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The study of gender inequality among Togolese households through the (α,β)- multi-level α- Gini decomposition: an approach using equivalence scales

Yawo Noglo
Paris West University Nanterre La Défense

Abstract

This paper aims to construct the gender inequality profile of Togolese households based on the (α,β) - multi-level α- Gini decomposition. The study uses the most recent country survey (QUIBB 2006) and expenditure per adult equivalent is determined through Lachaud's equivalence scale. $\alpha = 3$ is exogenously fixed and corresponds to a high degree of inequality aversion embodied by the within-group and between-group components. Different values (between 1 and 4) are assigned to β and this represents the sensitivity towards between-group non-overlappings (transvariation). On the first and second level of partitions, the results with the Lachaud equivalence scale show similarities compared to those from the Oxford scale. This is not the case by applying the FAO/WHO scale and considering expenditure per capita

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Contact: Yawo Noglo - noglohonore@gmail.com.
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1. Introduction

Much literature has been devoted to inequality issues and their decomposition into subgroups. Decomposition analysis may be divided into two components (between-group inequalities and within-group inequalities), which examine the contribution of these components to overall inequality. However, Dagum (1997a, 1997b) demonstrated that a third element subject to debate comes from a concept introduced by Gini (1916): transvariation. Transvariation shows the level of inequality between distributions in the overlapping area. Chameni Nembua (2006a, 2006b), showed that Dagum's decomposition applies to the coefficient of variation squared. The author proposed a generalized formulation by introducing a parameter of aversion α to inequality and constructed a general index α-Gini. We have the standard Gini for α=1 or the coefficient of variation squared if α=2. Ebert (2010) axiomatized the concept of α-Gini and defined a weak decomposability property. The weak decomposition is perfectly adapted to the structure of Gini index as well as some measures of the family of generalized entropy such as the coefficient of variation squared. Chameni Nembua (2013) provided an extension of the Dagum decomposition to α-Gini measures. Finally, Mornet et al. (2013) introduced an extension of the decomposition to several levels of partitions, the so-called (α,β) - multi-level decomposition. The overall inequality aversion α affects within-group and between-group inequalities and at the same time, the sensitivity towards between-group non-overlappings is symbolized by β.

The purpose of this paper is to measure and analyze for the first time concerning Togo, gender inequality based on the (α,β) - multi-level α-Gini decomposition and according to household head employment status. The multi-level decomposition provides a more representative approach of economic reality that may be used by the policy-maker to implement targeted redistributive actions. Togolese society is characterized by gender stereotypes originating from traditional values that give men a greater capacity than women. According to the Ministry for the Promotion of Women report (2011), women, who make up only 6.1% of employees are excluded from formal sector employment and are more engaged in the informal sector. Thus, inequality by gender exists on the labor market and is related to the household expenditure distribution. This article will attempt to respond to the following question: what is the Togo gender inequality profile through the (α,β) - multi-level α-Gini decomposition and by household head's employment status?

We will enrich this research by introducing Lachaud's equivalence scale (Lachaud, 1998, 2000) in order to determine our well-being indicator (expenditure per adult equivalent) and highlight the impact of the scale on the results. This equivalent scale determined from an Engel curve estimation is relevant because it is specific to the country and thus preferable to equivalence scales that do not take account of local conditions.

In the following sections, we will first outline the methodological framework by presenting the Lachaud, Oxford and FAO/WHO equivalence scales and explaining the (α,β) – decomposition of the α-Gini measures. We then present the data, followed by the empirical results and the conclusion.

2. Methods

2.1. The equivalence scales

Our baseline indicator of well-being is total real annual expenditure per adult equivalent through implementing an equivalence scale which takes into account the lesser cost of children and economies of scale. The study proposes to use the Lachaud equivalence scale (Lachaud, 1998, 2000). This comes from the econometric estimation of an Engel[1] curve and consequently leads to the construction of a specific equivalence scale for Togo. By contrast, the standard equivalence scales such as Oxford and FAO/WHO[2] scales do not vary, whatever the situation.

By estimating the Engel curve performed from Deaton's model and reeferring to the model of reference household (Deaton, 1997) (see Appendix 1 for details), the Lachaud equivalence scale in 2006 for Togo is:

$$m_{Lachaud} = \left(A + E_{0-5} + 0{,}5E_{6-14}\right)^{0.82} \quad (1)$$

A is the number of adults and E the number of children in the household. 1 and 0.5 represent the equivalence coefficients between the children and the adults respectively aged between 0 and 5; 6 and 14. θ = 0.82 indicates the factor of economy of scale and means that overall, Togolese households achieve low economies of scale. Togo is a very poor country and the household budget is largely devoted to food expenditure which increases quickly with the size of household.

In order to compare the results from Lachaud's equivalence scale, we introduce the Oxford and FAO/WHO equivalence scales. Oxford's equivalence scale is expressed as follows:

$$m_{Oxford} = 1A + 0.7AA + 0.5\,E_{0-14} \quad (2)$$

In this equation, A is the first adult in the household, AA other household members aged over 14 years and E_{0-14} the number of children aged between 0 and 14. These individuals have respectively the coefficients 1, 0.7, and 0.5. For the FAO/WHO scale, we have:

$$m_{FAO/WHO} = A_{Men} + 0.8A_{Women} + 0.5E_{0-14} \quad (3)$$

The weighting applies 1 unit to adult men (A_{Men}) of at least 15 years of age and 0.8 to adult women (A_{Women}) in the same age group. For children under the age of 15 (E_{0-14}), the weight is 0.5. This scale is partly based on nutritional, food and health needs.

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[1] We should remember that Engel (1895) attempts to measure the level of well-being of a household by the share of food expenditure in its total consumption. Thus, the share of food expenditure in total household consumption is a well-being indicator for comparing households of different size and composition. According to Engel, two households whose share of food expenditure is identical can be considered as having the same level of well-being.

[2] Food and Agricultural Organization / World Health Organization.

2.2. Inequality using the $(\alpha,\beta)-$multi-level $\alpha-$ Gini decomposition

The presentation of this method will follow Mornet et al. (2013). Let us consider a population P divided into one group partition $\mathbb{K}$ in which each group $k \in \mathbb{K}$ is itself subdivided into another group partition $\mathbb{S}_k$. The partition $\mathbb{K}$ contains $K \geq 2$ non-empty disjoint groups that are divided into $S_k \geq 2$ non-empty disjoint subgroups such that, $\mathbb{S}_k := \{1,\ldots,s,\ldots,S_k\}$. Let us suppose that P has n income units, $\mathbf{x}$ is the income distribution vector and $\mu(\mathbf{x})$ is the mean income. The α-Gini coefficient between groups ℓ and s nested into group k is:

$$G^{\alpha}_{k,\ell s} = \frac{\sum_{i=1}^{n_\ell}\sum_{r=1}^{n_s}\left|x_{i\ell}-x_{rs}\right|^{\alpha}}{n(\mathbf{x}_s)n(\mathbf{x}_\ell)\left[\mu(\mathbf{x}_s)^{\alpha}+\mu(\mathbf{x}_\ell)^{\alpha}\right]}. \tag{4}$$

The within-group α-Gini coefficient of group $s \in \mathbb{S}_k$ nested into $k \in \mathbb{K}$ $\left(G^{\alpha}_{k,ss}\right)$ is obtained when $\ell = s$. The economic β-directional distance measuring non-overlappings between the distributions is:

$$D_{k,\ell s}(\beta) = \frac{\left(\frac{1}{n_\ell n_s}\sum_{i=1}^{n_\ell}\sum_{x_{i\ell}\geq x_{rs}}(x_{i\ell}-x_{rs})\right)^{\beta} - \left(\frac{1}{n_\ell n_s}\sum_{r=1}^{n_s}\sum_{x_{rs}>x_{i\ell}}(x_{rs}-x_{i\ell})\right)^{\beta}}{\left(\frac{1}{n_\ell n_s}\sum_{i=1}^{n_\ell}\sum_{x_{i\ell}\geq x_{rs}}(x_{i\ell}-x_{rs})\right)^{\beta} + \left(\frac{1}{n_\ell n_s}\sum_{r=1}^{n_s}\sum_{x_{rs}>x_{i\ell}}(x_{rs}-x_{i\ell})\right)^{\beta}}, \tag{5}$$

with $\beta \geq 1$ representing the social planner's sensitivity towards between-group non-overlappings and $\mu(\mathbf{x}_\ell) > \mu(\mathbf{x}_s)$. The measure $(1-D_{k,\ell s}(\beta))$ represents the β-ratio of overlap. When $\mu(\mathbf{x}_\ell) = \mu(\mathbf{x}_s)$ then $D_{k,\ell s}(\beta) = 0$, the distributions are identical. Conversely, if $D_{k,\ell s}(\beta) = 1$ there is no overlapping between the distributions. Thus, the multi-level $\alpha-$Gini decomposition with two parameters α and β and two partitions of groups is:

$$G^{\alpha}_{T} = \underbrace{\sum_{k=1}^{K}\left(\sum_{s=1}^{S_k} G^{\alpha}_{k,ss}\, p_{k,s}\, s^{\alpha}_{k,s}\right) p_k s^{\alpha}_k}_{G^{\alpha}_{W,S}} + \underbrace{\sum_{k=1}^{K}\left(\sum_{s=2}^{S_k}\sum_{\ell=1}^{s-1} G^{\alpha}_{k,\ell s} D_{k,\ell s}(\beta)(p_{k,\ell}\, s^{\alpha}_{k,s} + p_{k,s}\, s^{\alpha}_{k,\ell})\right) p_k s^{\alpha}_k}_{G^{\alpha,\beta}_{nb,SK}}$$

$$+ \underbrace{\sum_{k=1}^{K}\left(\sum_{s=2}^{S_k}\sum_{\ell=1}^{s-1} G^{\alpha}_{k,\ell s}(1-D_{k,\ell s}(\beta))(p_{k,\ell}\, s^{\alpha}_{k,s} + p_{k,s}\, s^{\alpha}_{k,\ell})\right) p_k s^{\alpha}_k}_{G^{\alpha,\beta}_{t,SK}} \tag{6}$$

$$+\underbrace{\sum_{k=2}^{K}\sum_{h=1}^{k-1} G_{kh}^{\alpha}\ D_{kh}(\beta)(p_k s_h^{\alpha} + p_h s_k^{\alpha})}_{G_{nb,K}^{\alpha,\beta}} + \underbrace{\sum_{k=2}^{K}\sum_{h=1}^{k-1} G_{kh}^{\alpha}\ (1-D_{kh}(\beta))(p_k s_h^{\alpha} + p_h s_k^{\alpha})}_{G_{t,K}^{\alpha,\beta}}$$

where $p_k = \frac{n_k}{n}$ and $s_k^{\alpha} = \frac{n_k \mu_k^{\alpha}}{n\ \mu^{\alpha}}$ are respectively the population share and the income share of group k. $G_{W,S}^{\alpha}$ is the within-group component while $G_{nb,SK}^{\alpha,\beta}$, $G_{nb,K}^{\alpha,\beta}$, $G_{t,SK}^{\alpha,\beta}$ and $G_{t,K}^{\alpha,\beta}$ are respectively the net between-group and transvariation components on the two levels of partition. Note that $G_{nb,SK}^{\alpha,\beta} + G_{t,SK}^{\alpha,\beta} = G_{gb,SK}^{\alpha}$ represent the gross between-group component.

3. Data

The data are from the most recent survey (QUIBB 2006) on poverty in Togo. The collation of QUIBB was carried out by the General Directorate of Statistics and National Accounts (DGSCN) in cooperation with the World Bank, the UNDP, the United Nations Population Fund (UNFP) and the United Nations Children's Fund (UNICEF). These international institutions funded the survey which took place from 4 July to 11 August 2006. It is an areolar survey stratified into two stages. At the first stage, 300 Zones of Counting (ZC) were drawn with probabilities proportionate to the size of ZC. The second stage included 7500 households from the ZC (25 households per ZC) with 2600 and 4900 in urban and rural areas respectively. If a household refused to respond or was absent, it was automatically replaced by another according to well-defined criteria. Thus, among the 10.3 per cent of households replaced, 0.9 per cent refused to answer and 9.4 per cent were not found during the survey period. The first results of QUIBB 2006 revealed a problem concerning the quality of cartographic work, and doubts about the household listing in particular. An investigation was then carried out from 9 to 12 November 2006 in order to redress the weights of households and achieve better estimates of the survey results. The sample of QUIBB 2006 data is composed of 1570 females and 5930 males. Concerning the employment status of female household heads, 57 are public sector workers, 70 are private sector workers, 1155 are self-employed workers[3], 281 are unemployed[4] (or inactive) and 7 are undeclared. As for male household heads, 468 work in the public sector, 542 work in the private sector, 4283 are self-employed workers, 596 are unemployed (or inactive) and 41 are undeclared.

4. Empirical results of the $(\alpha,\beta)-$multi-level $\alpha-$Gini decomposition by gender and employment status of household head

The α-Gini coefficient is a good tool for assessing inequalities and has the advantage of taking into account the decision-maker's sensitivity towards inequality. The $(\alpha,\beta)-$multi-level decomposition allows distinguishing the degree of inequality aversion level α and the sensitivity to transvariation β. In this study, the social planner's degree of overall inequality is considered to be uniform in the various partitions and is exogenously fixed at 3 (α=3). This represents his high degree of inequality aversion and respects the strong diminishing

[3] The self-employed workers (males or females) are in the informal sector and they include self-employed farmers and agricultural workers, craftsman, independent house helps and service providers.

[4] In the sense of QUIBB 2006, the unemployed are people who have not worked for 1 month before the survey and who are looking for a job during this period.

transfers (SDT) principle. We define $\alpha = 3$ because gender inequality by employment status is of concern in Togo and the economic development cannot take place without the inclusion of all social actors. The problems will not be solved by small adjustments but they require a real shock of change. However, several values (between 1 and 4) are assigned to β parameter in order to estimate their impact on transvariation and the net between-group components. The results are displayed using respectively real annual expenditure per adult equivalent (caculated from the Lachaud, Oxford and FAO/WHO equivalence scales) and also real annual expenditure per capita (without applying an equivalence scale). The objective is to compare the findings from Lachaud's scale to other results.

The employment status is composed of 5 strata in each partition (Males and Females): public sector workers, private sector workers, self-employed workers, unemployed (or inactive) and undeclared. The elementary statistics are presented in Appendices 2 and 3.

Firstly, we consider the first step of the decomposition. At the first level of partition, for all employment statuses considered and applying Lachaud's equivalence scale, the results in Appendix 4 show that inequalities between the men, on the one hand, and between the women on the other hand, stood at 69.40% of the overall inequalities in Togo in 2006 (see details of calculation in Appendix 5). As for gross between-gender inequalities, they contribute to 30.60% to the total disparities and this value remains unchanged for any given value of β (Appendix 4). The β parameter only affects the transvariation term and so, the net between-group component. When $\beta = 1$, the contribution of net between-group disparity $\left(\frac{G_{nb}^{3,\beta}}{G_T^3} = 15.53\%\right)$ is almost equal to that of inequality of transvariation $\left(\frac{G_t^{3,\beta}}{G_T^3} = 15.07\%\right)$. The contribution of the net term indicates the gender expenditure differences for all pairwise comparisons where households headed by women are better off on average than those managed by men (see the mean expenditures per adult equivalent for the three equivalence scales and per capita in Appendices 2 and 3). Indeed, when Togolese women manage a household, they are engaged exclusively in the restricted household unit (themselves with their children). Hence, in female-headed households, the mean size of household is equal to 3 and the mean number of children per household is equal to 1. Unlike men, many of whom are polygamous with large household size (the average size of households is 5 and the average number of children per household is 2) that consequently causes household impoverishment. However, the transvariation contribution assesses the gender expenditure gaps for the remaining pairwise comparisons when some males' expenditures are greater than those of some females. If β varies between 1 and 4, the net component contribution rises from 15.53% to 27.25% and the proportion of transvariation disparity decreases from 15.07% to 3.35%. Hence, the higher is the value of β, the larger is the contribution of the net between-group component and thus the lower is the transvariation contribution. As a result, the closer to 4 is the value of β, the more sensitive to expenditure differences between the better-off women and the worse-off men the decision-maker is. The results using the Oxford equivalence scale are quite the same. However, a slight overestimation of the net between-group term is observed with FAO/WHO's equivalence scale and an underestimation of this component is noticed in absence of scale.

The second level of partition consists of the separate effect of within-group inequality for men and for women for all employment statuses considered. Referring to our high level of inequality aversion and our results integrating the Lachaud scale, there is a more significant disparity of spending within men's partition. Indeed, while inequalities within men's partition

represents 42.29% of the global inequality, conversely, their contribution within women's group is estimated at 27.11% (Tables are not presented but these values are reported in Appendix 5). As regards the impact of the parameter of sensitivity towards between-group non-overlappings (β) on this second partition, an upward trend is also observed for the contributions of the net between-group components as β increases. The percentages are different with the FAO/WHO scale but similar with the Oxford scale and per capita expenditures (Appendix 5).

For the second step of the decomposition, the first aspect is related to within-employment status inequalities. With Lachaud's equivalence scale, Appendix 6 illustrating the disparities within the types of employment shows that the self-employed workers generate more inequality. The contributions of men and women are 12.43% and 12.27% respectively. The self-employed workers are informal sector workers. This unorganised sector comprises many heteregenous activities with very high income disparities. Given that the decision-maker is highly sensitive to what happens in the tails of the distributions when $\alpha = 3$, the expenditure gaps in the tails are the largest for households headed by men and women who are self-employed workers. The decision-maker integrates these discrepancies into social policies by taking account of the aversion degree towards inequality, fixed at 3. Concerning the organized sectors (public and private), the wage grid is determined with legal criteria and does not lead to huge disproportions. Finally, the low level of inequality in the class of unemployed (or inactive) is due to the fact that the former are not the long-term unemployed. As for the inactive, they certainly obtain financial support through remittances from relatives living abroad. Note that there are similarities in the findings when applying the Oxford scale but we find differences regarding FAO/WHO, and also when we do not apply an equivalence scale for women's partition.

The second aspect is applied to between-employment status contributions. Considering the Lachaud scale, the male partition (Appendix 7) shows that the highest contributions to between-group inequalities are the expenditure disparities observed between households managed by men who are self-employed workers and households headed by : male private sector workers (11.45%) and male unemployed (or inactive) (7.54%). On the one hand, according to the mean expenditure per adult equivalent (Lachaud's scale) in Appendix 3, males working in the private sector are on average richer than those in the informal sector. Indeed, in Togo the highest and most regular pay is in the private sector while, self-employed workers are engaged in precarious jobs with low income. On the other hand, unemployed (or inactive) men are richer than their peers who are self-employed workers (see the average expenditure in adult equivalent with Lachaud's scale in Appendix 3). As mentioned above, the unemployed are not yet concerned by long-term employment and the inactive certainly obtain support from relatives living abroad. In the women's partition (Appendix 8), the between-group highest contribution is observed essentially with women self-employed workers and those who are unemployed (or inactive) (7.00%). The first category of women are poorer than the second (see the mean expenditure per adult equivalent in Appendix 2) for the reasons mentioned above with regard to the men's group. The above findings with Lachaud's scale are the same as those from the two other scales and expenditure per capita.

The results obtained with Lachaud's equivalence scale is similar to the results provided with the Oxford scale because firstly the two scale parameters are almost the same. The scale parameter from Lachaud is closed to 1 ($\theta = 0.82$) and this means that Togolese households achieve very low economies of scale. In the Oxford scale approach, θ is always equal to 1. Secondly, it is due to the organization of children's weightings in adult equivalent in the data

for both scales. The fact that the findings obtained with Lachaud's equivalence scale do not correspond to those from the FAO/WHO scale is linked to the decomposition of weightings in the FAO/WHO scale even though the scale parameters of both approaches are quite the same as previously.

5. Concluding remarks

We have studied gender inequality in Togo, based on the (α, β) - multi-level α-Gini decomposition. The use of Lachaud's equivalence scale provides more accurate results for economic policies. The decision-maker attributes great importance to inequality aversion ($\alpha = 3$). Hence, for all employment statuses considered, the men's partition is the most inegalitarian and at the same time, net between-group inequality increases when the parameter of sensitivity to non-overlappings β rises. Inequality is greater among both men and women who are self-employed workers due to the heteregenous activities in this informal sector that causes high income gaps. In the male group, we observe high inequality between the self-employed and private sector workers because, male private sector workers are on average richer than those in the informal sector. The female's partition reveals that the highest disparity is between the self-employed workers and the unemployed (or inactive) ; this is because, the unemployed are not yet concerned by long-term employment and the inactive certainly receive remittances from abroad.

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Appendices

Appendix 1: Additional explanations of the determination of Lachaud's equivalence scale

The Engel curve estimation is performed from Deaton's model (1997):

$$w_i = \sigma + \beta_1 \ln\left(\frac{x}{n}\right) + \beta_2 \ln(n) + \sum_{j=1}^{j-1} \delta_j \eta_{ji} \quad + \quad \text{other variables} \qquad (7)$$

w_i represents the share of food expenditure for the household i, x is household total expenditure, n is household size and η_{ji} indicates the proportion of people in the household i belonging to the category j (adult, children aged 0 to 5 and children between 6 to 14 years). The value of the scale parameter θ is equal to $(1-\frac{\beta_2}{\beta_1})$. The econometric results below show that, the coefficients for standard of living and household size are statistically significant at 1%, and enable us to calculate the scale parameter θ which is equal to 0.82. Only the coefficiednt related to children aged between 6 and 14 is significant at 10%. Thus the relative cost of children belonging to the 6-14 age group, compared to adults is determined considering a reference household (Deaton, 1997)[5]. According to Deaton (1997), the log of relative cost ratio of total expenditure of a household with two adults and one child (X^1), relatively to a reference group of two adults (X^0) is expressed by:

$$Ln\left(\frac{X^1}{X^0}\right) = \left[\left(1-\frac{\beta_2}{\beta_1}\right)\ln\left(\frac{3}{2}\right)\right] + \left[\frac{(\delta_a - \delta_c)}{3\beta_1}\right] \qquad (8)$$

δ_a et δ_c are respectively the coefficients of adults and children for the appropriate age group. Equation (7) allows to assess, in terms of total expenditure, the cost of a household with two adults and an additional person of a given age such as a child. Hence, the parameter that reflects the equivalence between children of 6-14 years and adults is 0.5[6]. Children in the 0-5 year age group do not significantly affect the share of food expenditure, so we arbitrarily assign the value 1 to the equivalence parameter for this age group.

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[5] According to Deaton (1997), it is possible to estimate the relative cost of children of category *j*, compared to adults by considering a reference household.

[6] According to (3), $\exp\left[\ln\left(X_1/X_0\right)_{\gamma\,6-14}\right] \approx 1.040$, which means that a child between 6 and 14 years of age is equivalent to 0.04 times a couple or to 8 % of an adult. Furthermore, $\exp\left[\ln\left(X^1/X^0\right)_{\gamma\,15-60}\right] \approx 1.076$, i.e a third adult is equivalent to 0.076 times a couple that is 15. 2% the reference couple. Thus, the cost of an additional child from 6-14 years compared to the cost of an additional adult aged 15 to 60 is 8 / 15.2 ≈ 0.526, that is, about 0.5.

Regression coefficients from the estimation of the household Engel curve through ordinary least squares-Togo-2006

Dependent variable : Share of food expenditure in the overall household budget	Coeff.	|Z|
Log real expenditure per capita	-0.158	(35.83)***
Log size of household	-0.028	(8.33)***
Educational level of household head		
Incomplete primary school	0.061	(8.47)***
Complete primary school	0.048	(6.45)***
Incomplete secondary school	0.037	(5.07)***
Complete secondary school	0.022	(3.40)***
Professional school	0.005	(0.53)
Demography		
Children <= 5 years	-0.006	(0.48)
Children 6-14 years	-0.016	(1.97)*
Adults 15-60 years	-0.004	(0.37)
Marital status of household head		
Married and monogamous	0.059	(7.46)***
Married and polygamous	0.049	(5.80)***
Separated / Divorced	0.037	(3.75)***
Widower/Widow	0.041	(4.38)***
Gender of household head		
Male	-0.014	(2.92)***
Constant	2.495	(39.72)***
Observations : 7495 households		
R^2 = 0.42		
Robust Z statistics in parentheses : * significance at 10%; ** significance at 5% ; * significance at 1%**		

Source: Calculation by the author.

Appendix 2: Elementary statistics of Female's expenditure by employment status

Women	Public sector workers	Private sector workers	Self-employed workers	Unemployed (or inactive)	Undeclared	Overall
With equivalence scale (Lachaud)						
Size of the group	57	70	1155	281	7	1570
Mean expenditure in CFA/year	484831.398	462774.024	277774.237	292673.643	290200.757	295837.311
3- Gini (G_T^3)	0.6009	0.4881	1.4307	1.6408	2.8252	1.4254
With equivalence scale (Oxford)						
Mean expenditure in CFA/year	508295.4325	490848.0715	294233.2305	306625.7306	297378.2392	312563.5765
3- Gini (G_T^3)	0.5434	0.4457	1.2493	1.4519	2.5425	1.2590
With equivalence scale (FAO/WHO)						
Mean expenditure in CFA/year	602734.3542	518987.7926	345394.2727	193862.4629	332358.1955	334799.4844
3- Gini (G_T^3)	0.7345	0.4211	1.8550	0.7164	0.0435	1.9654
Without equivalence scale						

Mean expenditure in CFA/year	345513.4934	350617.2359	230407.9738	242930.139	358085.4784	242281.7873
3- Gini (G_T^3)	0.927321	1.126724	3.175708	2.268941	1.360937	2.727694

Source : Author's calculation using the VBA code presented in Mornet (2013).

Appendix 3: Elementary statistics of Male's expenditure by employment status

Men	Public sector workers	Private sector workers	Self-employed workers	Unemployed (or inactive)	Undeclared	Overall
With equivalence scale (Lachaud)						
Size of the group	468	542	4283	596	41	5930
Mean expenditure in CFA/year	306977.2193	386696.2322	190332.9845	287849.9738	187420.8929	227267.0675
3- Gini (G_T^3)	1.0673	1.0202	2.1329	1.7337	0.6467	2.2238
With equivalence scale (Oxford)						
Mean expenditure in CFA/year	323458.1518	405988.0856	202406.7713	296479.1912	197799.0353	239990.4751
3- Gini (G_T^3)	0.9284	0.8717	1.8665	1.6132	0.6598	1.9447
With equivalence scale (FAO/WHO)						
Mean expenditure in CFA/year	304227.897	389058.7336	192019.9615	275946.4063	186403.3888	227281.0424
3- Gini (G_T^3)	1.0699	1.0006	2.0626	1.9685	0.7721	2.2009
Without equivalence scale						
Mean expenditure in CFA/year	231886.1294	320672.3649	156530.5274	239193.8955	141521.4943	185658.1436
3- Gini (G_T^3)	2.215765	2.072554	3.895602	3.003320	0.896791	4.048239

Source : Author's calculation using the VBA code presented in Mornet (2013).

Appendix 4: Decomposition between gender when α =3 and for all $\beta \in$ {1,…,4}

Overall	$\beta = 1$	$\beta = 2$	$\beta = 3$	$\beta = 4$
With equivalence scale (Lachaud)				
G_T^3	5.2579	5.2579	5.2579	5.2579
G_w^3	3.6492	3.6492	3.6492	3.6492
G_w^3 / G_T^3	69.40%	69.40%	69.40%	69.40%
$G_{gb}^{3,\beta}$	1.6087	1.6087	1.6087	1.6087
G_{gb}^3 / G_T^3	30.60%	30.60%	30.60%	30.60%
$G_{nb}^{3,\beta}$	**0.8165**	**1.2065**	**1.3649**	**1.4326**
$G_{nb}^{3,\beta} / G_T^3$	15.53%	22.95%	25.96%	27.25%

$G_t^{3,\beta}$	**0.7922**	**0.4022**	**0.2438**	**0.1761**
$G_t^{3,\beta} / G_T^3$	15.07%	7.65%	4.64%	3.35%
With equivalence scale (Oxford)				
G_T^3	4.6138	4.6138	4.6138	4.6138
G_w^3	3.2038	3.2038	3.2038	3.2038
G_w^3 / G_T^3	69.40%	69.40%	69.40%	69.40%
$G_{gb}^{3,\beta}$	1.4100	1.4100	1.4100	1.4100
$G_{gb}^{3,\beta} / G_T^3$	30.56%	30.56%	30.56%	30.56%
$G_{nb}^{3,\beta}$	**0.7123**	**1.0529**	**1.1918**	**1.2507**
$G_{nb}^{3,\beta} / G_T^3$	15.44%	22.82%	25.83%	27.11%
$G_t^{3,\beta}$	**0.6977**	**0.3571**	**0.2182**	**0.1593**
$G_t^{3,\beta} / G_T^3$	15.12%	7.74%	4.73%	3.45%
With equivalence scale (FAO/WHO)				
G_T^3	6.1503	6.1503	6.1503	6.1503
G_w^3	4.1663	4.1663	4.1663	4.1663
G_w^3 / G_T^3	67.74%	67.74%	67.74%	67.74%
$G_{gb}^{3,\beta}$	1.9840	1.9840	1.9840	1.9840
$G_{gb}^{3,\beta} / G_T^3$	32.26%	32.26%	32.26%	32.26%
$G_{nb}^{3,\beta}$	**1.0469**	**1.5136**	**1.6956**	**1.7763**
$G_{nb}^{3,\beta} / G_T^3$	17.02%	24.61%	27.57%	28.88
$G_t^{3,\beta}$	**0.9371**	**0.4704**	**0.2884**	**0.2077**
$G_t^{3,\beta} / G_T^3$	16.05%	7.65%	4.69%	3.38%
Without equivalence scale				
G_T^3	9.6917	9.6917	9.6917	9.6917
G_w^3	6.7759	6.7759	6.7759	6.7759
G_w^3 / G_T^3	69.91%	69.91%	69.91%	69.91%
$G_{gb}^{3,\beta}$	2.9158	2.9158	2.9158	2.9158
$G_{gb}^{3,\beta} / G_T^3$	30.09%	30.09%	30.09%	30.09%
$G_{nb}^{3,\beta}$	**1.2921**	**2.0114**	**2.3435**	**2,4945**
$G_{nb}^{3,\beta} / G_T^3$	13.33%	20.75%	24.18%	25.74%
$G_t^{3,\beta}$	**1.6237**	**0.9043**	**0.5723**	**0.4213**
$G_t^{3,\beta} / G_T^3$	16.75%	9.33%	5.91%	4.35%

Source : Author's calculation using the VBA code presented in Mornet (2013).

Appendix 5: Main components of the decomposition between genders and employment status

Total of the components in 2 levels		Contributions to G_T^3
With equivalence scale (Lachaud)		
$G_{gb,W}^3 + G_{w,W}^3$	1.4254	27.11%
$G_{gb,M}^3 + G_{w,M}^3$	2.2238	42.29%
Sum	3.6492	69.40%
$G_{gb,M+W}^3$	1.6087	30.60%
G_T^3	5.2579	100%
With equivalence scale (Oxford)		
$G_{gb,W}^3 + G_{w,W}^3$	1.259	27.29%
$G_{gb,M}^3 + G_{w,M}^3$	1.9448	42.15%
Sum	3.2038	69.44%
$G_{gb,M+W}^3$	1.4100	30.56%
G_T^3	4.6138	100%
With equivalence scale (FAO/WHO)		
$G_{gb,W}^3 + G_{w,W}^3$	1.9654	31.96%
$G_{gb,M}^3 + G_{w,M}^3$	2.2009	35.78%
Sum	4.1663	67.74%
$G_{gb,M+W}^3$	1.9840	32.26%
G_T^3	6.1503	100%
Without equivalence scale		
$G_{gb,W}^3 + G_{w,W}^3$	2.7277	28.14%
$G_{gb,M}^3 + G_{w,M}^3$	4.0482	41.77%
Sum	6.7759	69.91%
$G_{gb,M+W}^3$	2.9158	30.09%
G_T^3	9.6917	100%

Source : Author's calculation using the VBA code presented in Mornet (2013).

Appendix 6: Males' and females' within-group contributions to the overall expenditure inequalities ($G_{k,SS}^3 / G_T^3$)

$G_{k,SS}^3 / G_T^3$	Public sector workers	Private sector workers	Self-employed workers	Unemployed (or inactive)	Undeclared
With equivalence scale (Lachaud)					
Men	0.31%	0.80%	12.43%	0.68%	0.00%
Women	0.06%	0.07%	12.27%	0.97%	0.00%
With equivalence scale (Oxford)					
Men	0.31%	0.76%	12.66%	0.67%	0.00%
Women	0.06%	0.07%	12.31%	0.95%	0.00%
With equivalence scale (FAO/WHO)					

Men	0.26%	0.68%	10.55%	0.58%	0.00%
Women	0.09%	0.05%	18.04%	0.07%	0.00%
Without equivalence scale					
Men	0.28%	0.92%	12.56%	0.67%	0.00%
Women	0.03%	0.07%	15.33%	0.76%	0.00%

Source : Author's calculation using the VBA code presented in Mornet (2013).

Appendix 7: Males' employment group contribution to the total disparities when $\alpha = 3$ and for all $\beta \in \{1,...,4\}$

Men $G^3_{gb,Sk} / G^3_T$	Public sector workers	Private sector workers	Self-employed workers	Unemployed (or inactive)	Undeclared
With equivalence scale (Lachaud)					
Public sector workers	0.31%				
Private sector workers	1.12%	0.80%			
Self-employed workers	5.07%	**11.45%**	12.43%		
Unemployed (or inactive)	0.92%	1.62%	**7.54%**	0.68%	
Undeclared	0.04%	0.10%	0.15%	0.06%	0.00%
With equivalence scale (Oxford)					
Public sector workers	0.31%				
Private sector workers	0.95%	0.76%			
Self-employed workers	4.46%	**9.92%**	12.66%		
Unemployed (or inactive)	0.80%	1.40%	**6.51%**	0.67%	
Undeclared	0.04%	0.09%	0.14%	0.05%	0.00%
With equivalence scale (FAO/WHO)					
Public sector workers	0.26%				
Private sector workers	1.11%	0.68%			
Self-employed workers	4.92%	**11.46%**	10.55%		
Unemployed (or inactive)	0.91%	1.65%	**7.32%**	0.58%	
Undeclared	0.04%	0.10%	0.16%	0.06%	0.00%
Without equivalence scale					
Public sector workers	0.28%				
Private sector workers	1.21%	0.92%			
Self-employed workers	4.27%	**11.65%**	12.56%		
Unemployed (or inactive)	0.88%	1.72%	**7.28%**	0.67%	
Undeclared	0.03%	0.10%	0.14%	0.06%	0.00%

Source : Author's calculation using the VBA code presented in Mornet (2013).

Appendix 8: Females' employment group contribution to the total disparities when $\alpha = 3$ and for all $\beta \in \{1,...,4\}$

Women $G^3_{gb,Sk} / G^3_T$	Public sector workers	Private sector workers	Self-employed workers	Unemployed (or inactive)	Undeclared
With equivalence scale (Lachaud)					
Public sector workers	0.06%				
Private sector workers	0.13%	0.07%			
Self-employed workers	2.61%	2.42%	12.27%		
Unemployed (or inactive)	0.65%	0.62%	**7.00%**	0.97%	
Undeclared	0.02%	0.02%	0.20%	0.05%	0.00%
With equivalence scale (Oxford)					
Public sector workers	0.06%				
Private sector workers	0.14%	0.07%			
Self-employed workers	2.66%	2.57%	12.31%		
Unemployed (or inactive)	0.66%	0.65%	**6.94%**	0.95%	
Undeclared	0.02%	0.02%	0.19%	0.05%	0.00%
With equivalence scale (FAO/WHO)					
Public sector workers	0.09%				
Private sector workers	0.15%	0.05%			
Self-employed workers	3.62%	2.18%	18.04%		
Unemployed (or inactive)	1.00%	0.53%	**6.10%**	0.07%	
Undeclared	0.01%	0.01%	0.09%	0.00%	0.00%
Without equivalence scale					
Public sector workers	0.03%				
Private sector workers	0.10%	0.07%			
Self-employed workers	1.57%	2.28%	15.33%		
Unemployed (or inactive)	0.35%	0.51%	**6.84%**	0.76%	
Undeclared	0.01%	0.01%	0.23	0.05%	0.00%

Source : Author's calculation using the VBA code presented in Mornet (2013).