Spanish economic inequality: A gender approach

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Abstract

This paper examines the gender differences of expenditure distribution within the last decade in Spain. In particular, the Lorenz dominance is tested in order to know the gender gap when expenditure distributions are approximated by the Dagum model. The sensitiveness of the results to some conceptual choices such as the equivalence scale or the gender reference are also analysed.

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1. Introduction.

The female participation in the labour has increased during the last decades; however, it continues to be lower than the male participation. Besides, women’s wages are still lower than those of men. Some evidence shows that there are economic welfare gender differences in most countries, as shown in studies by Davies and Joshi (1998) or Quisumbing et al (2001)\(^1\). The majority of these papers, however, focus on poverty rather than inequality. This paper tries to analyse the gender distributional differences by means of comparing expenditure inequality between men and women and between male- and female-headed households.

Taking into account our target, this paper presents the results of expenditure parametric modelling for men and women and for male- and female-headed households using the Dagum model Type I (Dagum, 1977). The parametric modelling of expenditure distribution has the advantage that the information contained in the thousands or tenths of thousands of data can be concentrated on a few numbers of parameters.

Also, based on the results by Kleiber (1996), the Lorenz dominance between males and females and between male- and female-headed household expenditure distributions is tested. The Lorenz dominance allows distributions to be compared without choosing specific inequality indexes. Together with this, the sensitivity of results to the equivalent scale is analysed.

The scheme of this paper is as follows: section 2 highlights some conceptual choices; section 3 describes the Lorenz dominance ordering; section 4 summarizes the key issues in the parametric approach to model expenditure distribution; Section 5 presents the empirical results; finally, section 6 presents the conclusions.

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\(^1\) Gornick (2004) presents a review of the papers which examine the gender differences based on Luxemburg Expenditure Study. Lampieti and Stalker (2000) also review research carried out by the World Bank.
2. Conceptual choices

Before examining the gender differences within the expenditure distribution in Spain, this section aims at clarifying some important questions for the study of the expenditure distribution, namely, the variable, the unit of analysis and the equivalence scale related to the information provided by “Encuesta de Presupuestos Familiares (EPF)” for the period 1990-1991 and the “Encuesta Continua de Presupuestos Familiares (ECPF)”. Both surveys are conducted by the Instituto Nacional de Estadística, whose effective sample consists of 21155 households for EPF and of 9631 for ECPF and whose main aim is to get information to elaborate the weights in the Retail Index Price.

The analysis of inequality is based on an indicator of individual economic welfare, called income in general terms. To carry out this analysis, such variables as income (in terms of household resources), expenditure and wealth are considered. Wealth is perhaps the least used because of the difficulty of valuing it in a market sense. Usually, some controversy lies between income and expenditure. From the theoretical point of view, different arguments have been given to support both variables (see, for example, Ruiz-Castillo, 1987 and Blundell y Preston, 1994 in the case of expenditure and Atkinson, 1983, 38-41 in the case of income). Besides, other arguments given in favour of expenditure are related to the quality of expenditure data due to the fact that expenditure is a more reliable measure than income is (see, for example, Pena 1996 and Prieto-Alaiz and Pena-Trapero, 2000 in the Spanish case). For our purpose, we prefer to use expenditure data given that the definition in both surveys is more homogeneous.

The unit of recipient in the EPF and ECPF is the household. However, it is considered that the elementary unit in the welfare analysis is the individual rather than the household. Therefore, the question is how to pass from household expenditure distribution to individual expenditure distribution\(^2\). We adopt the most common solution, that is, to analyse the distribution of expenditure on individual level where each household is given a weight equal to the number of its members. This means that

\(^2\) Danzinger and Taussing(1979) and Cowell(1984) discuss, in depth, the treatment of the income unit in the distribution of income.
we assume that the members of the households pool their expenditure and share a common economic status.\(^3\)

These choices involve comparing the expenditure of households with different sizes, compositions by age, places of residence... These differences should be taken into account in order to give a real portrait of the expenditure distribution among individuals.

A very simple way of considering the differences of needs among households could be to obtain the per capita expenditure. However, as Coulter et al. (1992 a) point out, the disadvantage of the expenditure per capita is that it does not take into account that the marginal cost of an extra person may change as household size changes. Equivalence scale rates attempt to achieve both effects: the household size and the economies of scale generated by the size. By weighting the household expenditure according to a scale rate an equivalent expenditure is obtained.

One of the most often used equivalent scales is the OECD scale. According to it, the weights given to the members of the household are: 1.0 for the first adult in the household, 0.7 for the rest of adults and 0.5 for each children aged under 14.

Another approach is suggested by Buhmann et al. (1988) and Coulter et al.(1992a and 1992b) and consists of correcting the expenditure with a power of size of the household, that is,

\[
X^e_h = \frac{X_h}{n_h^s}, \quad s \in [0,1]
\]

where \(X^e_h\) is the equivalent expenditure of household \(h\), \(X_h\) is the expenditure of household \(h\), \(n_h\) is the number of household’s members \(h\) and \(s\) is a number between 0 and 1 used to adjust the size of the household. If \(s\) is equal to 0 there is no correction of the expenditure by the size of the households; if it is equal to 1, the equivalent expenditure coincides with the per capita expenditure; any value between these two

\(^3\)This assumption has been criticized for leading to neglecting or at least underestimating the degree of gender inequality in the distribution of expenditure (see Haddad and Kanbur, 1990 and Kanbur, 2003). Fritzell (1999) presents two alternative methods to allocate resource without assuming equal sharing. Dasgupta (2001) examines the implications of intra-household expenditure redistribution.
extremes allows calibration of the effect of scale economies: the greater the value of \( s \), the greater the equivalence scale effect. The main advantage of this approach is its flexibility and the fact that the majority of the equivalent scales are associated to a particular value of \( s \). For example, some studies have shown that the OECD scale is related to a value of \( s \) of about 0.7 (see, for example, Buchmann et al., 1988 and Jenkins and Cowell, 1994).

There is no general agreement about which equivalence to use. In fact, Coulter et al. (1992a) stress that ‘there is no single correct equivalence scale for adjusting expenditures’; for this reason ‘a range of scale relativities is both justifiable and inevitable’. Consequently, we use per capita expenditure, equivalent expenditure with the OECD scale and equivalent expenditure with \( s \) equal to 0.5.

Finally, we analyse how to face the gender characterization of expenditure. The direct gender reference is to examine the differences in males and females. Other way is to study the expenditure differences between individuals at female- and male- headed households\(^4\). Both choices are being considered in this paper.

3. **Lorenz curve and Lorenz dominance.**

Our aim is to compare two distributions of expenditure, one for males (or male-headed households) and another one for females (or female-headed households) by means of the Lorenz curve. It is assumed that these expenditure distributions could be represented by elements of the continuous distribution function set:

\[
\Phi := \{ F : \mathcal{R}_+ \to [0,1] \}
\]

where \( \mathcal{R}_+ := (0, \infty) \) and with density function, \( f(x) = dF(x) / dx \).

The Lorenz curve is defined as the relationship between the cumulative

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\(^4\) None of these two choices is free of critiques. Firstly, as we assume intra-households equal allocation of resource, the differences between men and women could reduce to differences among households. Other problem related to female- and male-headed households is that the headship of the household is sometimes reported to have little to do with the economic support of the household (see, Quisumbing et al, 2001).
proportion of expenditure units and the cumulative proportion of expenditure received when the units are arranged in ascending order of their expenditure, that is,

\[ L_F(p) = \frac{1}{\mu_F} \int_0^p zF^{-1}(t) dt \quad p \in [0,1] \]

where \( \mu_F = \int_0^\infty zdF(z) \) is the mean expenditure and \( F^{-1}(t) = \inf \{ x \mid F(x) \geq t \} \) is the inverse function for \( t \in [0,1] \) (see, Gastwirth, 1971). It is an increased continuous convex function with \( L_F(0) = 0 \) and \( L_F(1) = 1^5 \).

The interpretation of the Lorenz curve in terms of inequality is clear and direct. If every individual gets the same expenditure (equality), the expenditure distribution would degenerate in a point \( \mu_F \), that is, \( F^{-1}(p) = \mu_F \), for \( p \in [0,1] \). This implies that the Lorenz curve coincides with \( p \) (\( L_F(p) = p \) is called egalitarian line). Consequently, the nearer the Lorenz curve is to the egalitarian curve, the lesser inequality will be. So, given two expenditure distributions, \( F \) and \( G \in \Phi \), the distribution \( F \) is more equal than the distribution \( G \) if the Lorenz curve associated to \( F \) is higher than that associated to \( G \). When two Lorenz curves intersect, neither distribution can be said to be more equal than the other.

The relative position of two Lorenz curves defines the Lorenz dominance ordering. The distribution \( F \ Lorenz dominates \) the distribution \( G \), \( F \succeq_L G \), if \( L_F(p) \geq L_G(p) \) for \( \forall p \in [0,1] \) with \( L_F(p) \neq L_G(p) \) for some \( p \in [0,1] \) and, thus, the distribution \( F \) exhibits less inequality than the distribution \( G \).

The inequality within the Lorenz curve has two main characteristics. Firstly, it is a relative inequality in the sense that it is independent from the mean expenditure. Secondly, the Lorenz dominance is equivalent to the Pigou-Dalton Transfer Principle (see, Atkinson, 1970).

The Lorenz ordering has also important interpretations in terms of social

\[^5\text{In Kakwani (1980, p.89) and Nygard and Sändstrom (181, pp. 150-157) these properties and others are studied profusely.}\]
welfare. Atkinson (1970) showed that, if two expenditure distributions have the same mean, the Lorenz dominance ordering is identical to the ranking implied by a social welfare function which is the sum of the individual utilities and every individual has an identical utility function which is increasing and concave. Dasgupta et al. (1973) and Rothschild and Stiglitz (1973) relax the assumptions of Atkinson’s theorem and demonstrate that the Lorenz dominance ordering is equivalent to the ranking of any symmetric welfare function that is quasi-concave. For distributions with different means, Shorrocks (1983) states that if $F \geq_G G$ and $\mu_F \geq \mu_G$ then the distribution $F$ is a better distribution from the point of view of individualistic increasing concave welfare distribution.

Therefore, our aim is to test whether the Lorenz curve of $F$ is the same as that of $G$, against the alternative hypothesis that $F$ Lorenz dominates $G$, that is,

$$
H_0 : L_F(p) = L_G(p)
$$

$$
H_1 : L_F(p) \geq L_G(p)
$$

(1)

where $F$ denotes the expenditure distribution for males (or male-headed households) and $G$ denotes the expenditure distribution for females (or female-headed households).

4. Parametric modelling of expenditure distribution

This section describes the approach that has been followed to test the Lorenz dominance. This approach, called “indirect” by Maasumi (1994), is based on fitting a parametric model to expenditure data. The main advantage of this methodology is that the information contained in the thousands or tenths of thousands of data can be concentrated on a few numbers of parameters. Besides, useful information can be drawn directly from the estimated parameters, for example, comparing expenditure distributions as in hypothesis (1). However, this approach is very vulnerable to the presence of misspecification errors which could lead to erratic conclusions. Therefore, the parametric approach to the expenditure distribution implies not only the choice of

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6 The Lorenz dominance is quasi-ordering. Hence, some cases (such as crossing Lorenz curves and those where one distribution with lesser mean dominates the other in the Lorenz sense) cannot be compared in terms of social welfare by means of the Lorenz dominance. For these cases, Shorrocks (1983) and Kakwani (1984) introduce the generalized Lorenz curve, defined by scaling up the Lorenz curve by the mean expenditure.
functional form to fit the data properly but also estimation methods with good properties and goodness of fit techniques to analyse the deviation between the fitted model and the empiric distribution.

The parametric approach assumes that the expenditure distribution could be represented by a member of continuous distribution functions completely specified except for a \((px1)\) vector of unknown parameter, \(\theta\). Namely, by a member of

\[ \Psi := \{F_\theta, \theta \in \Theta\} \]

where \(\Psi \subset \Phi \) and \(\Theta \subset \mathbb{R}^p\) is the parametric space and \(f(x;\theta)\) is the density function of \(F_\theta\).

The first step in the parametric modelling consists of choosing, out of all the parametric functions, those models which fulfil some desirable properties, taking into account the nature of the data at hand. Some of these properties are the right skewness, the convergence to Pareto Law, a parsimonious parametric specification, the economic model foundation and flexibility\(^7\). The latter property has been outlined in the most recent papers trying to specify functions that net other models:

In the literature, we find that, among models with one parameter, only the Pareto Law provides, in general, an excellent fit to the upper tail of the expenditure distribution but, still, the fit over the whole range of expenditures is poor (see e.g. Mandelbrot, 1960). Among the two-parameter models, empirical evidence indicates that the gamma distribution seems to fit data better than the lognormal one, especially in the tails, but both overestimate skewness (see Salem and Mount, 1974). When it comes to practice, the Singh-Maddala distribution performs better than the gamma and the lognormal (see Singh and Maddala, 1976). Among the three-parameter models, Dagum (1977) introduces the Dagum model type I and Dagum (1980) find that this model performs better than the Sing-Maddala one. Finally, McDonald (1984) introduce the generalised beta of second kind (GB2) and show that GB2 fits better than any of the former distributions\(^8\).

\(^7\) Dagum (1990), Majunder and Chakravarty (1990) and Callealta et al. (1996) give different lists of other desirable properties for the parametric income models.

\(^8\) Kleiber and Kotz (2003) present a complete study about the most often used parametric income models.
GB2 includes many of the most often used distributions in the expenditure modelling\textsuperscript{9}, namely, three parameter distributions as Dagum and Sing-Maddala models; and two parameter distributions as lognormal, gamma or Fisk distributions. As it is expected, the GB2 gives a better fit than any of the nested models. However, the Singh-Maddala and Dagum distributions have good properties. As Kleiber (1996) points out, both have closed-form expressions for their distribution functions are invertible and perform almost as well as the GB2. Although there is not a natural ordering among the Dagum and the Singh-Maddala models, Kleiber (1996) notes that “Dagum is more flexible where a larger proportion of the data is and should therefore give a better fit than the much more popular Singh-Maddala”\textsuperscript{10}. Some examples of the outperformance of the Dagum model could be found in McDonald and Mantrala (1995), McDonald and Xu, (1995) and Victoria-Feser (1995, 2000). Consequently, this is the model that we will use to fit the expenditure distributions, whose distribution function takes the form:

\[
F(x; \theta) = D(x; a, b, p) = \left( \frac{1}{1 + \left( \frac{b}{x} \right)^\theta} \right)^b \quad x > 0, a > 0, b \geq 0, p \geq 0
\]

being \( b \) the scale parameter. In Dagum(1977), it could be found the main properties of this distribution, as the moments, the Gini coefficient and the Lorenz curve (see, also, Kleiber and Kotz, 2003).

The next step in the parametric modelling is the estimation of unknown parameters. The good properties of maximum likelihood estimators (MLE) under regularity conditions it are ell-known (see, for example, Zacks, 1981). Other estimation criteria are the method of the moments and the least squares method. However, evidence shows the outperformance of the maximum likelihood methods with individual data that are used in this paper. Most recently, robust estimation methods have been used by Victoria-

\textsuperscript{9} McDonald (1985) gives a detailed list of the models nested by GB2.

\textsuperscript{10} This author presents the relationship between the Dagum and Singh Maddala models. He also notes that the upper tail of the Singh-Maddala model is governed by two parameters and the region near the origin (where there are more individuals) is so only by one, while the opposite happens with the Dagum model.
In order to complete the parametric modelling, the goodness of the fit should be analysed so as to examine the appropriateness of the model. The goodness of fit tests set out under null hypothesis that the model generates the data and most of test statistics are based on the difference between the model assumed under null hypothesis and the empirical distribution\(^{11}\). Kolmogorov-Smirnov, Cramer-Mises or Anderson-Darling tests are examples of goodness of fit test (see Stephens, 1986 y Gibbons and Chakraborti, 1992). Unfortunately, when the model under null hypothesis is not fully specified, that is, when the parameters are unknown, the distributions of the goodness of fit statistics are unknown\(^{12}\). However, the bootstrap techniques provide a way to calculate the distribution of the test statistic.

Among the goodness of fit statistics, Stephens (1986) recommends Anderson-Darling (A\(^2\)) statistics, because it is more powerful to detect deviations at the tails. With the estimation of \(\theta\), this statistics take the form of

\[
A^2 = n \int_0^\infty \left( F_\theta(x) - F_\theta(x) \right)^2 \left[ F_\theta(x)(1 - F_\theta(x)) \right]^{-1} f(x; \hat{\theta}) dx
\]

where \(F_n(x)\) is the empirical distribution and \(\hat{\theta}\) is the MLE.

Once the parameter modelling has concluded, the interest hypothesis (1) could be expressed in terms of the parameters. So, let \(F_\theta\) be the distribution of males (or male-headed household) and \(G_\theta\) the expenditure distribution of females (female-headed households). The hypothesis (1) could be stated as

\[
H_0 : H(\theta_F) = H(\theta_G) \\
H_1 : H(\theta_F) > H(\theta_G) \text{ or } H(\theta_F) < H(\theta_G)
\]

where \(H()\) represents \(r\) non linear equations, i.e. \(H(\theta)=[h_1(\theta),...,h_r(\theta)]^T\). Taking into

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\(^{11}\) Brachmann, et al. (1996) employ Bickel and Rosenblat test based on comparing the distribution under null hypothesis to nonparametric density estimator in order to analyse the goodness of fit.

\(^{12}\) One exception is the goodness of fit test for normal distributions.
account the properties of maximum likelihood estimators and assuming independent
samples of men (male-headed households) and women (male-headed households), the
statistics to test the hypothesis (2) takes the form of

\[ \frac{t^T \left( H_F(\hat{\theta}_F) - H_G(\hat{\theta}_G) \right)}{\sqrt{t^T \hat{\Omega}_{FG} t}} \xrightarrow{D} N(0,1) \]  

(3)

where \( t \) is a unit column vector, \( \hat{\theta} \) is MLE of \( \theta \), and

\[ \hat{\Omega}_{FG} = \left( \hat{D}_{H_F} \hat{\Sigma}_F \hat{D}_{H_F}^T / n_1 \right) + \left( \hat{D}_{H_G} \hat{\Sigma}_G \hat{D}_{H_G}^T / n_2 \right) \]  

where \( \hat{D} \) is the (rxp) matrix with elements defined as

\[ \hat{D}_{ij} = \left. \frac{\partial h_i(\theta)}{\partial \theta_j} \right|_{\theta = \hat{\theta}} \text{ for } i = 1, \ldots, k \text{ and } j = 1, \ldots, p \]

and \( \hat{\Sigma} \) is the covariance matrix of MLE evaluated at \( \theta = \hat{\theta} \) (see, for example, Zacks, 1981).


In this paper, we use Kleiber(1996) results. So, given two Dagum distributions, \( D(a,b,p) \) and \( D(a',b',p') \), which represent the male (or male-headed household) and female (or female-headed household) expenditure distributions, respectively, the distribution of male (or male-headed household) dominates that of females (or female-headed household) in the Loren sense, if only if \( a \geq a' \) and \( ap \geq a' p' \). These necessary and sufficient conditions allow the expression of hypothesis of the Lorenz dominance
and the test statistics (3) in terms of the parameters of the Dagum model.

5. Empirical Evidence.

This section presents the results of the Lorenz dominance tests in the context of the parametric inference using the Dagum model. These tests are carried out to compare men (or male-headed household) expenditure and women (or female-headed household) expenditure in 1990 and in 1999. Three equivalent scales are employed: per capita scale, the OECD scale and the $s$ factor equal to 0.5.

The number of men and women is balanced in both years. However, there are much more people living at male-headed households (88% in 1990 and 86% in 1999) than those living at female-headed households, although this percentage has increased slightly during the two analysed years (from 12% in 1990 to 14% in 1999).

The features of the households where men and women live are similar. Nevertheless, the characteristics of households headed by women are quite different from those headed by men. The households headed by women have lesser average size and are more likely to contain an older person living alone, a single younger childless person or alone parents. Hence, any attempts to adjust for household composition are necessary in order to compare household expenditure although these will not compensate for all the differences between female and male headed households.

Tables 1, 2 and 3 show the MLE of the Dagum model parameters for the per capita expenditure, the equivalent expenditure with the OECD scale and the equivalent expenditure with $s$ equal to 0.5, respectively. The estimation is performed by nonlinear optimization with the implementation of the Newton-Raphson algorithm in language C (see, for example Harvey, 1981). As the convergence depends on the initial values, a grid search has been carried out previously. These tables also exhibit the Anderson statistics to test the goodness of fit. The null hypothesis is not rejected for a confidence level $\alpha=0.5$ (the critical points of Anderson statistics are computed according to bootstrap techniques) and it can be concluded that the Dagum model fits the data properly.
Table 4 summarizes the statistics to test mean expenditure differences between men and women and between male- and female-headed households. The table also shows the $p$-value. Regardless of the year and the gender reference, the evidence provides support for no mean expenditure differences with the OECD scale and with $s$ equal to 0.5. When the per capita expenditure is studied, the differences are detected when comparing mean expenditure between male- and female-headed households for significant levels higher than 3% in 1990 and higher than 8% in 1999, with greater mean expenditure for individuals who live at female-headed households. However, no mean differences appear when comparing men and women per capita expenditure.

Figure 1 shows the Lorenz curve of men and women for each equivalent income and year. The values of the statistics to test the Lorenz dominance and the $p$-value are shown in table 6. It is found that the data support the null hypothesis for not existing differences in the Lorenz curve between men and women, regardless of the year and the scale of equivalent. That implies that the expenditure distribution of men exhibits the same inequality as that of women. Therefore, taking into account that there are no significant differences in the mean expenditure, it can be concluded that men and women share the same level of welfare.

However, the results change dramatically when the gender reference is the headship of the households, as we can see in figure 2 and table 6. So, regardless of the scale and year, the male-headed household expenditure distribution dominates female-headed household expenditure distribution in the Lorenz sense, presenting, unambiguously, less inequality. The conclusions in terms of welfare depend on the scale that is used. According to the OECD scale and with the factor “$s$” equal to 0.5, the female-headed households are worse-off, given that there are no significant mean expenditure differences. In contrast, with the per capita expenditure, no conclusions could be drawn in terms of welfare with the Lorenz dominance, because there are significant mean expenditure differences between male-and female-headed households.
### Per capita expenditure

<table>
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<tr>
<th></th>
<th>1990</th>
<th></th>
<th></th>
<th>1999</th>
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<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>MHH</td>
<td>FHH</td>
<td>Male</td>
<td>Female</td>
<td>MHH</td>
<td>FHH</td>
<td>Male</td>
<td>Female</td>
<td>MHH</td>
<td>FHH</td>
<td>Male</td>
</tr>
<tr>
<td>a</td>
<td>3.005</td>
<td>2.9664</td>
<td>3.0380</td>
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<td>3.1956</td>
<td>3.1363</td>
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<td>0.0231</td>
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<td>0.0393</td>
</tr>
<tr>
<td>b</td>
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<td>3.3892</td>
<td>3.3775</td>
<td>3.8098</td>
<td>3.9240</td>
<td>3.0745</td>
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</tr>
<tr>
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<td>1.1416</td>
<td>1.1201</td>
<td>1.0332</td>
<td>1.1659</td>
<td>1.1715</td>
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<td>-63163.34</td>
<td>-11009.42</td>
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Table 1. Results of the Dagum model estimation with per capita expenditure

### Equivalent expenditure (ODCE scale)

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<tr>
<th></th>
<th>1999</th>
<th></th>
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<th>1999</th>
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<tr>
<td></td>
<td>Male</td>
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<td>MHH</td>
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<td>Female</td>
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<td>FHH</td>
<td>Male</td>
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<tr>
<td>A</td>
<td>3.1398</td>
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<td>2.8710</td>
<td>3.3241</td>
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<td>2.8955</td>
<td>0.0252</td>
<td>0.0244</td>
<td>0.0188</td>
<td>0.0481</td>
<td>0.0410</td>
</tr>
<tr>
<td>B</td>
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<td>0.0993</td>
</tr>
<tr>
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<td>1.0902</td>
<td>1.0935</td>
<td>1.0013</td>
<td>1.1520</td>
<td>1.1330</td>
<td>1.1397</td>
<td>1.1855</td>
<td>0.0212</td>
<td>0.0215</td>
<td>0.0164</td>
<td>0.0401</td>
<td>0.0368</td>
</tr>
</tbody>
</table>

Table 2. Results of the Dagum model estimation with equivalent expenditure (OCDE scale)
### Equivalent expenditure (s=0.5)

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>MHH</th>
<th>FHH</th>
<th>Male</th>
<th>Female</th>
<th>MHH</th>
<th>FHH</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>3.2965 (0.0270)</td>
<td>3.2844 (0.0265)</td>
<td>3.2979 (0.0200)</td>
<td>3.0384 (0.0526)</td>
<td>3.4529 (0.0416)</td>
<td>3.4682 (0.0425)</td>
<td>3.5132 (0.0330)</td>
<td>3.0655 (0.0706)</td>
</tr>
<tr>
<td>1999</td>
<td>3.2844 (0.0265)</td>
<td>3.2979 (0.0200)</td>
<td>3.0384 (0.0526)</td>
<td>3.4529 (0.0416)</td>
<td>3.4682 (0.0425)</td>
<td>3.5132 (0.0330)</td>
<td>3.0655 (0.0706)</td>
<td></td>
</tr>
</tbody>
</table>

### Table 3. Results of the Dagum model estimation with equivalent expenditure (s=0.5)

<table>
<thead>
<tr>
<th>Per capita Expenditure</th>
<th>Equivalent Expenditure (OECD scale)</th>
<th>Equivalent Expenditure (s=0.5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males/Females</td>
<td>-0.32</td>
<td>-0.24</td>
</tr>
<tr>
<td>MHH/FHH</td>
<td>1.96</td>
<td>0.08</td>
</tr>
</tbody>
</table>

### Table 4. Test results for the difference of means

<table>
<thead>
<tr>
<th>Per capita Expenditure</th>
<th>Equivalent Expenditure (OECD scale)</th>
<th>Equivalent Expenditure (s=0.5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males/Females</td>
<td>-</td>
<td>0.30</td>
</tr>
<tr>
<td>MHH/FHH</td>
<td>8.12</td>
<td>0.00</td>
</tr>
</tbody>
</table>

### Table 5. Test results for the Lorenz dominance
Fig. 1 Lorenz curves for men and women

Per capita Income-1990