2)$	Relative contribution	Gini index	Relative contribution
Male	.865	.266	.902	.301	.905	.495	.92	.403	.758
Female	.135	.182	.096	.187	.094	.239	.08	.327	.016
Within		.255	.999	.285	.999	.457	.999	.304	.774
Between		.000	.001	.000	.001	.000	.001	.008	.021
Overlap									.204
$I_{\max}^{between}(\Pi)$		.171		.217		.304		.266	
$\hat{R}^{between}(.)$		.001		.001		.002		.031	
Total	1.000	.255	1.000	.285	1.000	.457	1.000	.393	1.000
Region									
South	.115	.279	.125	.32	.117	.495	.103	.415	.013
Tensift	.142	.227	.126	.271	.109	.48	.097	.371	.015
Center	.273	.233	.25	.265	.287	.446	.34	.375	.08
North-West	.211	.259	.214	.284	.251	.44	.29	.394	.053
Center-North	.116	.255	.116	.285	.099	.415	.077	.396	.012
East	.075	.219	.064	.224	.051	.299	.036	.359	.004
Center-South	.069	.205	.055	.218	.044	.281	.029	.358	.004
Within		.243	.951	.273	.957	.445	.973	.071	.181
Between		.012	.049	.012	.043	.012	.027	.085	.217
Overlap									.602
$I_{\max}^{between}(\Pi)$		.302		.267		.284		.398	
$\hat{R}^{between}(.)$		.041		.046		.043		.214	
Total	1.000	.255	1.000	.285	1.000	.457	1.000	.393	1.000
Area of residence									
Urban	.469	.239	.439	.26	.581	.396	.751	.377	.286
Rural	.531	.158	.329	.171	.217	.227	.123	.313	.153
Within		.196	.768	.227	.798	.399	.874	.173	.439
Between		.059	.232	.058	.202	.058	.126	.169	.430
Overlap									.131
$I_{\max}^{between}(\Pi)$		.169		.155		.150		.274	
$\hat{R}^{between}(.)$		.350		.372		.383		.618	
Total	1.000	.255	1.000	.285	1.000	.457	1.000	.393	1.000

Table 4: Decomposition of Inequality Index-Morocco (1999)-Gender

Group	population share	Entropy index $I_{GE}(y, 0)$	Relative contribution	Entropy index $I_{GE}(y, 1)$	Relative contribution	Entropy index $I_{GE}(y, 2)$	Relative contribution	Gini index	Relative contribution
Male	.879	.263	.878	.298	.861	.484	.851	.399	.751
Female	.121	.246	.113	.267	.131	.394	.144	.384	.017
Within		.262	.991	.294	.992	.472	.995	.306	.768
Between		.002	.009	.002	.008	.002	.005	.024	.059
Overlap									.173
$I^{between}_{max}(\Pi)$		.143		.184		.259		.235	
$\hat{R}^{between}(.)$		.017		.013		.009		.100	
Total	1.000	.264	1.000	.296	1.000	.474	1.000	.399	1.000
Region									
South	.128	.274	.133	.3	.141	.456	.146	.405	.018
Tensift	.172	.242	.158	.278	.136	.432	.112	.385	.024
Center	.228	.253	.219	.292	.28	.476	.356	.391	.064
North-West	.211	.253	.203	.279	.195	.417	.179	.391	.043
Center-North	.121	.265	.122	.3	.102	.507	.09	.401	.012
East	.073	.194	.054	.202	.046	.274	.036	.339	.004
Center-South	.067	.261	.067	.311	.059	.558	.055	.396	.004
Within		.252	.955	.284	.959	.462	.974	.067	.169
Between		.012	.045	.012	.041	.012	.026	.086	.216
Overlap									.615
$I^{between}_{max}(\Pi)$		.259		.245		.267		.381	
$\hat{R}^{between}(.)$		.046		.050		.046		.226	
Total	1.000	.264	1.000	.296	1.000	.474	1.000	.399	1.000
Area of residence									
Urban	.539	.24	.491	.271	.641	.414	.796	.384	.364
Rural	.461	.165	.288	.172	.174	.225	.092	.317	.109
Within		.206	.780	.241	.815	.421	.888	.189	.473
Between		.058	.220	.055	.185	.053	.112	.162	.407
Overlap									.120
$I^{between}_{max}(\Pi)$		.156		.137		.127		.251	
$\hat{R}^{between}(.)$		.372		.400		.419		.647	
Total	1.000	.264	1.000	.296	1.000	.474	1.000	.399	1.000

Table 4: Continued

					Educational Level				
Illiterate	.582	.206	.422	.206	.321	.288	.224	.34	.23
Primary	.28	.212	.216	.212	.19	.285	.152	.349	.065
Secondary	.105	.265	.1	.265	.161	.387	.25	.384	.018
University	.027	.225	.025	.225	.065	.255	.15	.371	.002
Within		.226	.764	.218	.737	.367	.775	.126	.316
Between		.070	.236	.078	.263	.107	.225	.169	.424
Overlap									.260
$I_{\max}^{between}(\Pi)$		.255		.314		.534		.356	
$\hat{R}^{between}(.)$		.888		.696		.688		.355	
Total	1.000	.296	1.000	.296	1.000	.474	1.000	.399	1.000

Table 5: Decomposition of Inequality Index-Syria (2003)-Gender

Group	population share	Entropy index $I_{GE}(y, 0)$	Relative contribution	Entropy index $I_{GE}(y, 1)$	Relative contribution	Entropy index $I_{GE}(y, 2)$	Relative contribution	Gini index	Relative contribution
Female	.058	.279	.071	.327	.09	.556	.113	.411	.005
Male	.942	.223	.922	.256	.904	.427	.883	.37	.865
Within		.226	.993	.261	.994	.440	.996	.325	.870
Between		.002	.007	.002	.006	.002	.004	.014	.037
Overlap									.093
$I_{\max}^{between}(\Pi)$		.086		.123		.196		.147	
$\hat{R}^{between}(.)$		.018		.013		.009		.094	
Total	1	.228	1	.263	1	.442	1	.374	1
Region									
South	.29	.211	.272	.249	.322	.419	.371	.358	.096
North.East	.45	.224	.445	.256	.384	.397	.308	.373	.178
Center	.16	.239	.172	.29	.181	.606	.225	.383	.028
Costal	.08	.195	.076	.21	.082	.292	.078	.345	.008
Within		.220	.965	.255	.969	.434	.982	.116	.309
Between		.008	.035	.008	.031	.008	.018	.068	.181
Overlap									.510
$I_{\max}^{between}(\Pi)$		.178		.174		.184		.316	
$\hat{R}^{between}(.)$		.045		.047		.043		.215	
Total	1	.228	1	.263	1	.442	1	.374	1
Area of residence									
Rural	.498	.189	.413	.218	.34	.396	.301	.341	.186
Urban	.502	.235	.516	.267	.6	.422	.663	.379	.301
Within		.212	.929	.247	.939	.426	.964	.182	.487
Between		.016	.071	.016	.061	.016	.036	.089	.238
Overlap									.275
$I_{\max}^{between}(\Pi)$		.136		.124		.119		.244	
$\hat{R}^{between}(.)$		.119		.129		.134		.365	
Total	1	.228	1	.263	1	.442	1	.374	1

Table 5: Continued

Educational Level									
Illiterate	.263	.21	.242	.25	.216	.5	.22	.358	.057
Primary	.426	.193	.36	.217	.317	.324	.253	.344	.15
Secondary	.24	.219	.23	.243	.251	.377	.26	.366	.064
University	.071	.273	.085	.299	.137	.461	.213	.406	.009
Within		.209	.917	.242	.920	.418	.946	.105	.280
Between		.019	.083	.021	.080	.024	.054	.094	.251
Overlap									.468
$I_{\max}^{between}(\Pi)$		.213		.230		.297		.350	
$\hat{R}^{between}(.)$		.089		.091		.080		.268	
Total	1	.228	1	.263	1	.442	1	.374	1

Table 6: Decomposition of Inequality Index-Syria (2007)-Gender

Group	population share	Entropy index $I_{GE}(y, 0)$	Relative contribution	Entropy index $I_{GE}(y, 1)$	Relative contribution	Entropy index $I_{GE}(y, 2)$	Relative contribution	Gini index	Relative contribution
Female	.063	.232	.079	.259	.092	.380	.096	.378	.005
Male	.937	.181	.914	.210	.902	.359	.900	.333	.854
Within	-	.185	.993	.214	.994	.362	.996	.291	.860
Between	-	.001	.007	.001	.006	.001	.004	.013	.039
Overlap	-	-	-	-	-	-	-	-	.101
$I_{\max}^{between}(\Pi)$		.073		.100		.151		.134	
$\hat{R}^{between}(.)$		.014		.013		.010		.099	
Total	1.000	.186	1.000	.215	1.000	.363	1.000	.338	1.000
Region									
South	.283	.169	.257	.190	.276	.277	.264	.322	.084
North.East	.467	.182	.459	.214	.393	.345	.316	.336	.183
Center	.162	.148	.129	.184	.147	.427	.216	.300	.025
Costal	.088	.180	.085	.218	.122	.365	.167	.328	.010
Within	-	.173	.930	.202	.938	.349	.962	.102	.303
Between	-	.013	.070	.013	.062	.014	.038	.086	.254
Overlap	-	-	-	-	-	-	-	-	.443
$I_{\max}^{between}(\Pi)$		.176		.194		.244		.322	
$\hat{R}^{between}(.)$		.074		.069		.057		.266	
Total	1.000	.186	1.000	.215	1.000	.363	1.000	.338	1.000
Area of residence									
Rural	.465	.177	.443	.214	.389	.432	.391	.329	.177
Urban	.535	.172	.497	.197	.559	.303	.579	.326	.315
Within	-	.175	.939	.204	.948	.352	.970	.166	.492
Between	-	.011	.061	.011	.052	.011	.030	.074	.219
Overlap	-	-	-	-	-	-	-	-	.289
$I_{\max}^{between}(\Pi)$		.108		.099		.093		.215	
$\hat{R}^{between}(.)$		.105		.113		.117		.344	
Total	1.000	.186	1.000	.215	1.000	.363	1.000	.338	1.000

Table 6: Continued

				Educational Level					
Illiterate	.144	.161	.124	.184	.101	.280	.075	.314	.016
Primary	.519	.163	.457	.189	.411	.289	.336	.317	.228
Secondary	.265	.175	.250	.203	.282	.382	.352	.327	.077
University	.071	.195	.075	.220	.119	.345	.179	.343	.008
Within	-	.169	.907	.196	.912	.342	.942	.111	.329
Between	-	.017	.093	.019	.088	.021	.058	.094	.277
Overlap	-	-	-	-	-	-	-	-	.395
$I_{\max}^{between}(\Pi)$		.178		.201		.301		.308	
$\hat{R}^{between}(.)$		.097		.094		.070		.304	
Total	1.000	.186	1.000	.215	1.000	.363	1.000	.338	1.000

Table 7: Decomposition of Inequality Index-Syria (1997)-Gender

Group	population share	Entropy index $I_{GE}(y, 0)$	Relative contribution	Entropy index $I_{GE}(y, 1)$	Relative contribution	Entropy index $I_{GE}(y, 2)$	Relative contribution	Gini index	Relative contribution
Female	.062	.212	.07	.234	.082	.358	.094	.358	.005
Male	.938	.185	.925	.207	.913	.326	.903	.335	.863
Within	-	.186	.995	.209	.995	.330	.997	.293	.868
Between	-	.001	.005	.001	.005	.001	.003	.011	.034
Overlap	-	-	-	-	-	-	-	-	.099
$I_{max}^{between}(\Pi)$		.071		.098		.147		.131	
$\hat{R}^{between}(.)$		.013		.011		.007		.088	
Total	1.000	.187	1.000	.210	1.000	.331	1.000	.338	1.000
Region									
South	.302	.183	.294	.204	.314	.302	.316	.335	.097
North.East	.441	.179	.422	.196	.388	.2862	.336	.330	.180
Center	.166	.179	.159	.203	.140	.313	.120	.330	.024
Costal	.090	.196	.094	.238	.129	.476	.209	.345	.010
Within	-	.181	.970	.204	.972	.325	.982	.105	.311
Between	-	.006	.030	.006	.028	.006	.018	.056	.167
Overlap	-	-	-	-	-	-	-	-	.522
$I_{max}^{between}(\Pi)$		.156		.166		.200		.298	
$\hat{R}^{between}(.)$		.036		.035		.030		.189	
Total	1.000	.187	1.000	.210	1.000	.331	1.000	.338	1.000
Area of residence									
Rural	.484	.188	.486	.207	.442	.310	.392	.337	.218
Urban	.516	.182	.501	.209	.547	.339	.601	.334	.281
Within	-	.185	.987	.208	.989	.329	.993	.169	.499
Between	-	.002	.013	.002	.011	.002	.007	.034	.102
Overlap	-	-	-	-	-	-	-	-	.399
$I_{max}^{between}(\Pi)$		.122		.111		.106		.230	
$\hat{R}^{between}(.)$		.020		.021		.022		.150	
Total	1.000	.187	1.000	.210	1.000	.331	1.000	.338	1.000

Table 7: Continued

	Educational Level								
Illiterate	.230	.169	.207	.183	.179	.253	.141	.320	.045
Primary	.526	.179	.503	.201	.481	.314	.460	.330	.260
Secondary	.194	.193	.201	.225	.230	.387	.280	.343	.043
University	.050	.193	.051	.210	.073	.287	.094	.345	.004
Within	-	.180	.962	.202	.964	.323	.975	.119	.351
Between	-	.007	.038	.008	.036	.008	.025	.056	.165
Overlap	-	-	-	-	-	-	-	-	.484
$I_{\max}^{between}(\Pi)$		.165		.181		.233		.302	
$\hat{R}^{between}(.)$		.043		.042		.036		.185	
Total	1.000	.187	1.000	.210	1.000	.331	1.000	.338	1.000

Table 8: Decomposition of Inequality Index-Yemen (1998)-Gender

Group	population share	Entropy index $I_{GE}(y, 0)$	Relative contribution	Entropy index $I_{GE}(y, 1)$	Relative contribution	Entropy index $I_{GE}(y, 2)$	Relative contribution	Gini index	Relative contribution
Female	.050	.367	.050	.350	.045	.492	.041	.447	.002
Male	.950	.365	.947	.323	.953	.414	.957	.434	.908
Within	-	.365	.998	.324	.998	.417	.998	.397	.910
Between	-	.001	.002	.001	.002	.001	.002	.009	.020
Overlap	-	-	-	-	-	-	-	-	.071
$I^{between}_{max}(\Pi)$		.078		.036		.022		.046	
$\hat{R}^{between}(.)$		.009		.018		.038		.190	
Total	1.000	.366	1.000	.325	1.000	.418	1.000	.436	1.000
				Region					
G1	.184	.252	.127	.228	.181	.304	.262	.354	.039
G2	.098	.286	.076	.256	.064	.324	.052	.381	.007
G3	.027	.177	.013	.202	.005	.318	.001	.328	.000
G4	.262	.330	.237	.309	.244	.410	.246	.424	.066
G5	.283	.329	.255	.273	.278	.315	.291	.401	.086
G6	.080	.260	.057	.261	.034	.356	.020	.385	.003
G7	.065	.253	.045	.286	.021	.508	.011	.388	.001
Within	-	.296	.810	.269	.827	.369	.883	.088	.202
Between	-	.070	.190	.056	.173	.049	.117	.170	.390
Overlap	-	-	-	-	-	-	-	-	.408
$I^{between}_{max}(\Pi)$		.439		.386		.438		.470	
$\hat{R}^{between}(.)$		.158		.146		.112		.362	
Total	1.000	.366	1.000	.325	1.000	.418	1.000	.436	1.000
				Area of residence					
Urban	.231	.240	.152	.271	.053	.462	.020	.381	.013
Rural	.769	.214	.450	.220	.633	.291	.792	.357	.590
Within	-	.220	.602	.223	.686	.339	.812	.262	.602
Between	-	.146	.398	.102	.314	.079	.188	.167	.384
Overlap	-	-	-	-	-	-	-	-	.014
$I^{between}_{max}(\Pi)$		.188		.123		.091		.180	
$\hat{R}^{between}(.)$		.776		.831		.861		.930	
Total	1.000	.366	1.000	.325	1.000	.418	1.000	.436	1.000

Table 8: Continued

				Educational Level					
Group	share	$I_{GE}(y, 0)$	contribution	$I_{GE}(y, 1)$	contribution	$I_{GE}(y, 2)$	contribution	index	contribution
Illiterate	.521	.334	.476	.294	.480	.368	.474	.415	.263
Primary	.334	.377	.344	.323	.342	.388	.328	.439	.115
Secondary	.105	.453	.130	.448	.132	.747	.157	.495	.011
University	.040	.410	.045	.426	.041	.651	.038	.486	.001
Within	-	.364	.995	.323	.995	.416	.996	.170	.391
Between	-	.002	.005	.002	.005	.002	.004	.021	.048
Overlap	-	-	-	-	-	-	-	-	.561
$I_{\max}^{between}(\Pi)$		.399		.344		.358		.420	
$\hat{R}^{between}(.)$		.005		.005		.005		.050	
Total	1.000	.366	1.000	.325	1.000	.418	1.000	.436	1.000

Table 9: Decomposition of Inequality Index Mauritania (2004)-Area of Residence

Rural	.561	.211	.464	.249	.361	.457	.277	.356	.221
Urban	.439	.237	.407	.278	.528	.500	.663	.377	.240
Within	-	.222	.871	.265	.889	.520	.940	.180	.461
Between	-	.033	.129	.033	.111	.033	.060	.128	.328
Overlap	-	-	-	-	-	-	-	-	.211
$I_{\max}^{between}(\Pi)$		.171		.160		.159		.280	
$\hat{R}^{between}(.)$		.192		.206		.208		.458	
Total	1.000	.255	1.000	.298	1.000	.553	1.000	.391	1.000
				Region					
Other regions	.756	.243	.720	.288	.648	.559	.602	.383	.496
Nouakchout	.244	.221	.211	.263	.290	.450	.362	.365	.075
Within	-	.238	.932	.280	.938	.533	.964	.223	.571
Between	-	.017	.068	.018	.062	.020	.036	.086	.219
Overlap	-	-	-	-	-	-	-	-	.210
$I_{\max}^{between}(\Pi)$		.200		.220		.262		.311	
$\hat{R}^{between}(.)$		.087		.084		.076		.276	
Total	1.000	.255	1.000	.298	1.000	.553	1.000	.391	1.000

Table 10: Decomposition of Inequality Index-Tunisia (1980)-Gender

Group	population share	Entropy index $I_{GE}(y, 0)$	Relative contribution	Entropy index $I_{GE}(y, 1)$	Relative contribution	Entropy index $I_{GE}(y, 2)$	Relative contribution	Gini index	Relative contribution
Male	.931	.327	.931	.356	.931	.626	.941	.434	.861
Female	.069	.318	.068	.317	.068	.434	.058	.427	.005
Within	-	.327	.999	.353	.999	.611	1.000	.375	.866
Between	-	.000	.001	.000	.001	.000	.000	.006	.014
Overlap	-	-	-	-	-	-	-	-	.120
$I_{\max}^{between}(\Pi)$		.130		.186		.305		.199	
$\hat{R}^{between}(.)$		.003		.002		.000		.031	
Total	1.000	.327	1.000	.353	1.000	.611	1.000	.433	1.000
Area of residence									
Rural	.520	.25	.400	.257	.249	.362	.134	.382	.157
Urban	.480	.27	.399	.307	.571	.519	.763	.402	.292
Within	-	.256	.799	.289	.820	.548	.897	.195	.450
Between	-	.064	.201	.064	.180	.063	.103	.177	.408
Overlap	-	-	-	-	-	-	-	-	.142
$I_{\max}^{between}(\Pi)$		.206		.183		.174		.295	
$\hat{R}^{between}(.)$		.313		.348		.361		.599	
Total	1.000	.32	1.000	.353	1.000	.611	1.000	.433	1.000
Region									
Great Tunis	.174	.290	0.155	.330	.263	.570	.424	.416	.047
North East	.161	.281	0.139	.300	.132	.490	.119	.400	.023
North West	.168	.282	0.145	.298	.097	.488	.063	.403	.018
Center West	.144	.330	0.145	.360	.103	.564	.065	.439	.015
Center East	.211	.281	0.181	.298	.182	.461	.167	.405	.043
South	.143	.238	0.104	.257	.097	.412	.083	.372	.016
Within	-	.284	.869	.308	.873	.563	.921	.070	.161
Between	-	.043	.131	.045	.127	.048	.079	.159	.367
Overlap	-							.205	.472
$I_{\max}^{between}(\Pi)$									
$\hat{R}^{between}(.)$									
Total	1.000	.327	1.000	.353	1.000	.611	1.000		1.000

Table 11: Decomposition of Inequality Index-Tunisia (1985)-Area of Residence

Group	population share	Entropy index $I_{GE}(y, 0)$	Relative contribution	Entropy index $I_{GE}(y, 1)$	Relative contribution	Entropy index $I_{GE}(y, 2)$	Relative contribution	Gini index	Relative contribution
Rural	.458	.221	.317	.234	.183	.318	.082	.365	.111
Urban	.542	.283	.480	.335	.651	.627	.835	.412	.367
Within	-	.255	.797	.306	.834	.644	.917	.207	.478
Between	-	.065	.203	.061	.166	.058	.083	.170	.392
Overlap	-	-	-	-	-	-	-	-	.130
$I_{\max}^{between}(\Pi)$		.192		.163		.149		.272	
$\hat{R}^{between}(.)$		.338		.373		.391		.626	
Total	1.000	.320	1.000	.367	1.000	.702	1.000	.434	1.000
				Region					
Great Tunis	.199	.301	.187	.357	.301	.661	.452	.425	.060
North East	.140	.274	.120	.313	.115	.644	.120	.401	.017
North West	.156	.234	.114	.291	.074	.710	.057	.373	.013
Center West	.146	.263	.120	.283	.078	.428	.042	.396	.013
Center East	.209	.278	.182	.301	.196	.484	.188	.405	.046
South	.150	.233	.109	.271	.091	.446	.064	.375	.016
Within	-	.266	.833	.313	.855	.648	.922	.072	.166
Between	-	.054	.167	.053	.145	.055	.078	.183	.422
Overlap	-	-	-	-	-	-	-	179	.411
$I_{\max}^{between}(\Pi)$		.297		.282		.317		.409	
$\hat{R}^{between}(.)$		.181		.190		.173		.452	
Total	1.000	.320	1.000	.367	1.000	.702	1.000	.434	1.000
				Educational Level					
Illiterate	.520	.231	.376	.248	.252	.375	.143	.370	.165
Primary	.311	.257	.250	.284	.237	.475	.203	.391	.085
Secondary	.136	.249	.106	.305	.182	.626	.313	.384	.026
University	.033	.267	.027	.269	.076	.361	.167	.391	.003
Within	-	.243	.747	.274	.747	.580	.826	.122	.280
Between	-	.077	.253	.093	.253	.122	.174	.203	.468
Overlap	-	-	-	-	-	-	-	.109	.252
$I_{\max}^{between}(\Pi)$		.283		.329		.497		.407	
$\hat{R}^{between}(.)$		.278		.288		.253		.507	
Total	1.000	.320	1.000	.367	1.000	.702	1.000	.434	1.000

Table 12: Decomposition of Inequality Index - Tunisia (1990)-Area of Residence

Rural	.405	.21	.311	.220	.197	.300	.112	.354	.093
Urban	.595	.234	.508	.253	.645	.385	.791	.374	.409
Within	-	.224	.819	.245	.842	.405	.903	.202	.503
Between	-	.050	.181	.046	.158	.043	.097	.145	.361
Overlap	-	-	-	-	-	-	-	-	.136
$I_{\max}^{between}(\Pi)$		.164		.136		.121		.241	
$\hat{R}^{between}(.)$		.303		.338		.360		.600	
Total	1.000	.274	1.000	.291	1.000	.448	1.000	.401	1.000
Region									
Great Tunis	.207	.257	.194	.280	.281	.443	.405	.392	.059
North East	.138	.267	.134	.279	.140	.417	.144	.396	.020
North West	.150	.240	.132	.243	.088	.316	.052	.377	.015
Center West	.146	.227	.121	.232	.082	.307	.049	.366	.014
Center East	.210	.242	.185	.249	.203	.338	.200	.377	.046
South	.150	.189	.104	.208	.085	.330	.070	.338	.015
Within	-	.238	.869	.255	.878	.412	.920	.065	.161
Between	-	.036	.131	.036	.122	.036	.080	.148	.369
Overlap	-	-	-	-	-	-	-	186	.470
$I_{\max}^{between}(\Pi)$		.247		.261		.357		.370	
$\hat{R}^{between}(.)$		.145		.136		.100		.400	
Total	1.000	.274	1.000	.291	1.000	.448	1.000	.401	1.000
Educational Level									
Illiterate	.488	.231	.411	.236	.306	.314	.204	.370	.170
Primary	.295	.224	.241	.234	.223	.318	.184	.365	.074
Secondary	.155	.221	.125	.236	.187	.354	.269	.361	.032
University	.036	.221	.029	.245	.072	.376	.169	.361	.003
Within	-	.226	.826	.237	.813	.383	.854	.112	.280
Between	-	.048	.174	.054	.187	.065	.146	.160	.398
Overlap	-	-	-	-	-	-	-	-	.323
$I_{\max}^{between}(\Pi)$		.234		.261		.357		.370	
$\hat{R}^{between}(.)$		.204		.209		.183		.431	
Total	1.000	.274	1.000	.291	1.000	.448	1.000	.401	1.000

Table 13: Decomposition of Inequality Index Tunisia (1995)-Area of Residence

Group	population share	Entropy index $I_{GE}(y, 0)$	Relative contribution	Entropy index $I_{GE}(y, 1)$	Relative contribution	Entropy index $I_{GE}(y, 2)$	Relative contribution	Gini index	Relative contribution
Rural	.39	.203	.269	.212	.157	.280	.080	.350	.077
Urban	.61	.254	.528	.276	.670	.422	.818	.389	.437
Within	-	.234	.797	.261	.828	.445	.898	.214	.514
Between	-	.060	.203	.054	.172	.050	.102	.155	.373
Overlap	-	-	-	-	-	-	-	-	.113
$I_{max}^{between}(\Pi)$		.189		.151		.131		.249	
$\hat{R}^{between}(.)$		.316		.358		.386		.622	
Total	1.000	.294	1.000	.315	1.000	.495	1.000	.416	1.000
Region									
Great Tunis	.213	.258	.187	.280	.256	.418	.329	.393	.058
North East	.139	.276	.131	.289	.127	.422	.118	.404	.019
North West	.141	.247	.118	.267	.084	.419	.059	.383	.013
Center West	.150	.223	.114	.234	.068	.320	.036	.365	.012
Center East	.205	.275	.192	.296	.251	.463	.325	.403	.053
South	.152	.188	.098	.192	.070	.238	.042	.338	.014
Within	-	.247	.839	.270	.856	.450	.910	.067	.162
Between	-	.047	.161	.045	.144	.045	.090	.165	.396
Overlap	-	-	-	-	-	-	-	-	.442
$I_{max}^{between}(\Pi)$		.300		.267		.284		.399	
$\hat{R}^{between}(.)$		.158		.170		.157		.413	
Total	1.000	.294	1.000	.315	1.000	.495	1.000	.416	1.000

Table 14: Decomposition of Inequality Index-Tunisia (2000)-Area of Residence

Group	population share	Entropy index $I_{GE}(y, 0)$	Relative contribution	Entropy index $I_{GE}(y, 1)$	Relative contribution	Entropy index $I_{GE}(y, 2)$	Relative contribution	Gini index	Relative contribution
Rural	.413	.210	.316	.226	.207	.319	.098	.356	.103
Urban	.587	.254	.545	.292	.676	.618	.848	.389	.406
Within	-	.236	.861	.273	.883	.603	.946	.206	.509
Between	-	.038	.139	.036	.117	.034	.054	.129	.320
Overlap	-	-	-	-	-	-	-	-	.171
$I_{\max}^{between}(\Pi)$		.156		.131		.117		.239	
$\hat{R}^{between}(.)$		.244		.275		.293		.542	
Total	1.000	.274	1.000	.309	1.000	.637	1.000	.404	1.000
				Region					
Great Tunis	.164	.246	.147	.272	.203	.408	.209	.386	.036
North East	.138	.232	.117	.254	.099	.386	.064	.372	.015
North West	.131	.215	.103	.234	.083	.348	.050	.362	.013
Center West	.148	.244	.132	.260	.090	.375	.046	.381	.015
Center East	.189	.266	.183	.328	.264	.959	.492	.395	.046
South	.229	.230	.192	.250	.147	.361	.082	.372	.039
Within	-	.240	.875	.274	.887	.601	.943	.059	.145
Between	-	.034	.125	.035	.113	.036	.057	.142	.351
Overlap	-	-	-	-	-	-	-	-	.505
$I_{\max}^{between}(\Pi)$		.251		.244		.277		.382	
$\hat{R}^{between}(.)$		.136		.143		.131		.371	
Total	1.000	.274	1.000	.309	1.000	.637	1.000	.404	1.000