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Has poverty decreased in Cameroon between 2001 and 2007? An analysis based on multidimensional poverty measures.

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Abstract

This paper uses the Alkire Foster methodology for multidimensional poverty measurement to analyze the evolution of multidimensional poverty for Cameroon for the period 2001-2007. This approach seeks to overcome the limitations of the income-based poverty measures by combining income with five other dimensions: education, health, electricity, water and sanitation. The identification step employs two forms of cutoff: for each dimension there is a cutoff which identifies individuals deprived in that specific dimension; across dimensions, a second cutoff gives the minimum number of dimensions that an individual must be deprived to be considered poor. For the aggregation step, the Alkire Foster methodology uses a dimension-adjusted Foster Greer and Thorbecke (FGT) measure. The results show that the reduction in income poverty which Cameroon experienced over the study period was accompanied by a significant increase in multidimensional poverty.

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1 Introduction

Several studies have concluded that income poverty has declined in Cameroon over the period 2001-2007[1] . However, this decline in income poverty does not seem to go hand in hand with the improvement of living conditions. Indeed, Cameroonians continue to believe in their majority that the situation has worsened over the same period (ECAM3). There is therefore a paradox which is worth discussing: on the one hand an increase in household consumption is accompanied by a reduction in income poverty and on the other hand, people have the strong feeling that the living conditions have deteriorated. This paradox can be explained by the fact that income is not the only determinant of well-being, there are other factors: education, health, housing quality, etc., which can affect the quality of life. Therefore, it could be interesting to see whether the findings would hold if the monetary analysis were complemented by a multidimensional analysis. The aim of this paper is to apply the Alkire Foster methodology (henceforth, AF) to analyse the evolution of multidimensional poverty for Cameroon for the period 2001-2007 using data from the 2001 and 2007 Living Standard Surveys (ECAM2 and ECAM3). The Millenium Development Goals discourse has provided a framework for the selection of our six dimensions. These dimensions include income, education, health, electricity, water and sanitation. Using equal weights and a cutoff $k = 3$, we find that the decline in income poverty has been accompanied by an important increase of multidimensional poverty.

The rest of the paper proceeds as follows. Section 2 describes the AF methodology in detail. Section 3 describes the data, the dimensions used and the cutoffs applied. Section 4 discusses the main empirical findings while a final section concludes.

2 Methodology

Alkire and Foster (2007, 2009) suggest a counting approach which follows the method of aggregation proposed by Foster, Greer, and Thorbecke (1984) in the sense that it is built on the same family of measures. This family satisfies a range of useful properties. A key property for policy is decomposability, which allows the index to be broken down by population subgroups (such as region or ethnicity) to show the characteristics of multidimensional poverty for each group. Furthermore, it can be unpacked to reveal the dimensional deprivations contributing most to poverty for any given group, which is

[1]Studies by the Cameroon's National Institute of Statistics (NIS) and the World Bank concluded that the incidence of poverty has declined from 40.2 per cent in 2001 to 39.9 percent in 2007. They further observed that other poverty indicators have shown a similar trend. Thus, the depth of poverty decreased from 12.8 percent to 12.3 percent and the severity of poverty decreased from 5.6 percent to 5 percent. We have to note that while the Incidence of poverty (headcount index) is the share of the population whose income or consumption is below the poverty line, the Depth of poverty (poverty gap) provides information regarding how far off households are from the poverty line. In other words, the Depth of poverty gives the total resources needed to bring all the poor to the level of the poverty line. As for Poverty severity (squared poverty gap), it takes into account not only the distance separating the poor from the poverty line (the poverty gap), but also the inequality among the poor. That is, a higher weight is placed on those households who are further away from the poverty line.

particularly useful for policy targeting. To identify the poor, the AF method uses two forms of cutoffs: for each dimension there is a cutoff which identifies individuals deprived in that specific dimension; across dimension, a second cutoff gives the minimum number of dimensions that an individual must be deprived to be considered poor.

2.1 Notation

Consider a population of n individuals. Let $d \geq 2$ be the number of dimensions. Dimensions might relate to income, health, education, or housing. Let $x = [x_{ij}]$ the $n \times d$ matrix of achievements, where x_{ij} is the achievement of individual $i (i = 1, \ldots, n)$ in dimension $j (j = 1, \ldots, d)$. x is of the following form:

$$\begin{pmatrix} x_{11} & . & x_{1j} & . & x_{1d} \\ . & . & . & . & . \\ x_{i1} & . & x_{ij} & . & x_{id} \\ . & . & . & . & . \\ x_{n1} & . & x_{nj} & . & x_{nd} \end{pmatrix}$$

Let $z > 0$ be the cutoff below which a person is considered to be deprived in dimension j, and let z be a row vector of dimension-specific cutoffs. The first step for measuring the poverty is to identify who is poor.

2.2 Identification

For simplicity we assume that all dimensions are equally weighted.[2] Suppose that a matrix of deprivations $x^0 = [x^0_{ij}]$ is derived from x as follows: for all i and j,

$$x^0_{ij} = \begin{cases} 1 & \text{if } x_j < z_j \\ 0 & \text{otherwise.} \end{cases}$$

For example, $x^0_{ij} = 1$ means that individual i is deprived in dimension j and $x^0_{ij} = 0$ that individual i is not. By summing each row of x^0, we obtain a column vector c of deprivation counts counting c_i the number of deprivation suffered by individual i.

For identifying, consider the identification function $\rho(x_i; z)$ such that

[2]The AF methodology is flexible in assigning different weights to various dimensions, depending on their relative importance. However, our study treats all dimensions equally in the sense that the same weight (one) is assigned to each dimension. The reason for this is that we believe that for Cameroon, none of the chosen dimensions is more important than the others. It may happen that some of the dimensions are more important than others. In that case, the measures should be obtained by assigning different weights to different dimensions. The weights may be assumed to reflect the importance a policy maker attaches to alternative dimensions in a poverty alleviation proposal.

$$\rho(x_i; z) = \begin{cases} 1 & \text{if individual } i \text{ is multidimensionnally poor} \\ 0 & \text{if not.} \end{cases} \tag{1}$$

Let k be the cutoff[3]. An individual i will be considered poor or $\rho_k(x_i; z) = 1$ if $c_i \geq k$. $\rho(x_i; z)$ is the identification function relating to the cutoff k. The equation (1) could be rewritten:

$$\rho(x_i; z) = I(c_i \geq k) \begin{cases} 1 & \text{if } c_i \geq k \\ 0 & \text{if not.} \end{cases} \tag{2}$$

$I(c_i \geq k)$ is the standard indicator function taking the value 1 if the expression in brackets holds and the value 0 if not.

2.3 Multidimensional poverty measures

Let $M(x; z)$ be the class of multidimensional poverty measures suggested by Alkire and Foster (2007). An informative partial index is the headcount ratio. Let q_k be the number of poor identified according to the thresholds vector z and the cutoff k, the headcount ratio H is following:

$$H = \frac{q_k}{n} \tag{3}$$

With $q_k = \sum_{i=1}^{n} \rho_k(x_i; z) = \sum_{i=1}^{n} I(c_i \geq k)$

This is simply the fraction of the population that is multi-dimensionally poor.

The share of possible deprivations suffered by a poor individual i is given by:

$$\bar{c}(k) = \frac{1}{d}[c_i \rho_k(x_i; z)] \tag{4}$$

And the average deprivation share across the poor by

[3]The cutoff k like the income poverty line is always slightly arbitrary, therefore the only way for us to justify a certain cutoff was to make sure the results were always reasonable and check the cutoffs in the neighborhood to make sure we didn't have any knife-edge results. Thus later in this paper we provide a robustness check for different values of k and show that no matter the cutoff k, results are unchanged.

$$A = \frac{1}{q_k d} \sum_{i=1}^{n} c_i \rho_k(x_i; z) \tag{5}$$

The first measure proposed by Alkire Foster (2007) combines H and A to obtain an expression satisfying the dimensional monotonicity (unlike H). The new measure M_0 called adjusted headcount ratio is given by:

$$M_0 = HA = \frac{1}{nd} \sum_{i=1}^{n} c_i \rho_k(x_i; z) \tag{6}$$

A useful property satisfied by this measure is decomposability. Suppose that n-size population is divided for example into two mutually exclusive subgroups of sizes n_1 and n_2 respectively. It is such a case when one considers urban and rural populations. The two subgroups are respectively represented by two matrices of achievements x_1 and x_2. Then we have:

$$M(x; z) = \frac{n_1}{n} M(x; z) + \frac{n_2}{n} M(x; z) \tag{7}$$

.

3 Choosing dimensions and deprivation cutoffs

To estimate multidimensional poverty in Cameroon we use data from the 2001 and the 2007 surveys (ECAM2 and ECAM3). From both surveys, we are able to get information on six aspects of people's living standard. These dimensions span their income level, their education, their health, their sanitation, their access to electricity and their access to water. For the income dimension, the poverty line used is the official one given by the National Institute of Statistics (NIS). For all the other dimensions, the thresholds that we have used are the basic minimum that a person should have. Most of the time, the cutoff just divides the population into two groups: people who are deprived in the dimension and those who are not[4].

1. Income: The household final consumption expenditure per capita is included as a dimension of poverty. The household final consumption expenditure is the market value of all goods and services including food, clothing, and housing, purchased by

[4]While the dimensions here may seem arbitrary, they correspond to the MDG goals. For the question of how to select capabilities or dimensions for evaluation, see Sen (1992, 1993, 2004a, 2004b), Atkinson et al. (2002), Robeyns (2005) and Alkire (2002, 2008). In an extensive review of literature on the selection of dimensions and indicators, Alkire finds researchers justifying their selection of indicators on the basis of up to five criteria (Alkire 2007). These criteria are as follows: 1) data availability and adequacy; 2) normative assumptions based upon theoretical frameworks; 3) public discussions; 4) deliberative participation; and 5) empirical analysis.

the household. This dimension corresponds to MDGs Goal 1 (Eradicating poverty and hunger). ***Cutoff point:*** Using Cameroon's official poverty line for the year 2007, households with adult equivalent per capita consumption below 269448FCFA (411euros) are considered deprived in this dimension.

2. Educational attainment: Access to universal primary education is Goal 2 of the MDGs that Cameroon is committed to achieving by 2015. It is therefore pertinent to include education as a dimension of poverty. ***Cutoff point:*** A household is declared deprived in education if none of its members has attained at least a primary education. Because the unit of analysis is the household, all household members are considered non-deprived if at least one person has completed primary education[5].

3. Health: Consultation acts as a proxy for the health status. Indeed, in Cameroon, people sometimes cannot afford to go to hospital when they are ill[6]. Yet, it is crucial to consult a doctor or a chemist to recover from disease. This dimension which corresponds to different MDGs goals (4, 5, 6) identifies the persons the household consulted when they were ill. ***Cutoff point:*** A household is declared deprived in this dimension if any household member did not consult one of the following persons during illness: doctor, chemist, nurse.

4. Sanitation: Access to proper sanitation facilities can prevent the spread of diseases like diarrhea and malaria. It is therefore an important dimension of the wellbeing of households. Access to improved sanitation is also part of MDG's Goal 7 (ensure environment sustainability). ***Cutoff points:*** A household is declared deprived if it does not have access to flushing toilets but has the following types of toilet facilities: a) none; b) pit latrine; c) bucket toilet; d) use field.

5. Drinking water: Diarrhea, often due to unsafe drinking water, is one of the leading causes of childhood deaths in Cameroon. Several communicable diseases, such as Hepatitis are spread through unsafe drinking water. Moreover, Since Cameroon is continually riddled with water shortages, access to drinking water cannot be taken for granted. In addition, increased access to safe drinking water is part of the MDG's Goal 7 (ensure environment sustainability). ***Cutoff points:*** A household is declared deprived in this dimension if its primary source of drinking water is anything other than tap water or bottled water.

6. Electricity: Electricity allows lighting, which in turn allows people to be independent during the night time. It also enables a wide range of work and leisure activities ranging from refrigeration, sewing, and so forth. Increasing the access to electricity (especially in rural areas) will not only improve the living conditions of the rural population but it will also reduce the proportion of the population using solid fuels improving the quality of the air. This dimension indirectly corresponds to MDG's Goal 7 (ensure environment sustainability). ***Cutoff points:*** A household is declared deprived in electricity if it does not have access to electricity.

[5]This variable follows the idea of effective literacy of Basu and Foster (1998) that all household members benefit from the abilities of a literate person in the household, regardless of each person's actual level of education.

[6]One person in four still has recourse to traditional medicine or to drug hawkers for consultation.

4 Results

Figure 1 shows the percentage change of households deprived in each of the six dimensions. We can notice that except for the dimensions "income" (40.2 - 39.9 percent) and "education" (75.7-72.8 percent) for which the percentage of deprived households has decreased, the deprivation in all other dimensions has increased critically between 2001 and 2007. Deprivation in health dimension has experienced the most important increase, from 19.1 percent in 2001 to 69.4 per cent in 2007. At the regional level, the result is the same. In fact, no region has improved its performance in the "health" dimension. The dimensions "water" (24-27.1 percent),"electricity" (52.4-54.7 percent) and "sanitation" (92.8-93.2 percent) experienced a rather moderate degradation.

Table 1 presents the multidimensional measures H and M_0, evaluated using six dimensions equally weighted and $k = 3$. Table 1 also gives the percentage contribution of each region to the multidimensional measures for 2001. Table 2 gives the same information for 2007. The results suggest a significant deterioration of the living conditions of Cameroonian households. Indeed, multidimensional poverty headcounts measured in Cameroon in 2001 and 2007 are respectively 61.3 percent and 71.1 percent. In other words, in 2001, 61.3 percent of households in Cameroon were multidimensionally poor against 71.1 percent in 2007. These results show that the reduction of income poverty has been accompanied by a significant increase in multidimensional poverty. However, if the multidimensional poverty increased globally, large disparities appear in the regions of the country. In order to capture differences in multidimensional poverty measures, we turn to their breakdown at the regional level.

Douala is the city with the highest increase in multidimensional poverty. Indeed, the multidimensional poverty which affected 15.3 percent of the population of Douala in 2001, almost doubled to stand at 29.8 per cent in 2007. This situation is paradoxical because Douala is not only the richest city in the country, but it is also the city which experienced a large decline in national income poverty over the same period (10.3 to 5.5 percent)[7]. Like in Douala, the situation in Yaounde is paradoxical. Indeed, while the incidence of income poverty fell by 55 percent between 2001 and 2007, the incidence of multidimensional poverty has increased by 46 percent over the same period[8].

Comparing the evolution of poverty among the 10 regions allows some comments. The Southwest, with a 33 percent increase in multidimensional poverty is the region which experienced the largest increase, followed by the Littoral region with a 26.3 percent increase. In contrast, the poorest regions income-wise which are the Far North and the North recorded the lowest increase in multidimensional poverty: 1.5 percent and 4 percent respectively. These results reflect the fact that people who are income-poor are not always the same who lack access education, health, water, electricity and proper sanitation. Monetary poverty thus appears to significantly misidentify deprivations in other dimensions. In terms of policy implication, these findings suggest that by only focusing on income poverty, people who are deprived in other dimensions may be excluded. The M_0 estimates follow the same trend as the H . Finally, we note

[7]For this comparison we use the Cameroon's official income poverty.

[8]Douala is the economic capital and Yaounde is the political capital.

that on average, Cameroonians experienced more deprivation in 2007 than in 2001 . Indeed, in 2001, multidimensionally-poor Cameroonians were deprived on average in 67.2 dimensions and in 2007 they were deprived on average in 72.9 dimensions .

The results shown previously were reported for the value of $k = 3$. In particular, we saw that unlike income poverty which has declined, multidimensional poverty was higher in 2007 than in 2001. One can wonder whether the results would change for different k cutoffs. Table 3 and Fig. 2 report M_0 levels for $k = 1, 2, 3, 4, 5, 6$ and shows that the ranking of the two years. Indeed, each curve in Fig. 1 describes the poverty level for each year when k is varied. Dominance is then possible between the two regions when any curve lies above or below another for all possible values of k. When two curves cross, there is no possibility of dominance. In Fig. 2, dominance relation exists between 2001 and 2007 since the curves never intersect.

5 Conclusion

Basing on the Alkire-Foster methodology, this paper has analysed the evolution of multidimensional poverty for Cameroon for the period 2001-2007 using data from the 2001 and 2007 Living Standard Surveys (ECAM2 and ECAM3). The Millenium Development Goals discourse has provided a framework for the selection of our six dimensions: income, education, health, electricity, water and sanitation.

Using equal weighs, we found that except for dimensions "income" (40.2 - 39.9 percent) and "education" (75.7-72.8 percent) for which the percentage of deprived households has decreased, the deprivation in all other dimensions has increased between 2001 and 2007. Furthermore, with a cutoff $k = 3$, we have found that the reduction of income poverty has been accompanied by an important increase in multidimensional poverty. Indeed, multidimensional poverty indices measured in Cameroon in 2001 and 2007 are respectively 61.3 percent and 71.1 percent.

We also found that the 2 richest cities, Douala and Yaounde which experienced a large decrease in the income poverty between 2001 and 2007 experienced a critical increase in multidimensional poverty over the same period. Indeed, the multidimensional poverty which affected respectively 15.3 percent and 16.1 percent in both cities in 2001 increased to stand at 29.8 per cent and 29.9 per cent in 2007.

We have finally tested the robustness by varying k and we could conclude that our results did not change for different values of k.

The main result of this paper suggests that income-based poverty measures will necessarily lead to only a partial understanding of poverty, and therefore to unfocused or ineffective poverty reduction programs. They fail to capture many aspects of deprivation, including lack of access to education, water, electricity and proper sanitation. Consequently the policy recommendations from such traditional analysis only plead for transfer policies that alleviate poverty in the short-term (Fusco 2003), whilst leaving structural socio-economic policies that could break the inter-generational reproduction mechanism of poverty in the long-term (Dagum 2002). These limitations of income-based poverty measures clearly highlight the strong need for a broader definition of poverty that widens the concept of poverty to reflect, for instance, aspects of well-being

not captured fully by income or consumption alone.

Tables and figure

Table 1: Multidimensional poverty measures for 2001 by regions ($k = 3$)

	2001				
Regions	H	% contribution	M_0	% contribution	A
Douala	15.3	0.3	0.082	0.3	53.6
Yaounde	16.1	0.7	0.086	0.5	53.4
Adamawa	83.1	2.6	0.564	2.6	67.9
Centre	61.3	4.5	0.373	4.1	60.8
East	77.2	4.3	0.533	4.5	69
Far North	93.6	23.2	0.702	26	75
Littoral	46.5	3.7	0.269	3.2	57.8
North	87.9	11.9	0.662	13.4	75.3
Northwest	71.8	17.3	0.472	17.1	66.2
West	59.7	16.7	0.358	15	60
South	51.3	4.5	0.297	3.9	57.9
Southwest	49	10.3	0.296	9.3	60.4
Cameroon	61.3	100	0.412	100	67.2

Table 2: Multidimensional poverty measures for 2007 by regions ($k = 3$)

	2007				
Regions	H	% contribution	M_0	% contribution	A
Douala	29.8	0.6	0.158	0.4	53
Yaounde	29.9	1.2	0.159	0.9	53.2
Adamawa	86.8	2.8	0.678	3	78.1
Centre	74.8	4.7	0.475	4.1	63.5
East	86.7	4.2	0.704	4.6	81.2
Far North	95	21.2	0.8	24	86
Littoral	63.1	3.2	0.383	2.6	84.2
North	91.6	14.8	0.774	17.2	84.5
Northwest	82.3	15.4	0.584	15	71
West	65.5	14.2	0.407	12.1	62.1
South	55.7	4.1	0.335	3.4	60.1
Southwest	73	13.6	0.474	12.1	64.9
Cameroon	71.1	100	0.518	100	72.9

Table 3: M_0 values for different values of k

	$k = 1$	$k = 2$	$k = 3$	$k = 4$	$k = 5$	$k = 6$
2001	50.5	48.3	41.2	30.8	16.4	3.6
2007	59.5	58.1	51.8	41.5	29.5	14.8

Figure 1: Percentage of households deprived in various dimensions in 2001 and 2007

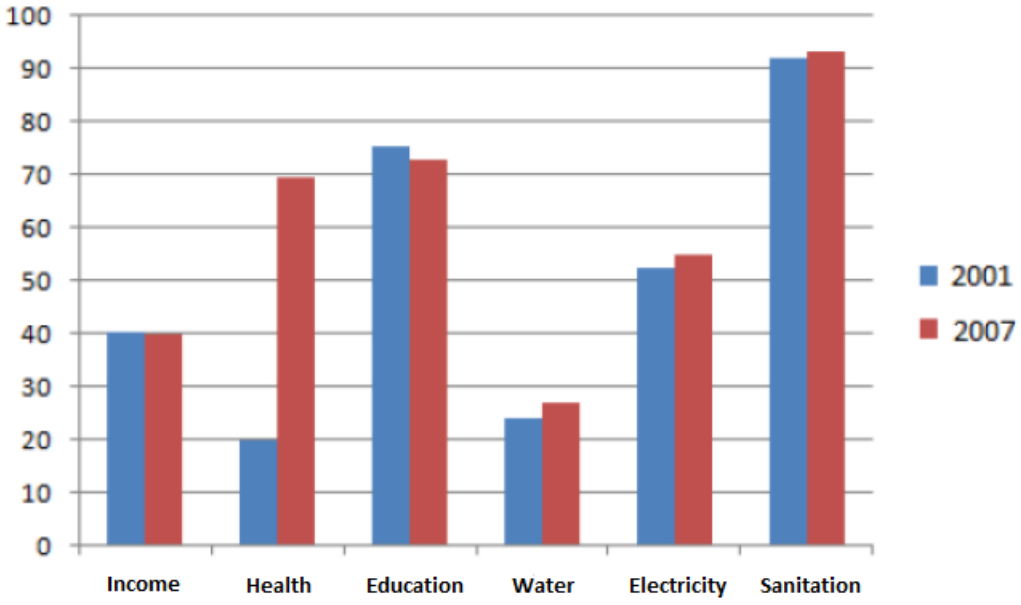
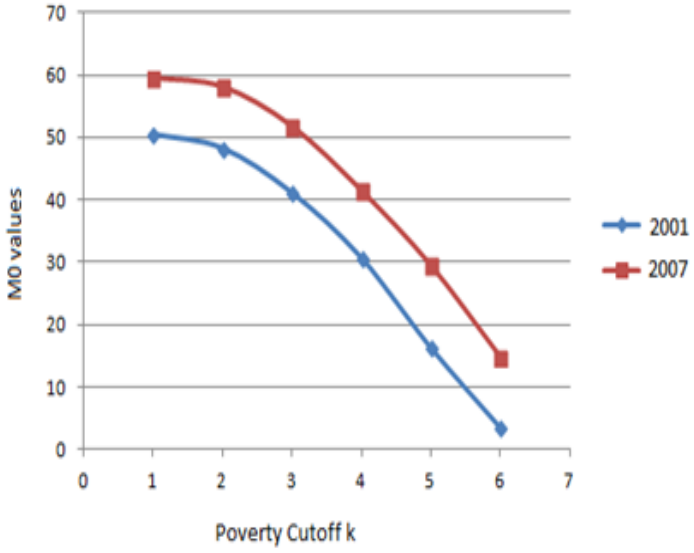


Figure 2: M_0Dominance



References

Alkire, S. (2008) "Choosing dimensions: the capability approach and multidimensional poverty", in Kakwani, Nanak and Jaques Silber eds, *The Many Dimensions of Poverty* , p. 89-119. Basingstoke: Palgrave-MacMillan.

Alkire, S.; Foster, J. (2011) "Counting and multidimensional poverty measurement". *Journal of Public Economics* **95**, 476-487.

Atkinson, A.B. (2003) "Multidimensional deprivation: contrasting social welfare and counting approaches". *Journal of Economic Inequality* **1**, 51-65.

Basu, K.; Foster, J. (1998) "On Measuring Literacy". *The Economic Journal* **108**, 1733-1749.

Batana, Yélé M. (2008) "Multidimensional Measurement of Poverty in Sub-Saharan Africa", OPHI working paper series, (13), www.ophi.org.uk.

Foster , J.; Greer, J.; Thorbecke , E. (1984) "A class of decomposable poverty Measures". *Econometrica* **388**, 215-51.

Institue Nationale des Statistiques (2002a) "*ECAM III : Document de Méthodologie*", Yaoundé.

Laderchi, C.; Saith, R.; Stewart, F. (2003) "Does it Matter That We Don't Agree on the Definition of the Poverty? A comparison of Four Approaches" *Oxford Development Studies* **31**, 243-274.

Sen, A.K. (1980a) "Equality of What?", in McMurrin (ed.), *Tanner Lecture on Human Values*, Cambridge : Cambridge University Press, 26 p.

-, (1984) "The Living Standard", *Oxford Economic Papers* **36**, 74-90.

-, (1985), *Commodities and Capabilities*, Amsterdam : Elsevier, 142b p.

-, (1987), *On Ethics and Economics*, Oxford: Blackwell, trad. de Sophie Marnat, Ethique et Economie, Paris : Presses Universitaires de France, 1993, 364 p.

-, (1992), *Inequality re-examined*, Oxford : Clarendon Press, trad. de Paul Chemla, Repenser l'inégalité, Paris : Seuil, 2000, 281 p.

-, (1993a), Capability and Well-being in Nussbaum M. and Sen A., (ed.), *The Quality of Life*, Oxford: Clarendon Press, p. 30-53.

-, (2004a) "Elements of a Theory of Human Rights". *Philosophy and Public Affairs* **32** 315-356.

-, (2004b) "Incompleteness and Reasoned Choice". Synthese 140 **(1-2)** 43-59.

Robeyns, I. (2005) "The Capability Approach : a Theoretical Survey". *Journal of Human Development*, vol. 6, n°1, 32 p.