An empirical analysis about the impact of income components on inequality in European countries

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July 3, 2015

Abstract

In this work we use data relating to the year 2012 of the European Union Statistics on Income and Living Conditions (EU-SILC) to analyze and compare the impact from income components, taxes and social contributions on inequality among households in four major euro area countries: France, Germany, Italy and Spain. To this aim we first aggregate, for each household, gross income components into four main components which reflect roughly speaking: (i) employee income, (ii) income from self-employment, (iii) social transfers and (iv) residual income components. Next, we evaluate the contribution from each income component to inequality in the distribution of gross household income as measured by Zenga's point and synthetic inequality indexes. At this step we apply a very simple decomposition rule which gives rise to readily interpretable results. Finally, to assess the impact from taxes and social contributions, we subtract the latter from gross household income and evaluate the inequality indexes on the distribution of net disposable household income as well.

Keywords: Zenga inequality index, income components, EU-SILC

JEL codes: D30, D31, D33

1   Introduction

In this paper we analyze income data from the cross-sectional component of the EU-SILC relating to the year 2012[1]. Our scope is to assess the impact from income components, taxes and social contributions on inequality in the distribution of household income in some European countries. Our results are based on a decomposition rule for Zenga's (2007) inequality index (see Zenga *et al.*, 2012; and

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[1]EUSILC UDB 2012 - version 2 of August 2014

Zenga, 2013) whose main idea goes as follows: Let

$$y_1 \leq y_2 \leq \cdots \leq y_N$$

denote total income Y of N households and let

$$w_1, w_2, \ldots, w_N$$

be positive weights associated to the latter. Given that several households might have the same total income Y, suppose that there are r different values for y_i and denote by $N_1, N_2, \ldots, N_r$ the cumulative frequencies associated to them. To measure inequality in the distribution of total income Y we shall employ Zenga's point and synthetic inequality indexes (Zenga, 2007). Their definitions are based on the notions of "upper" and "lower" group means, which are given by

$$\overset{+}{M}_h(Y) := \begin{cases} \dfrac{\sum_{i=N_h+1}^{N} y_i w_i}{\sum_{i=N_h+1}^{N} w_i}, & \text{for } h = 1, 2, \ldots r-1 \\[2em] y_N & \text{for } h = r \end{cases}$$

and

$$\bar{M}_h(Y) := \frac{\sum_{i=1}^{N_h} y_i w_i}{\sum_{i=1}^{N_h} w_i}, \qquad h = 1, 2, \ldots r,$$

respectively. Given $\overset{+}{M}_h(Y)$ and $\bar{M}_h(Y)$, one can measure inequality between the hth "upper" and "lower" group by

$$I_h(Y) := \frac{\overset{+}{M}_h(Y) - \bar{M}_h(Y)}{\overset{+}{M}_h(Y)},$$

and taking the average over these point inequality indexes yields Zenga's synthetic inequality index

$$I(Y) := \sum_{h=1}^{r} I_h \times W_h,$$

where $W_h := \sum_{i=N_{h-1}+1}^{N_h} w_i / \sum_{i=1}^{N} w_i$ with $N_0 = 0$.

Now, assume that

$$y_i = x_{i,1} + x_{i,2} + \cdots x_{i,c}, \qquad i = 1, 2, \ldots, N,$$

i.e. that total income Y in each household is given by the sum of $c > 1$ income components. The contribution from the jth income component X_j to $\bar{M}_h(Y)$ is then given by

$$\bar{M}_h(X_j) := \frac{\sum_{i=1}^{N_h} x_{i,j} w_i}{\sum_{i=1}^{N_h} w_i}, \qquad h = 1, 2, \ldots r,$$

and the contribution to $\overset{+}{M}_h(Y)$ can be defined in similar way. Given that

$$\bar{M}_h(Y) = \sum_{j=1}^{c} \bar{M}_h(X_j)$$

and

$$\overset{+}{M}_h(Y) = \sum_{j=1}^{c} \overset{+}{M}_h(X_j),$$

it is straightforward to see that

$$I_h(Y) = \sum_{j=1}^{c} \frac{\overset{+}{M}_h(X_j) - \bar{M}_h(X_j)}{\overset{+}{M}_h(Y)}$$

and thus that the contribution from X_j to the point inequality index $I_h(Y)$ is simply given by

$$B_h(X_j) := \frac{\overset{+}{M}_h(X_j) - \bar{M}_h(X_j)}{\overset{+}{M}_h(Y)}.$$

Based on this simple decomposition rule for the point inequality indexes $I_h(Y)$, one can evaluate the contribution from the jth income component to the synthetic inequality index $I(Y)$ by

$$B(X_j) := \sum_{h=1}^{r} B_h(X_j) \times W_h.$$

Besides their simplicity, the above decomposition rules for the point and synthetic inequality indexes give rise to readily interpretable results. In fact, the *relative* contribution

$$\beta_h(X_j) := \frac{B_h(X_j)}{I_h(Y)} = \frac{\overset{+}{M}_h(X_j) - \bar{M}_h(X_j)}{\overset{+}{M}_h(Y) - \bar{M}_h(Y)}$$

can be viewed as the contribution from income component X_j to the difference between the hth "upper" and "lower" groups' mean income, while

$$\beta(X_j) := \frac{B(X_j)}{I} = \frac{\sum_{h=1}^{r} \beta_h(X_j) \times (I_h(Y) \times W_h)}{\sum_{h=1}^{r} (I_h(Y) \times W_h)}$$

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can be interpreted as a weighted average of the relative contributions $\beta_h(X_j)$.

It has been observed in Zenga (2012), that the relative contributions $\beta_h(X_j)$ and $\beta(X_j)$ should be compared with the shares

$$\gamma(X_j) := \frac{\sum_{i=1}^{N} x_{i,j} \times w_i}{\sum_{i=1}^{N} y_i \times w_i}$$

of the income components on total population income in order to discern whether a given income component X_j has an exacerbating or mitigating impact on inequality in the distribution of total income Y. In fact, if

$$x_{i,j} = y_i \times \gamma(X_j), \qquad \text{for all } i = 1, 2, \ldots, N,$$

then it is not difficult to see that

$$\gamma(X_j) = \beta_1(X_j) = \beta_2(X_j) = \cdots = \beta_r(X_j) = \beta(X_j),$$

while if

$$x_{i,j} \leq y_i \times \gamma(X_j), \qquad \text{for } i \leq i^* < N \tag{1}$$

and

$$x_{i,j} > y_i \times \gamma(X_j), \qquad \text{for } i > i^*, \tag{2}$$

then it follows that

$$\gamma(X_j) < \beta_h(X_j) \qquad \text{for all } h = 1, 2, \ldots, r \tag{3}$$

and thus

$$\gamma(X_j) < \beta(X_j). \tag{4}$$

These implications suggest that income component X_j exacerbates inequality in the distribution of total income Y if its relative contributions $\beta_h(X_j)$ and $\beta(X_j)$ exceed $\gamma(X_j)$ and that it mitigates inequality otherwise (note that the inequalities involving $\gamma(X_j)$ in (1) to (4) may be reversed).

In the following sections we shall apply the above decomposition rule to cross-sectional EU-SILC data from the year 2012. We first compute the contributions from gross income components to inequality in the distribution of gross household income and then evaluate the impact of taxes and social contributions by comparing inequality in the distribution of gross and net disposable household income.

2 Income data from the EU-SILC dataset

As can be read in the accompanying documentation[2], the *"EU-SILC is the EU reference source for comparative statistics on income distribution and social exclusion at European level, ..."* and it provides both cross-sectional and longitudinal data. Its reference population includes all private households and their current members residing in the territory of the member state at the time of data collection. For details on the latter aspect of the EU-SILC we refer to the accompanying documentation and to the references therein.

In the present work we shall be merely interested in the income variables included in the "EUSILC UDB 2012 - version of 2 of August 2014", which have been collected at either personal or household level. The numbers of interviewed persons (only persons aged 16 and over are eligible sample members) and households for each country included in our analysis are reported in Table 1.

At the outset we shall consider *total household gross income* (variable HY010), henceforth indicated by Y_{gross}. Based on the data included in the EU-SILC we know for each household how Y_{gross} is composed in terms of

X_1 **employee income**: which is defined as the sum over all household members of *gross employee cash or near cash income* (variable PY010G) and *company*

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[2]EU-SILC 065 (operation 2012)

Table 1: Sample sizes by country

Country	# personal interviews	# household interviews
Italy	40,287	19,579
Germany	23,587	13,145
France	22,742	11,999
Spain	28,210	12,714

car (variable PY021G)

X_2 **self-employment income**: which is defined as the sum over all household members of *gross cash benefits or losses from self employment including royalties* (variable PY050G)

X_3 **social benefits**: which includes the sum over all household members of *unemployment benefits* (variable PY090G), *old-age benefits* (variable PY100G), *survivors' benefits* (variable PY110G), *sickness benefits* (variable PY120G), *disability benefits* (variable PY130G) and *education-related allowances* (variable PY140G). Moreover this income component includes the sum of the following gross components collected at household level: *family/children related allowances* (variable HY050G), *social exclusion not elsewhere classified* (variable HY060G) and *housing allowances* (variable HY070G)

X_4 **residual income components**: which includes the sum over all household members of *pensions received from individual private plans other than those covered under ESSPROS* (variable PY080G) and the sum of the following gross components collected at household level: *income from rental of a property or land* (variable HY040G), *regular inter-household cash transfers received* (variable HY080G), *interests, dividends, profit from capital investments in un-*

incorporated business (variable HY090G) and *income received by people aged under 16* (variable HY110G)

Knowing that

$$Y_{gross} = X_1 + X_2 + X_3 + X_4,$$

we shall evaluate, be means of the decomposition rule outlined in Section 1, the contributions to inequality in the distribution of Y_{gross} from the gross income components X_1, X_2, X_3 and X_4.

Next, given that most researchers are actually interested in *total disposable household income* (variable HY020), henceforth Y_{net}, we shall also include the following typically negative income components in our analysis: *regular taxes on wealth* (variable HY120G), *tax on income and social contributions* (variable HY140G) and *regular inter-household cash transfers paid* (variable HY130). Subtracting the latter income components from Y_{gross} yields, according to the definition given in the EU-SILC, *total disposable household income* Y_{net} (variable HY020) and comparing Zenga's inequality indexes on Y_{gross} and Y_{net} provides useful insight into how taxes and social contributions affect inequality (in the analyzed datasets the share of *regular inter-household cash transfers paid* is negligible).

It is worth noting that, as an alternative approach, the typically negative income components could well be aggregated into an additional fifth income component X_5. Adding X_5 to the first four gross components yields Y_{net} and the decomposition rule outlined in Section 1 could well be applied directly to Y_{net}. Even though this alternative approach does account for the joint distribution of Y_{gross} and Y_{net}, while the approach of this paper does not, we think that the alternative approach would give rise to results whose interpretation is less immediate because it is unusual to view taxes and social contributions as a (negative) component of net disposable income. To further support the choice made in this paper we observe that the fact

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that Y_{gross} and Y_{net} are usually almost perfectly cograduated determines a quite narrow range for the possible joint distributions.

3 Results

Table 2 is a summary of the main results of our computations. All results we are going to comment below have been obtained by substituting the *household cross-sectional weight* (variable DB090) in place of w_i in the formulae of Section 1. For ease of comparison among countries, in $\beta_h(\cdot)$ and $I_h(\cdot)$ we substituted the subscript h, which depends on the number of different values observed for the income variables Y_{gross} and Y_{net}, by values p ranging from 0 to 1. The value of h corresponding to the indicated value of the subscript p is given by

$$h = \max \left\{ h' : \sum_{h''=1}^{h'} W_{h''} \leq p \right\}.$$

According to the results reported in Table 2 and their elaborations in Table 3, the country with largest mean income $M(\cdot)$ (gross and net disposable) is France, where $M(Y_{gross}) = 46,798$ Euro and $M(Y_{net}) = 37,859$ Euro. It follow Germany with $M(Y_{gross}) = 43,066$ Euro and $M(Y_{net}) = 31,644$ Euro, Italy with $M(Y_{gross}) = 39,902$ Euro and $M(Y_{net}) = 29,956$ Euro and finally Spain with $M(Y_{gross}) = 27,827$ Euro and $M(Y_{net}) = 23,972$ Euro. In percentage terms, the largest gap between gross and net disposable household income is observed in Germany, where $(M(Y_{gross}) - M(Y_{net}))/M(Y_{gross}) = 26.5\%$, then in Italy (24.9%), France (19.1%) and finally in Spain (13.9%).

As for inequality, according to Zenga's synthetic inequality index $I(\cdot)$ it is smallest in France for both gross and net disposable household income. In fact, $I(Y_{gross}) = 0.723$ for France, which means that the lower mean $\bar{M}_h(Y_{gross})$ is on average 72.3% smaller than the corresponding upper mean $\overset{+}{M}_h(Y_{gross})$. Going over to

net disposable household income, Zenga's synthetic index reduces to $I(Y_{net}) = 0.699$, which amounts to a decrease of $I(Y_{gross}) - I(Y_{net}) = 0.024$. In Germany, the country with second largest inequality following France, we observe the largest reduction in inequality in passing from Y_{gross} to Y_{net}: $I(Y_{gross}) = 0.744$ and $I(Y_{net}) = 0.708$ so that $I(Y_{gross}) - (Y_{net}) = 0.036$. Also Italy, the third country following France in terms of inequality, exhibits clearly a larger reduction of the synthetic Zenga index than France: $I(Y_{gross}) = 0.755$ and $I(Y_{net}) = 0.721$ so that $I(Y_{gross}) - I(Y_{net}) = 0.034$. In Spain, the country where income is most unequally distributed among the considered ones, $I(Y_{gross}) = 0.756$, $I(Y_{net}) = 0.745$ and the reduction in inequality in going from Y_{gross} to Y_{net} is smallest: $I(Y_{gross}) - I(Y_{net}) = 0.011$.

To provide better insight into the distribution of Y_{gross} and Y_{net}, we divided the household sample from each country into 20 classes according to Y_{gross} in such way that the sum of the weights w_i in each class is approximately equal to 5% of their sum over the whole sample. Then we computed the class means for Y_{gross} and Y_{net} and plotted them against each other. Figures 1 to 4 show the outcome along with the inequality curves $I_p(Y_{gross})$ and $I_p(Y_{net})$ as functions of $p \in (0,1)$ (note that the scales on the ordinate axes are different; the lower panels show the inequality curves on a larger scale for $p \in (0, 0.1)$ and $p \in (0.9, 1)$, respectively). As expected the class means for Y_{net} tend to be concave functions of the corresponding class means for Y_{gross} and, accordingly, $I_p(Y_{net})$ is usually smaller than $I_p(Y_{gross})$, but in France, Germany and Italy $I_p(Y_{net})$ exceeds $I_p(Y_{gross})$ for very small values of p. Exact values of $I_p(Y_{gross})$ and $I_p(Y_{net})$ for some selected values of $p \in (0,1)$ are reported in Table 2 for each country.

Consider next the four gross income components and their impact on inequality in the distribution of Y_{gross}. Going trough the shares $\gamma(\cdot)$, it is immediately apparent that employee income X_1 accounts for most of population income in all countries.

In fact, it accounts for $\gamma(X_1) = 47.5\%$ of population income in Italy, the country where $\gamma(X_1)$ is smallest, and for $\gamma(X_1) = 64.5\%$ of population income in Germany, where $\gamma(X_1)$ is largest. The relative contributions $\beta_p(X_1)$ do clearly exceed $\gamma(X_1)$ over most of the range of p and they exhibit an inverse U-shaped trend as functions of $p \in (0,1)$. In Germany $\beta_{0.50}(X_1) = 90.5\%$ at its maximum value, which means that employee income X_1 accounts for 90.5% of the difference between $\overset{+}{M}_{0.5}(Y_{gross})$ and $\overline{M}_{0.5}(Y_{gross})$ (also here we used p in place of h in the subscripts of the "upper" and "lower" group means). Given that also $\beta(X_1)$ is clearly larger than $\gamma(X_1)$ in the four considered countries, we conclude that employee income X_1 has an exacerbating impact on inequality.

The second largest income component in terms of its share on population income is given by the social benefits X_3 component. The share of this income component ranges from $\gamma(X_3) = 25.5\%$ in Germany to $\gamma(X_3) = 29.0\%$ in Italy. However, as opposed to what is observed for gross employee income X_1, the relative contributions $\beta_p(X_3)$ are smaller than $\gamma(X_3)$ and their trend as functions of $p \in (0,1)$ is decreasing. Accordingly, also $\beta(X_3)$ is clearly smaller than $\gamma(X_3)$, confirming the inequality offsetting impact of social benefits X_3.

As for the third largest income component in terms of $\gamma(\cdot)$, it is given by self-employment income X_2 in all countries except for France, where the share of the residual income components X_4 is nearly twice as large. The share of self-employment income X_2 ranges from $\gamma(X_2) = 5.5\%$ in Germany to $\gamma(X_2) = 18.8\%$ in Italy and in all considered countries self-employment income X_2 exhibits a clear inequality fostering effect, since $\beta_p(X_2)$ does widely exceed $\gamma(X_2)$ over the whole range of p.

The residual income components X_4 in aggregated form account for less than 5% of population income in all considered countries but France, where $\gamma(X_4) = 12\%$.

The relative contribution $\beta_p(X_4)$ is, except for Germany, larger than $\gamma(X_4)$ over most of the range of p, but just in France the difference is quite marked. This fact leads to conclude that the residual income components X_4 do have a positive impact on inequality in France, while in the remaining three countries the impact on inequality from X_4 is about neutral.

Literature review

Since it was first proposed in Zenga (2007), several several research papers have been published about Zenga's point and synthetic inequality indexes $I_p(\cdot)$ and $I(\cdot)$. First applications to income data can be found in Zenga (2007b), Zenga (2008) and Greselin et al. (2013), while Polisicchio (2008), Polisicchio and Porro (2008), Porro (2008) and Porro (2011) analyze properties of the curve defined by the point inequality indexes $I_p(\cdot)$ as function of $p \in (0,1)$ and its relation with the Lorenz (1905) curve. Inferential problems related to the synthetic $I(\cdot)$ index have been analyzed by Greselin and Pasquazzi (2009), Greselin et al. (2010), Langel and Tillé (2012), Antal et al. (2011) and Greselin et al. (2014) and, as for decomposition rules, Radaelli (2008a) proposes a subgroups decomposition for the point and synthetic inequality indexes that has been applied to real income data in Radaelli (2007), Radaelli (2008b) and Greselin et al. (2009). A comparison of the properties of the latter with a subgroups decomposition rule for Gini's index can be found in Radaelli (2010). The income components decomposition rule we have applied in the present work has been originally proposed in Zenga et al. (2012) and has been extended to the Gini (1914) and Bonferroni (1930) indexes in Zenga (2013).

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Table 2: Contributions to inequality from income components

France

	$\gamma(\cdot)$	$\beta_{0.05}(\cdot)$	$\beta_{0.10}(\cdot)$	$\beta_{0.25}(\cdot)$	$\beta_{0.50}(\cdot)$	$\beta_{0.75}(\cdot)$	$\beta_{0.90}(\cdot)$	$\beta_{0.95}(\cdot)$	$\beta(\cdot)$
X_1	0.535	0.628	0.657	0.683	0.676	0.630	0.531	0.452	0.628
X_2	0.062	0.070	0.075	0.083	0.098	0.119	0.156	0.185	0.106
X_3	0.283	0.175	0.140	0.094	0.061	0.043	0.041	0.037	0.078
X_4	0.120	0.127	0.128	0.141	0.165	0.208	0.272	0.325	0.187
	$M(\cdot)$	$I_{0.05}(\cdot)$	$I_{0.10}(\cdot)$	$I_{0.25}(\cdot)$	$I_{0.50}(\cdot)$	$I_{0.75}(\cdot)$	$I_{0.90}(\cdot)$	$I_{0.95}(\cdot)$	$I(\cdot)$
Y_{gross}	46,798	0.819	0.780	0.720	0.679	0.681	0.734	0.782	0.723
Y_{net}	37,859	0.806	0.759	0.700	0.659	0.648	0.665	0.681	0.699

Germany

	$\gamma(\cdot)$	$\beta_{0.05}(\cdot)$	$\beta_{0.10}(\cdot)$	$\beta_{0.25}(\cdot)$	$\beta_{0.50}(\cdot)$	$\beta_{0.75}(\cdot)$	$\beta_{0.90}(\cdot)$	$\beta_{0.95}(\cdot)$	$\beta(\cdot)$
X_1	0.645	0.741	0.770	0.829	0.905	0.879	0.821	0.748	0.831
X_2	0.055	0.064	0.066	0.068	0.081	0.107	0.151	0.198	0.098
X_3	0.255	0.160	0.131	0.068	-0.023	-0.025	-0.020	-0.010	0.031
X_4	0.044	0.035	0.033	0.035	0.037	0.039	0.049	0.063	0.040
	$M(\cdot)$	$I_{0.05}(\cdot)$	$I_{0.10}(\cdot)$	$I_{0.25}(\cdot)$	$I_{0.50}(\cdot)$	$I_{0.75}(\cdot)$	$I_{0.90}(\cdot)$	$I_{0.95}(\cdot)$	$I(\cdot)$
Y_{gross}	43,066	0.857	0.828	0.769	0.709	0.689	0.710	0.741	0.744
Y_{net}	31,644	0.847	0.798	0.729	0.666	0.651	0.675	0.707	0.708

	Italy							
	$\gamma(\cdot)$	$\beta_{0.05}(\cdot)$	$\beta_{0.10}(\cdot)$	$\beta_{0.25}(\cdot)$	$\beta_{0.50}(\cdot)$	$\beta_{0.75}(\cdot)$	$\beta_{0.90}(\cdot)$	$\beta_{0.95}(\cdot)$	$\beta(\cdot)$
X_1	0.475	0.504	0.531	0.580	0.590	0.528	0.442	0.377	0.531
X_2	0.188	0.197	0.209	0.228	0.257	0.309	0.370	0.427	0.275
X_3	0.290	0.256	0.212	0.142	0.099	0.099	0.112	0.115	0.136
X_4	0.047	0.043	0.047	0.050	0.055	0.063	0.077	0.081	0.058
	$M(\cdot)$	$I_{0.05}(\cdot)$	$I_{0.10}(\cdot)$	$I_{0.25}(\cdot)$	$I_{0.50}(\cdot)$	$I_{0.75}(\cdot)$	$I_{0.90}(\cdot)$	$I_{0.95}(\cdot)$	$I(\cdot)$
Y_{gross}	39,902	0.905	0.851	0.770	0.710	0.696	0.729	0.766	0.755
Y_{net}	29,956	0.895	0.819	0.725	0.665	0.661	0.724	0.807	0.721

	Spain							
	$\gamma(\cdot)$	$\beta_{0.05}(\cdot)$	$\beta_{0.10}(\cdot)$	$\beta_{0.25}(\cdot)$	$\beta_{0.50}(\cdot)$	$\beta_{0.75}(\cdot)$	$\beta_{0.90}(\cdot)$	$\beta_{0.95}(\cdot)$	$\beta(\cdot)$
X_1	0.618	0.615	0.675	0.774	0.800	0.796	0.707	0.601	0.743
X_2	0.082	0.112	0.112	0.106	0.112	0.146	0.218	0.320	0.142
X_3	0.272	0.251	0.188	0.092	0.056	0.021	0.027	0.023	0.081
X_4	0.028	0.022	0.025	0.027	0.032	0.037	0.048	0.057	0.034
	$M(\cdot)$	$I_{0.05}(\cdot)$	$I_{0.10}(\cdot)$	$I_{0.25}(\cdot)$	$I_{0.50}(\cdot)$	$I_{0.75}(\cdot)$	$I_{0.90}(\cdot)$	$I_{0.95}(\cdot)$	$I(\cdot)$
Y_{gross}	27,827	0.962	0.876	0.776	0.708	0.686	0.708	0.733	0.756
Y_{net}	23,972	1.004	0.908	0.773	0.693	0.667	0.694	0.722	0.745

X_1 employee income, X_2 self-employment income, X_3 social transfers, X_4 residual income components, Y_{gross} total household gross income, Y_{net} total disposable household income, $M(\cdot)$ mean of variable between parenthesis (expressed in Euro)

Table 3: Comparisons between the distributions of Y_{gross} and Y_{net}

	France	Germany	Italy	Spain
$M(Y_{gross})$	46,798	43,066	39,902	27,827
$M(Y_{net})$	37,859	31,644	29,956	23,972
$\frac{M(Y_{gross})-M(Y_{net})}{M(Y_{gross})}$	0.191	0.265	0.249	0.139
$I(Y_{gross})$	0.723	0.744	0.755	0.756
$I(Y_{net})$	0.699	0.708	0.721	0.745
$I(Y_{gross}) - I(Y_{net})$	0.024	0.036	0.034	0.011

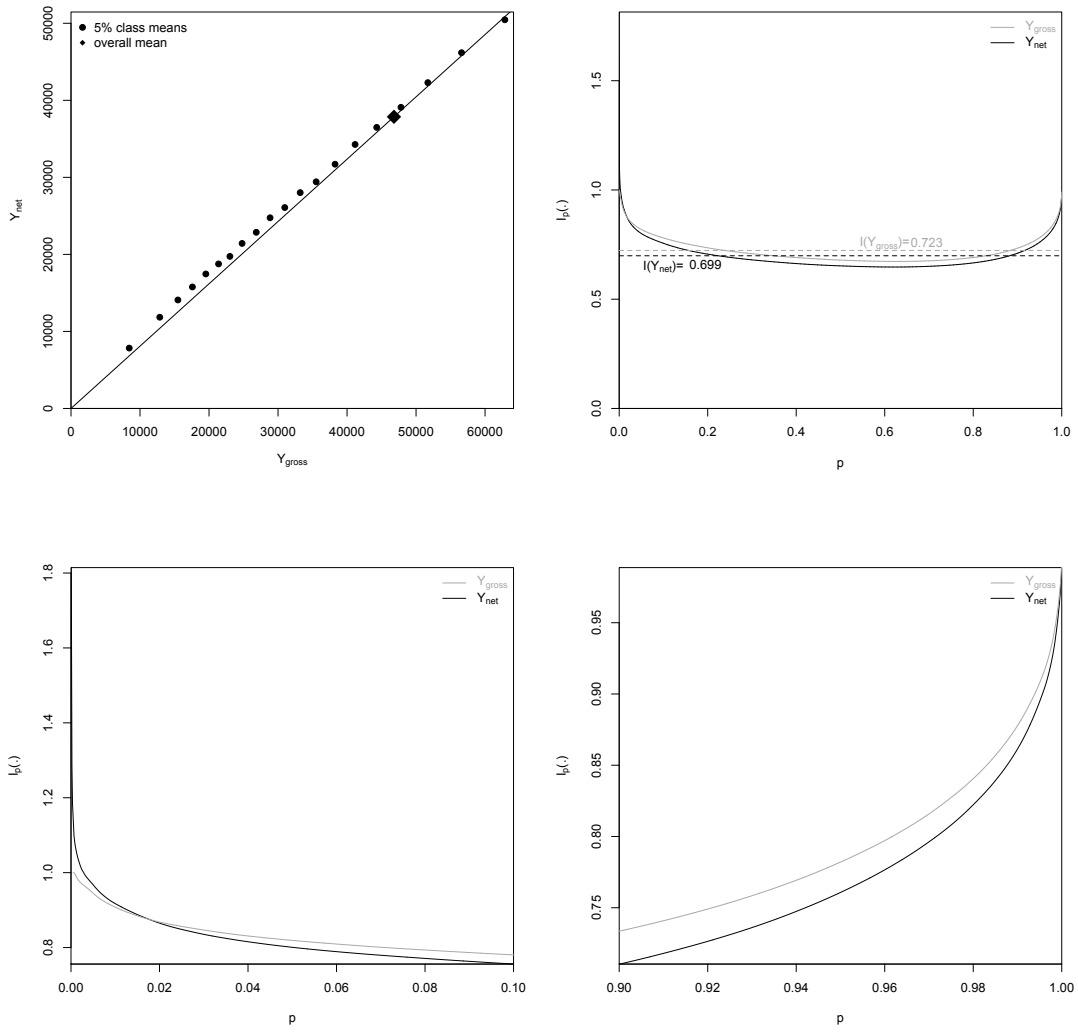Figure 1: Zenga's inequality curves for France

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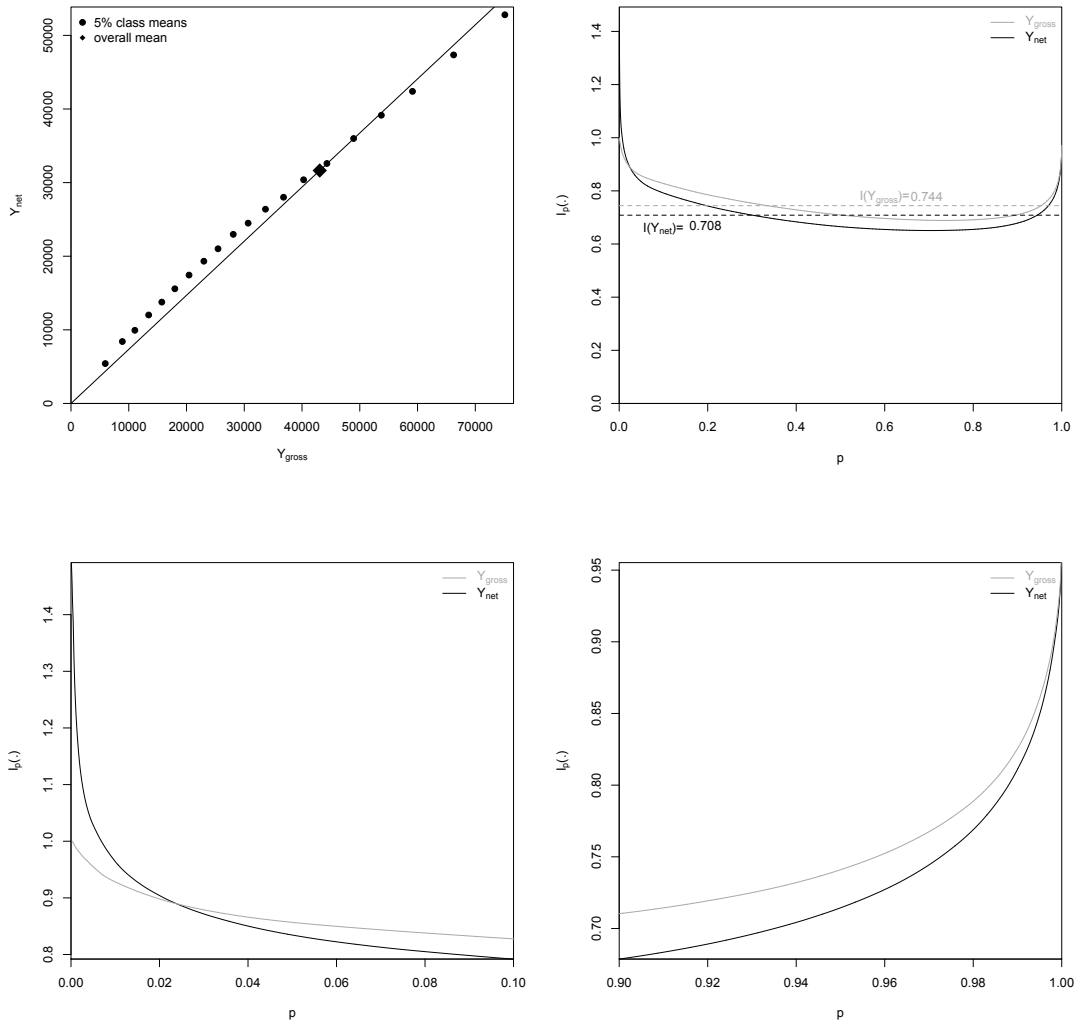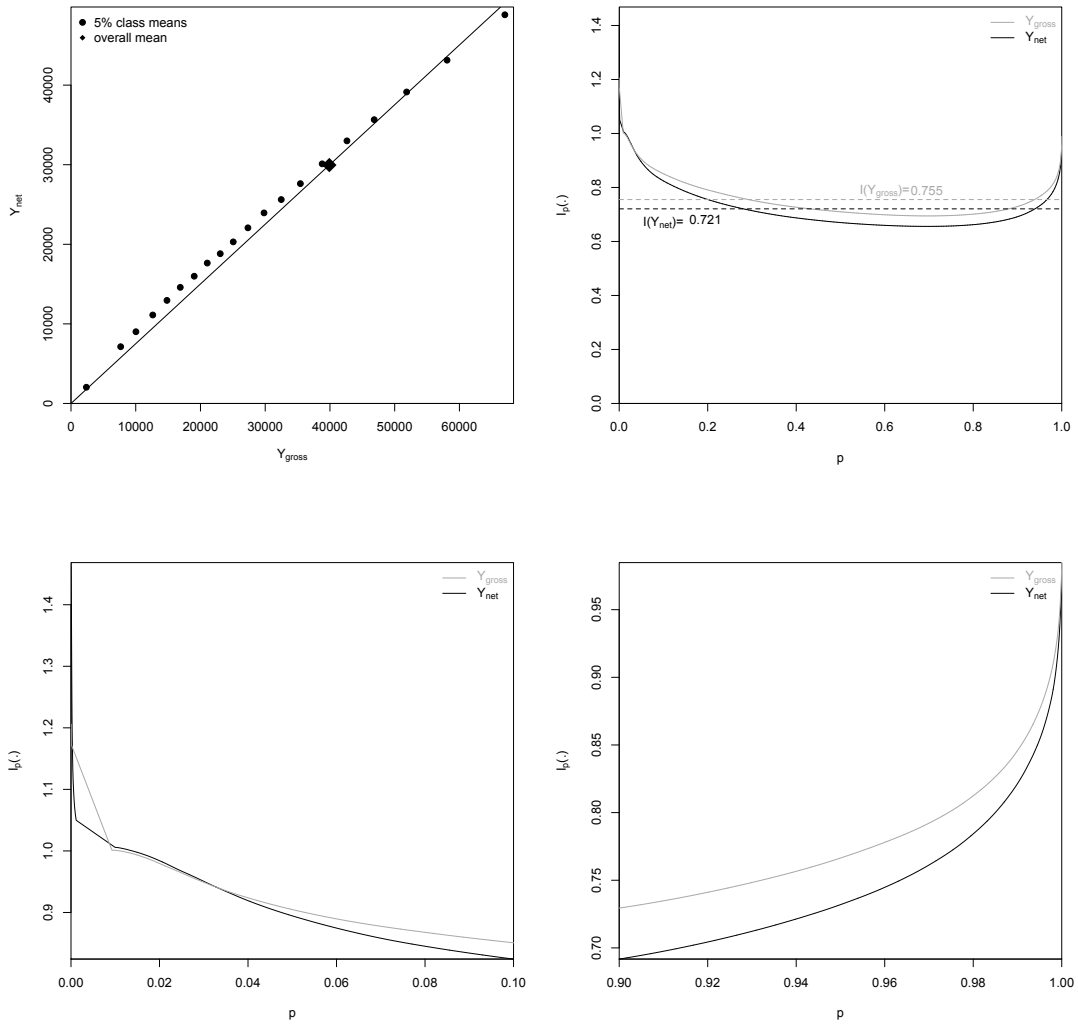Figure 2: Zenga's inequality curves for Germany

Figure 3: Zenga's inequality curves for Italy

Figure 4: Zenga's inequality curves for Spain