

Direction des Statistiques Démographiques et Sociales

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GENDER INEQUALITY IN EARNED INCOMES AND
IN LIVING STANDARDS

A COMPARISON BETWEEN FRANCE, GERMANY,
ITALY, SWEDEN AND THE UNITED-KINGDOM

Sophie PONTHEUX

Division Conditions de vie des ménages

Document de travail



Institut National de la Statistique et des Etudes Economiques

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Gender inequality in earned incomes and in living standards A comparison between France, Germany, Italy, Sweden and the United-Kingdom

Abstract:

The starting point of the paper is the dramatic difference between the level of gender inequality measured on the basis of earned incomes or measured on the basis of living standards. The first part analyses the gender gap in earned incomes; a decomposition of this gap shows that the three main factors of gender inequality in earnings – activity rates, part-time employment and the wage gap – operate very differently in the five countries compared. The second part examines the sequence going from individuals' earned incomes to their living standards and how it results in near equality between men and women. To analyze this sequence, an intermediary notion of family equivalent earned income is implemented; it allows to highlight the contrasted effect, for men and for women, of intra-household transfers as they are assumed by the standard methodology used in the measurement of living standards. This results in almost no gender inequality in living standards. A decomposition of the Gini coefficient shows that the share of gender inequality in the total inequality of living standards is reduced to almost nothing. The paper concludes with a discussion of the questions raised by this disappearance of gender inequality.

Keywords: gender inequality, earned income, living standard, income pooling, decomposition of inequality.

Résumé :

Le document prend comme point de départ la différence spectaculaire du niveau de l'inégalité entre femmes et hommes mesurée sur la base de leurs revenus d'activité ou sur la base de leurs niveaux de vie. La première partie analyse l'écart des revenus d'activité ; une décomposition de cet écart montre que la contribution des principaux facteurs d'inégalité entre les femmes et les hommes – inactivité, travail à temps partiel et écart des salaires – est très variable entre les pays comparés. La seconde partie examine la séquence qui va des revenus d'activité aux niveaux de vie et comment elle conduit à une quasi-égalité des niveaux de vie des femmes et des hommes. L'analyse de cette séquence met en œuvre une notion intermédiaire de revenu familial d'activité ; cela permet de mettre en évidence l'effet contrasté, pour les femmes et pour les hommes, des transferts intra-ménage tels qu'ils sont supposés dans la méthodologie standard de calcul des niveaux de vie, résultant en une quasi-disparition de l'inégalité entre les femmes et les hommes. Une décomposition de l'indice de Gini des niveaux de vie montre également que la part de l'inégalité entre les femmes et les hommes est presque inexistante. La conclusion propose une discussion des questions soulevées par cette quasi-disparition.

Mots-clé : inégalité entre les femmes et les hommes, revenu d'activité, niveau de vie, mise en commun des revenus, décomposition de l'inégalité.

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Introduction

Studies on inequality between women and men remind regularly that, in spite of remarkable advances during the last decades, women remain less economically active than men, work more often in part-time jobs and that the wage gap is still substantial (OECD, 2012; Cipollone *et al*, 2012; European commission, 2010). These differences, if they result in most countries in large gender gaps in earned incomes (annual amount of wages, self-employed profits and unemployment benefits), do not seem to affect so much the gender gaps in living standards. For example in France, the gender gap in earned incomes between men and women in the 20 to 59 age range¹ is about 36% and the gender gap in living standards is nine times lower, around 4%; in Germany or Italy, it is ten times as low. The main purpose of this paper is to question this spectacular difference, starting with an analysis of the gender gap in earned incomes and examining how the sequence from individual earned incomes to living standards results in almost erasing the effect of economic inequality between men and women.

The huge difference between the two gaps is no mystery: it results from the change of unit between a person's earned income and her standard of living, precisely the fact that the earned income is measured at the individual level, while the standard of living is measured at the household level and assumed equal for all the members of a given household. Intra-household transfers on one side, social transfers on the other, act as "corrective" factors - actually linked themselves since taxes and social benefits are often not independent from the household composition - explaining that a person's standard of living may be higher or lower than her own earned income. That it can be lower is acknowledged for a long time: Rowntree (1901 [2000]), in his study of poverty, distinguished between a worker's poverty due to his low earnings and that due to the number of dependents in his family. In this view, that of the breadwinner, the household is taken as a burden. But for the breadwinner's dependent family members, who live on his earnings (assumed to be shared), the household is a resource. In the last decades, it is mostly under this angle - *i.e.* how the household can be a protection for those with low or no earnings - that the issue has been looked at. One strand of literature in particular examines how individuals with low or no participation in employment escape poverty (Laiß, 2006 for France; Gardiner and Millar, 2006 for the UK), or investigates the weak overlapping, at individual level, between low paid employment and poverty (Gregg and Wadsworth, 2005; Marx and Nolan 2012; Marx and Verbist, 1998). European studies on the working poor also show - when they distinguish women and men - that workers' poverty risk tends to be lower for women than for men in most countries (Eurofound, 2010a, Andress and Lohman, 2008), a fact difficult to reconcile with the large over-representation of women at the bottom of the earnings distribution; using different methodologies, Ponthieux (2010) or Peña-Casas and Ghailani (2011) show that this is essentially due to the fact that poverty is measured on the basis of the households', not the individuals', incomes. All underline the crucial impact of family configurations, which tend, on average, to mitigate poor individual economic outcomes. The articulation between individuals' earned income and households' standard of living is nevertheless complex since three dimensions interplay: the labor market, the

¹ In 2008, between men and women in the 20 to 59 age range, excluding students and pensioners.

households' structure and the welfare State. Recent work have examined this articulation, but only in the case of women (Laïb, 2007), or not distinguishing between men and women (Allègre, 2011).

Our perspective in this paper is twofold:

- Firstly, to assess the level and factors of economic inequality between men and women. For this purpose, we use a notion of earned income. The notion of earned income is an extension of the annual wage income implemented since a few years at Insee (Aeberhardt *et al.*, 2007). It was developed firstly in order to face a limitation in the study of wage disparities: based most often on hourly pay, it was not possible to take into account the effect of disparities in "quantities" of employment, more specifically the effect of involuntary unemployment. The extension to which we proceed consists in taking into account not only employees' wages, but also self-employed incomes and unemployment benefits. The earned income is thus defined here as the total gross² amount of wages, profits of self-employed and unemployment benefits, received by a person during one year. Its interest for our purpose is that it allows to include individuals who earn no income; it is then a meaningful indicator of the combined effects of gender inequality in activity rates, in full-time employment and in wages.

- Secondly, to analyze the sequence going from earned incomes to living standards. The approach is meant to be methodological and "educational", in the line of a tradition of French studies describing thoroughly this sequence (Baudelot and Choquet, 1981; Lapinte and Vanovermeir, 2009). An intermediary measure of family equivalent earned income is implemented in order to show the effect of income pooling such as it is assumed in the standard methodology. The aim is to highlight the differentiated effect of family configurations for women and for men and its link with the economic outcomes of the division of labor between genders, adding to the literature evoked above an explicit gender perspective.

Five countries are compared: Germany, France, Italy, Sweden and the United Kingdom. This choice of countries reflects two main concerns³: one was to compare countries diverse enough – in terms of social and institutional features likely to have an impact on the economic inequality between women and men – but at the same time not "too" different; it was thus excluded considering the EU 27 member states. The other was to seek countries representative of the models derived from the typology of Welfare States proposed by Esping-Andersen (1990, 1999). Although criticized for the absence of a gender perspective and the male-breadwinner model of the family as a reference (Lewis, 1992, 1999; Orloff, 1993), it remains a widely used tool for cross-country comparisons. This typology distinguishes three models of articulation between market, family and social welfare: a "conservative-corporatist" model, characterized by social benefits attached to employment (Germany, France and Italy); a "social democratic" model combining a strong redistribution by the tax-benefits system and universal social benefits (Sweden); a "liberal" model centred on market regulation and a residual social welfare close to social assistance (the United Kingdom). The typology is now often further refined to

² Except France, for which the data provides only the incomes nets of social contributions. Definitions of incomes are detailed in Appendix 2.

³ As well as more pragmatic criteria, such as national samples of sufficient size to be able to correctly describe the sub-populations we are interested in.

take into account differences in the scope of family solidarity, narrow in Northern countries, extended in the South and associated with weak public support to families, or differences in public policies supporting women's access to work (Gauthier, 1996; Gornick and Jäntti, 2010; Eurofound, 2010b; Del Bocca *et al.*, 2008). These refinements result in differentiations within the conservative model: one follows the North / South line of family solidarities (in our sample of countries, this singles Italy out), the other follows the line of policies facilitating the articulation between work and family, setting apart France and Germany with a regime *a priori* more favorable to women in France.

The statistical analysis is based on EU-SILC⁴, which provides detailed harmonized variables on individuals' annual activity and earnings and households' incomes, as well as socio-demographic information at both levels. The survey year is 2009, thus concerning the earned income and economic activity of year 2008⁵. This choice of year allows avoiding most of the possible disturbances induced by the financial/economic crisis, since European labor markets were "hit" essentially by the end of that year. The population studied, called "population of reference" below, consists of individuals from 20 to 59 years old, having completed their initial education and not being retired. In order not to complicate excessively the analysis by too many breakdowns of family configurations, the analysis is limited to persons living in one person households, single parent families or couples (either without or with children)⁶.

The paper starts with an overview of gender economic inequality, understood as the inequality in resources resulting from market work and measured by the gap in earned incomes. The gender gap in earned income is decomposed in order to compare the impact of inequalities in activity rates, in the shares of full-time/part-time employment and in wages across the five countries. These three pillars of gender inequality contribute very differently to the gap in the five countries. Then the paper turns to the effects of shifting from the notion of earned income to the living standard. Going from the individual earned income to the family equivalent earned income allows to highlight the different impact of intra-household transfers for women and for men; these transfers are, on average, favourable to women. In terms of gender inequality, looking at earned incomes or at living standards results in a radical change of perspective. As for cross-country differences, the comparison based on earned incomes shows that they are essentially due to gender gaps in participation in the labor market, in the share of full-time employment and in wage gaps, while a comparison based on living standards shows essentially differences in the households' structure, not differences in gender inequalities. A decomposition of the Gini coefficient shows how, in the total inequality of living standards, the inequality between men and women is reduced to almost nothing.

⁴ The German dataset is not available to NSIs, but only through Eurostat research contracts. This contract requires to mention that the European Commission and Eurostat bear no responsibility for the analyses and conclusions of studies using these data.

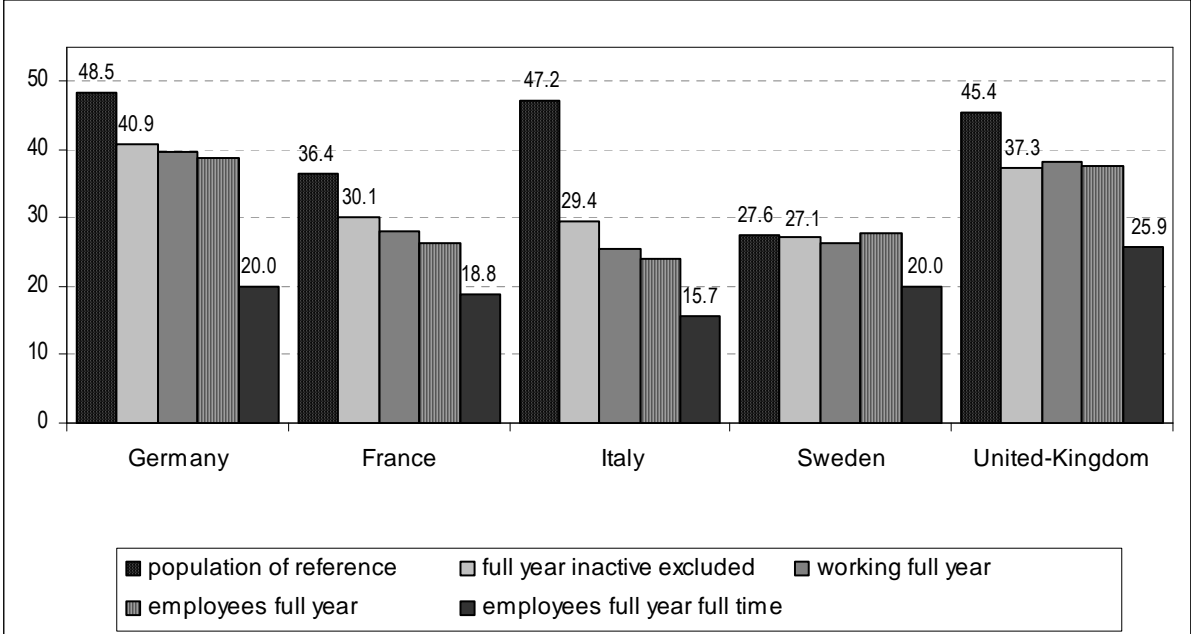
⁵ Annual incomes are collected with a lag.

⁶ Complex households are then excluded from the study. Other criteria were applied in order to preserve the consistency between the individuals' and the households' incomes. This is detailed in Appendix 1.

1. Overview of the economic inequality between women and men

In the five countries compared, gender inequalities in economic outcomes are substantial: the gender gap in earned income goes from a minimum of 27.5% in Sweden to 36% en France, 45% in the UK, 47% in Italy and 48.5% in Germany (Fig. 1). This gap is the reflection in terms of earnings of the unequal distribution of women and men by activity status¹, basically the fact that women are, on average, less often economically active than men and those who are active work less often full-time than men (table 1).

Fig. 1 – Gender gaps (*) in earned income (%)



(*) Measured as (M-F)/M
 Source: EU-Silc 2009, Population: population of reference (individuals aged 20-59, students and pensioners excluded)

The gap in earned incomes is in consequence neatly lower (except in Sweden) once the individuals who did not have any economic activity during the reference period are excluded; it is a bit lower when those who were active but with interruptions of employment are also excluded, and it goes further down between women and men who were full-year fill-time employees. Beyond this general trend, the five countries show strikingly different levels and profiles between the most encompassing and the most restrictive approaches; in Italy the earnings gap is reduced by almost 70%, essentially from the exclusion of the full-year inactive, in Germany by almost 60%, essentially when shifting from working full-year to working full-year and full-time, while at the other end in Sweden it has dropped only by about 25%.

These huge differences result from national specificities in the distribution of men and women by activity status. Italy shows the highest gender ratio of inactivity (share of inactive women / share of

¹ The activity status is defined on the basis of retrospective annual calendars of activity, indicating the number of months spent in employment, unemployment and inactivity. Three basic situations are distinguished: full-year employment, alternating employment, full-year inactivity (Appendix 2). These status are not comparable to the usual ILO status, based on a much shorter period of observation (the previous week) and considering that a person is employed if reporting she has worked for pay or profit at least one hour (she is unemployed if she has not worked and is available to start working within the next two weeks and actively seeking a job, inactive when she is neither at work nor unemployed).

inactive men) of the five countries: the share of inactive women reaches 27.5%, 17 times higher than that of men. At the opposite, the gender gap in inactivity is very low in Sweden, where only 3.7% of women are not economically active⁸ (Table 1). Between these extremes, the other countries are rather contrasted: the gender ratio of inactivity is low in the UK, despite a relatively high share of inactivity among women (the highest just after Italy) – but also among men. The ratio is higher in France than in Germany, even though the share of inactivity among women is lower in France – but that of men too (it is the lowest in the five countries) so that in the end the gender gap is more pronounced.

Table 1 – Distribution of women and men by annual activity status (%)

		At least 1 month of economic activity							No economic activity
		Full year employment				Alternating employment		Total	
		Total	In which			<i>Employed less than 7 months</i>			
			Employees		Self empl ^{ed}				
	Full time	Part time							
Germany	All	75.6	55.2	15.6	4.9	14.8	10.7	90.4	9.6
	Men	82.8	73.8	3.0	6.0	13.7	9.7	96.6	3.4
	Women	68.4	36.4	28.2	3.8	15.8	11.7	84.2	15.8
	W/M	0.8	0.5	9.4	0.6	1.2	1.2	0.9	4.6
France	All	82.5	64.0	11.6	6.9	12.0	7.4	94.5	5.5
	Men	89.0	76.4	3.1	9.5	10.0	5.6	99.0	1.0
	Women	76.1	51.8	20.0	4.2	14.0	9.2	90.0	10.0
	W/M	0.9	0.7	6.5	0.4	1.4	1.7	0.9	9.8
Italy	All	76.1	52.9	6.9	16.3	9.5	6.5	85.6	14.4
	Men	91.3	65.6	2.0	23.7	7.1	4.3	98.4	1.6
	Women	60.7	40.0	11.9	8.8	11.9	8.8	72.5	27.5
	W/M	0.7	0.6	5.9	0.4	1.7	2.1	0.7	17.0
Sweden	All	88.8	69.2	15.2	4.4	8.3	4.4	97.1	2.9
	Men	89.5	79.9	3.8	5.8	8.2	4.3	97.8	2.2
	Women	87.9	57.4	27.7	2.8	8.4	4.5	96.3	3.7
	W/M	1.0	0.7	7.3	0.5	1.0	1.1	1.0	1.7
U-Kingdom	All	82.2	60.5	13.9	7.8	3.1	2.9	85.2	14.8
	Men	87.6	72.9	3.0	11.7	3.9	3.9	91.5	8.5
	Women	77.1	48.9	24.1	4.1	2.2	1.9	79.3	20.7
	W/M	0.9	0.7	8.0	0.4	0.6	0.5	0.9	2.4

Source: EU-Silc 2009, Population: population of reference (individuals aged 20-59, students and pensioners excluded)

Inactivity corresponds to very different situations for men and for women: in short, economic inactivity is strongly associated with women's family status, while it looks rather "accidental" for men (Box 1). Explanations to women's lower participation in the labor force usually refer to three types of factors (Jaumotte, 2003; Del Boca *et al.*, 2009; Genre *et al.*, 2010; Thévenon, 2013): the tax system, which may discourage second earners – this could explain the disproportionate share of inactive women in Italy, where couples benefit from a substantial tax credit for the dependent spouse and other dependent adults - *cf.* Figari, 2011); children, a factor of employment interruption and withdrawal from the labor force; the institutional context, more or less favoring work/family articulations (childcare availability for pre-school age children, flexible hours and part-time work). It is not in the scope of this

⁸ The contrast is the same as with the usual ILO categories; the two countries are also almost at the extreme values of the gender ratio of employment (European commission, 2010, p.19).

study to investigate further these explanations - however, the differences observed between our five countries appear consistent with what can be expected.

Box 1 - Economic inactivity: family status, domestic and care work, disability

Most of the months of economic inactivity correspond to two main situations: the months a person spent doing domestic and care work, the months in which a person was (permanently or temporarily) unfit for work. These two situations (distinguished on the basis of the detailed retrospective calendars) are very differently distributed among women and men. For women, a large share of the inactive months is reported as dedicated to domestic and care work; for men a large share of these months is reported as corresponding to disability.

Among women, the share of “inactive months” associated with domestic/care work is especially high in Italy (85.5% of these months) then in the UK (71.5%) – see table. A comparison of the share of mothers of dependent children among inactive and active women illustrates the specific impact of the family status: except in Sweden, this share is generally higher among inactive women, but only in the case of mothers living with a partner - with the exception of the UK, where single mothers are also over-represented. It is in Germany that the concentration of inactivity among mothers is the highest. On men’s side, it is the contrary: fathers tend to be more often active than other men – and inactive men live more often alone. However, two countries show a different profile: Sweden, with a high concentration of inactivity among individuals - women as well as men - who are living alone; Italy, where inactive men are over-represented among men living in couples without children.

		Germany	France	Italy	Sweden	U-Kingdom
<i>Share of the household type among inactive / share of the household type among active</i>						
One person household	M	1.7	(1.9)	1.4	(2.5)	2.1
	W	0.3	0.2	0.3	1.8	0.7
Couple, no dependant child	M	1.0	()	1.2	()	0.6
	W	0.7	0.6	0.6	()	0.3
Single parent household	M	()	()	()	()	()
	W	0.5	0.6	0.4	()	1.9
Couple, dependant child(ren)	M	0.5	()	0.8	()	0.5
	W	2.0	1.5	1.5	()	1.3
<i>Total parents</i>	<i>M</i>	<i>0.5</i>	<i>()</i>	<i>0.8</i>	<i>()</i>	<i>0.7</i>
	<i>W</i>	<i>1.7</i>	<i>1.4</i>	<i>1.3</i>	<i>0.9</i>	<i>1.5</i>
<i>Domestic-care work and disability in % of inactive months (%)</i>						
Domestic-care work	M	10.4	10.6	8.2	()	16.8
	W	57.5	58.8	85.5	24.2	71.5
Disability	M	66.9	42.7	27.1	()	78.2
	W	11.3	35.0	1.3	49.3	25.1
Total	M	77.3	53.2	35.2	(87.9)	94.9
	W	68.9	93.8	86.8	73.5	96.6

Source: EU-Silc 2009, Population: economically inactive individuals of the population of reference (individuals aged 20-59, students and pensioners excluded).

(xx) figure based on a small number of observations.

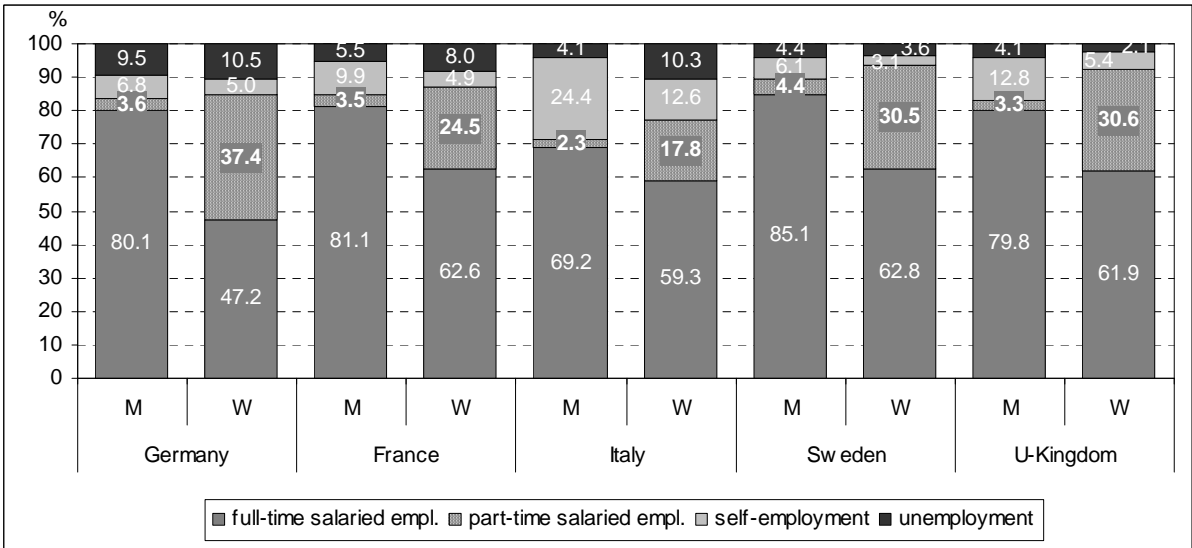
() not enough observations.

Disability is the other component of inactivity that the calendars allow to identify; in the five countries, its share is higher among inactive men than among inactive women - especially in Germany and the UK (and also in Sweden but the number of observations is too small for the detailed figures to be displayed).

Put together with the large differential in the incidence of inactivity, these differences in the composition of women’s and men’s inactivity can be analyzed as a manifestation of the gendered division of work: women’s absence from market work corresponds to their specialization in care and domestic work – a view supported by the latest statistics on time-use (Miranda, 2011); men’s absence from market work is most often accidental.

Besides the inactivity gap, the composition of men’s and women’s months of activity differs also by employment intensity on one hand, working time status on the other. The most striking difference is that observed in the distribution of salaried employment between full-time and part-time jobs (Fig. 2). The share of part-time work in women’s months is about ten times that of men in Germany, about eight times in the UK, slightly lower in the other countries. Except in Italy, the part-time gap is more pronounced than the inactivity gap, illustrating the link between women’s inactivity and part-time work underlined in comparative analysis of women labor supply (Del Boca *et al.*, 2009; OCDE, 2010; Thévenon, 2013); the part-time gap is the essential difference between men’s and women’s active months, especially high in Germany - and to a smaller degree in the UK (*cf.* fig. 1).

Figure 2 – Composition of the active months (%)



Source: EU-Silc 2009, Population: economically active individuals of the population of reference (individuals aged 20-59, students and pensioners excluded).

As shown in Table 1 and Figure 2, there are other gender gaps, but they are much less impressive than the gaps in inactivity and part-time: in the five countries, women are less often self-employed than men - for diverse total shares of self-employment¹, the highest in Italy. Except in the UK and to a lesser degree in Sweden, the share of months spent unemployed is higher among women, especially in Italy and France. The share of alternating employment (most often with a majority of unemployment) is the most disparate between countries and between genders: it is higher for women than for men in Germany, France and Italy, lower in Sweden. It is almost the same for women and men in the UK at the global level, but the share of alternations with a majority of unemployed months is much lower for women than for men (about one half lower). In addition, its low level compared to the other countries suggests a more pronounced partitioning between employment and non employment.

¹ Self-employment is different from salaried employment in several aspects; one crucial difference in terms of annual activity status is that self-employment looks more stable, because the status is less connected to the actual activity than in the case of employees: an employee without work is either unemployed or not economically active, while the self-employed may face huge variations in their business and still remain self-employed. A consequence is that the link between their actual amount of activity (measured by the number of months in the status) and their earnings is likely to be less tight than in the case of dependent workers. Another problem is that a share of self-employment (that we are not able to estimate) could actually correspond to hidden unemployment or inactivity.

The number of months in activity and the status in activity have a strong impact on the gender gap in earned incomes; the most notable differences between countries single out Italy on one side, because of the large (in)activity gap, Germany on the other because of the large gap in part-time work. But the earnings gap results also from other factors, as illustrated by the size of the gap even once the population is restricted to individuals employed full-year and full-time (cf. Fig. 1): about 20% in Germany, France and Sweden, a bit lower in Italy (16%), and neatly higher in the UK (26%). It is essentially due to the gap in annual wages. The gender gap is actually higher between the self-employed than between salaried workers (cf. Box 2), but since they represent a smaller share of the active population, this gap has relatively few impact on the total earnings gap.

Box 2 – The gender earnings gap among full-year self-employed

Between men and women having declared to work as self-employed during the whole period of reference, the gap in earnings (measured as (M-F)/M) goes from -12.7% in Sweden to 48.5% in Germany. As in the case of wage earners, there are important gender differences in the type of activity, as suggested by a small number of studies (cf. Favre 2009 for France; Strhomeyer 2007 for Germany).

The comparison with the gap in annual wages is difficult: the incomes from self-employment are of a different kind (they correspond at the same time to profits, i.e. returns to the capital the self-employed invest in their business); their level is the result of an financial accounting taking into account profit and loss, hence they can be nil and even negative. In addition, the self-employed include family workers (the unpaid persons who help a person of their family in their business) that the data do not allow to distinguish.

The status of self-employed is also rather heterogeneous between countries (cf. EIRO 210), making cross country comparisons difficult. For example in Sweden, this status is defined by the fact that a person is not dependent from only one employer – then workers who have several employers paying them wages can opt for the status of self-employed. The fact that the self-employed receive wages is not a specialty of Sweden: significant shares of self-employed earn wages also in the other countries, especially in France (see Table); this may indicate the existence of situations combining dependent and self employment – which cannot be identified with the information in the retrospective calendars which indicate only the main activity. This situation seems less frequent in the UK. Including or not the wages has the same effect in France and in Sweden: the gender gap increases; it changes almost nothing in the other countries.

Self-employed gender gap in income level and composition (%)

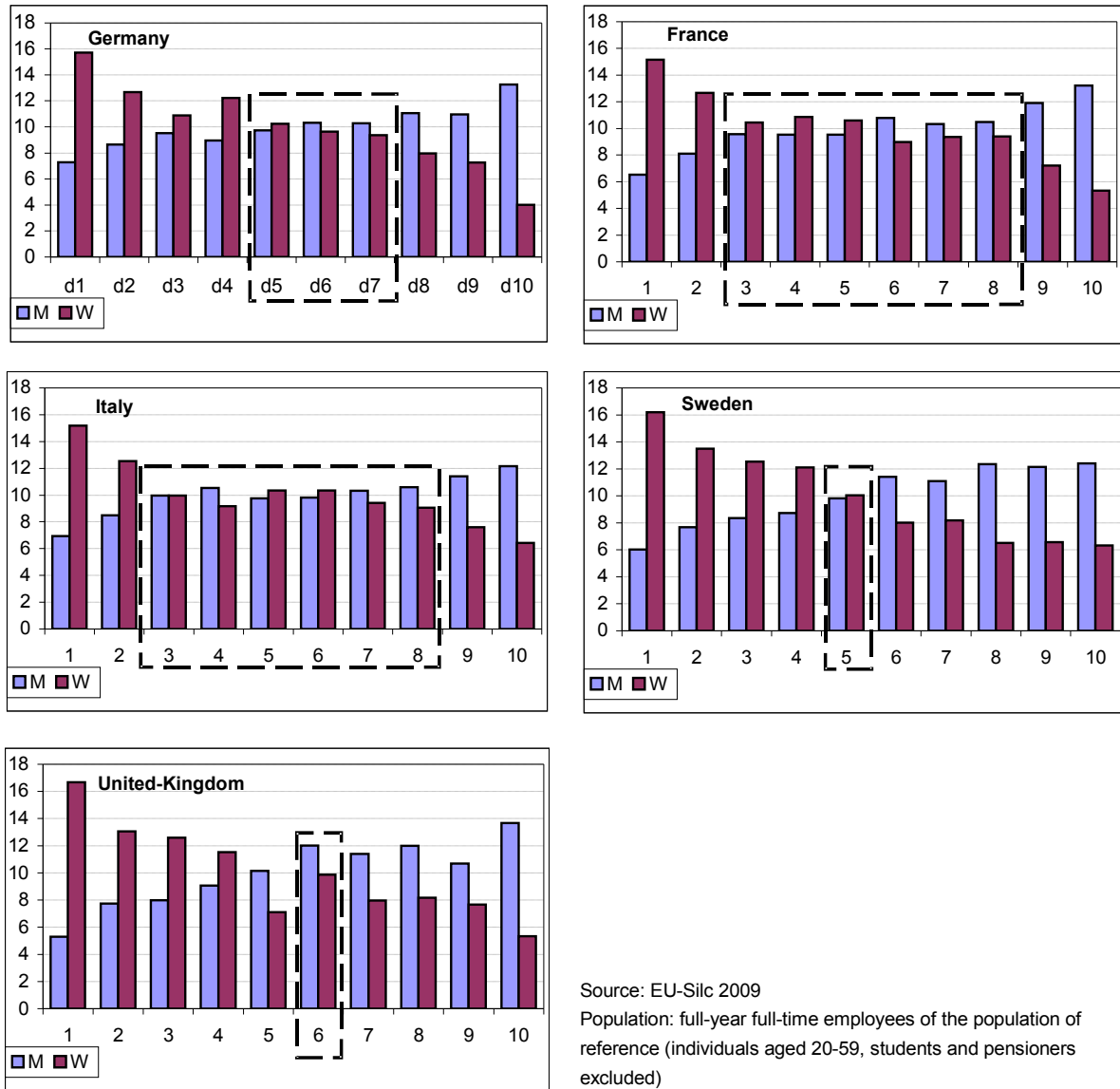
	Germany	France	Italy	Sweden	U-Kingdom
Gap in self-employed profits	48.5	24.2	23.3	-12.7	41.3
Share of the self-employed having received wages	7.4	32.9	8.5	37.8	2.9
Men	5.1	36.5	8.3	38.7	1.7
Women	11.0	24.9	9.1	35.7	5.8
Gap in total earnings	47.7	34.7	24.4	1.6	40.7

Source: EU-Silc 2009, Population: full-year self-employed of the the population of reference (individuals aged 20-59, students and pensioners excluded).

Among full-year full-time employees, the wage gap results from differences in the jobs’ characteristics; women’s and men’s jobs remain very different either by industry, sector or occupation and in addition, the share of women tends to be lower at the top of the wage distribution (cf. European Council, pp.67-69). These horizontal and vertical segregations determine the respective positions of men and women in the distribution of annual wages: women tend to be over-represented at the bottom and under-represented at the top of this distribution (Fig. 3). Depending on the country, the degree of segregation can be illustrated by the over-representation of women in the bottom deciles and/or their under-

representation at the top, opposed to the area of deciles in which the shares of men and women are about equal (in Fig. 3, we have retained “equal” as a difference of at most 2 percentage points); this area of “equality” is extremely narrow in Sweden and in the UK, larger in Germany, and much larger in France and Italy – for different reasons as we will see below.

Figure 3 – Shares of men and women by deciles of pooled annual wage



Source: EU-Silc 2009
 Population: full-year full-time employees of the population of reference (individuals aged 20-59, students and pensioners excluded)

All in all, the gender gap in total earnings can be analyzed as resulting from differentials in the “quantity” of activity, in the composition of the months of activity, and in the average “price” of these months (price which itself includes various effects of employment segregation). A decomposition of the gap allows to measure the relative impact of these three dimensions in the total earnings gap.

2. An “accounting-decomposition” of the gender gap in earned income

The decomposition of the gender earnings gap presented now is inspired from the usual techniques of decomposition of the wage gap (developed after Oaxaca 1973 or Blinder 1973). In short, the method consists in computing the market value of the productive characteristics of one group of population using the returns to the same characteristics of a another group, in order to separate the effect of differences in characteristics from that of differences in returns to these characteristics. The implementation is said here “accounting” insofar as the characteristics taken into account are limited to the activity status during the active months and their market value is computed not on the basis of an econometric estimation of the returns to one month of activity but on the basis of a simple computation of the mean monthly earnings associated to the activity status. Compared to the usual decompositions of the wage gap¹⁰, this decomposition decomposes what happens upstream.

We write Y the mean annual earned income, t the activity rate (number of active months / 12), a_i the share of months spent in status i in the total number of active months, where i represents alternatively the four activity status distinguished above (dependent full-time work, dependent part-time work, self-employment and unemployment¹¹) and y_i the “price” of one month in a given status, *i.e.* the mean monthly earned income in activity i ¹². The annual earned income can be expressed as the product of the number of active months ($12 * t$) by the sum of the monthly earnings in each status i (y_i) weighted by the share of active months in this activity status (a_i); this gives:

$$Y = 12 * t * \sum_i (a_i * y_i)$$

The value of the gap between men’s and women’s earned income can be written:

$Y_h - Y_f = 12 * [th * \sum_i (a_i h * y_i h)] - [tf * \sum_i (a_i f * y_i f)]$, f and h indicating respectively women and men, and can be decomposed as follows:

$$\begin{aligned} Y_h - Y_f &= 12 * [th * \sum_i (a_i f * y_i f)] - [tf * \sum_i (a_i f * y_i f)] \\ &+ 12 * [th * \sum_i (a_i h * y_i f)] - [th * \sum_i (a_i f * y_i f)] \\ &+ 12 * [th * \sum_i (a_i h * y_i h)] - [th * \sum_i (a_i h * y_i f)] \end{aligned}$$

This expression analyses the total earnings gap as the sum of:

- a gap in “quantity” (the first term): $12 * [th * \sum_i (a_i f * y_i f)] - [tf * \sum_i (a_i f * y_i f)]$, corresponding to the difference due to unequal activity rates. Its value is measured as the difference between the annual income women would have (given the structure of their own active months and their own “prices”) if they had the same activity rate as men.

¹⁰ The wage gap results itself from differences in men’s and women’s productive characteristics (human capital), job segregation (by industry and occupation) and from a possible wage discrimination – that is precisely what the usual decompositions try to measure. The data do not allow to implement this type of decomposition.

¹¹ We also include a residual status grouping the observations with some earned income even though having no month of activity. This anomaly may come from the fact that the retrospective calendars are based on self reported status while the incomes are based on registers, or reflect effects of memories (the persons are asked about their activity during the preceding year and may have forgotten), or correspond to incomes received with a lag, or to the income from a very occasional job (e.g. some hours that the calendar, based on the main situation, does not take into account).

¹² The average monthly earnings in each activity status (the y_i) are computed as the annual amounts of wages, self-employed income and benefits from unemployment divided by the number of months in the corresponding status. However, it is not possible to distinguish, within the annual amount of wages what results from the months of full-time or part-time work. For the computation, we have then calculated the average monthly wage in full-time and part-time work only among the observations which had only months of full-time or months of part-time. It is no more possible to know exactly the number of unemployed months corresponding to the amount of unemployment benefits. As for the situations combining employment and non employment, the average monthly earned income is computed on the basis of all their earnings, not distinguishing between wages, self-employed incomes or unemployment benefits.

- a gap in structures (the second term): $[th * \sum_i (a_i h * y_i f)] - [th * \sum_i (a_i f * y_i f)]$. It corresponds to the difference due to the fact that the composition of men's and women's active months is different – it is measured as the difference between men's earned incomes (given their own activity rate and composition of active months) if they were paid at the “price” of women and women's earned income if they had the same rate of activity as men. This term can be detailed in order to show the value of the differences in the shares of full-time dependent work, part-time dependent work, self-employment and unemployment between man and women.

- a gap in prices (the third term): $[th * \sum_i (a_i h * y_i h)] - [th * \sum_i (a_i h * y_i f)]$, the difference due to unequal monthly earnings in each status – it is measured as the difference between men's actual earned income and the income they would have (given their own activity rate and composition of active months) if they were paid at the “price” of women. This term can be detailed too in order to show the gap associated with a specific type of activity.

The results of the decomposition are presented in Table 2.

Table 2 – Contribution of the gaps in quantities, structures and prices in the gap in earned income

	Germany		France		Italy		Sweden		U-Kingdom	
	value	%	value	%	value	%	value	%	value	%
Total earned income gap	48.5	100.0	36.4	100.0	47.2	100.0	27.6	100.0	45.4	100.0
Components										
1- Quantity - Gap due to the difference in the activity rates										
$[th * \sum_i (a_i f * y_i f)] - [tf * \sum_i (a_i f * y_i f)]$	8.6	17.7	6.5	17.9	15.6	33.0	1.3	4.8	8.1	17.9
2- Structure - Gap due to the difference in the composition of the active months										
$[th * \sum_i (a_i h * y_i f)] - [th * \sum_i (a_i f * y_i f)]$	17.5	36.1	8.6	23.7	12.5	26.5	6.8	24.5	9.2	20.3
In which 2.1- full-time /part-time in salaried employment	17.0	35.0	6.1	16.8	5.5	11.7	4.7	17.1	4.3	9.4
2.2- other differences	0.6	1.1	2.5	6.9	7.0	14.8	2.0	7.3	5.0	10.9
3- Price - Gap due to the difference in the mean monthly earnings										
$[th * \sum_i (a_i h * y_i h)] - [th * \sum_i (a_i h * y_i f)]$	22.4	46.2	21.3	58.4	19.2	40.5	19.5	70.7	28.1	61.8
In which 3.1- wage gap in full-time salaried employment	17.0	35.1	15.4	42.2	11.2	23.7	18.1	65.4	22.2	48.8
3.2- other differences	5.4	11.1	5.9	16.2	7.9	16.8	1.5	5.3	5.9	13.0
(1) + (2.1) + (3.1)	42.5	87.7	28.0	76.8	32.3	68.4	24.1	87.4	34.5	76.1

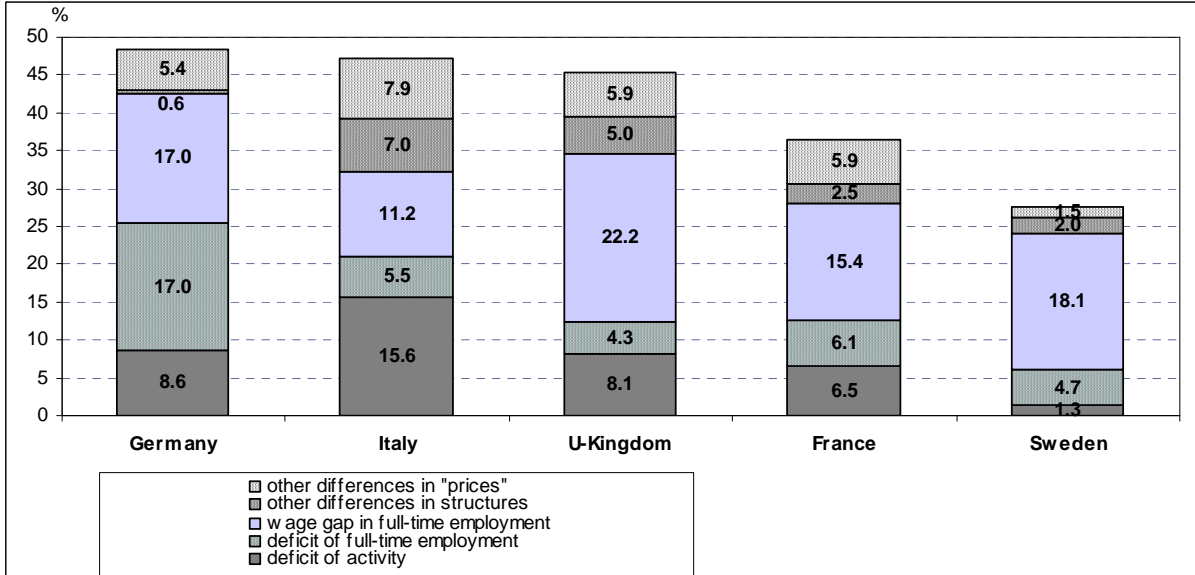
Source: EU-Silc 2009, Population: population of reference (individuals aged 20-59, students and pensioners excluded)

The three components contribute very differently to the total gap in the five countries. The “quantity” gap, due to the difference between men's and women's activity rates, appears relatively close in Germany, France and the UK, accounting for about 18% of the total gender gap in earned incomes; it is much larger in Italy (one-third of the total gap), much smaller in Sweden (barely 5%). The gap in “structures” (resulting from differences in the distribution by status of men's and women's active months) account for about 20% of the total gap in the UK (this is the lowest level in the five countries), about 24% in France and Sweden, 26% in Italy; it is notably higher in Germany where it represents 36% of the total gap. This second component results essentially (even almost completely in Germany) from the unequal distribution of the months of salaried employment between full-time and part-time work – except in Italy and to a smaller degree in the UK; in these two countries, it is the share of the “other differences” (self-employment and unemployment) which dominates. The addition of the gaps due to quantities and structures amounts to more than half the total gender gap in earned income in

Italy and in Germany. In the other countries, it is the “price” gap which arrives first. Its share results mostly from the gender wage gap in full-time salaried employment, except in Italy.

Looking at the level of the components and once the countries are ordered by the size of the total gap shows better the disparity between the five countries (Fig. 4). Germany, Italy and the UK are relatively close considering the level of the total gap, but quite different in terms of its composition. The first ones differ essentially by the size of the gap resulting from women’s deficit of activity (Italy) and from women’s deficit of full-time employment (Germany); the UK differs from both by the large size of the gap resulting from the gender wage gap in full-time employment (the highest in level in the five countries). France is close to the UK considering the addition of the deficits of inactivity and full-time employment, but the much smaller size of the wage gap in full-time employment makes the difference. The wage gap in full-time employment is greater in Sweden than in France, but Sweden ends with the lowest total gap among the five countries because all the other components are smaller.

Figure 4 – Level and components of the gender gap (*) in earned income



(*) Measured as (M-F)/M.
 Source: EU-Silc 2009, Population: population of reference (individuals aged 20-59, students and pensioners excluded)

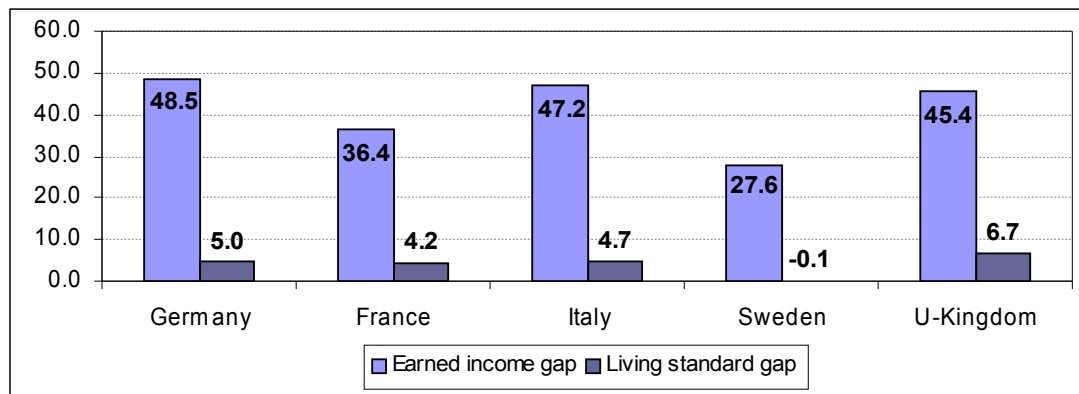
While no clear pattern emerges from the comparison, the relative size of the main components of the gap nevertheless suggests a sort of trade-off between the share of inactive women and the size of the wage gap in full-time employment. This could illustrate the effect of selection into employment analyzed by Olivetti and Petrongolo (2008); they show that the correlation between large employment gaps and small wage gaps is largely the consequence of non-random selection of women into employment, those with lower productive characteristics being more likely to be inactive. However, the selection effect, if it works in the case of Italy, is not mechanical: the employment gap does not necessarily predict the size of the wage gap. If it was the case, there would be no reason for the wage gap in full-time employment to be the same in Germany and in Sweden (cf. Fig. 1). This means that other factors are at stake, especially horizontal and/or vertical job segregation.

In terms of economic outcomes of women compared to men, cross-country differences are notable: Sweden is the uncontested first in the “honour list”, with the lowest gender gap in earnings of the five countries – however the performance is less undisputable in terms of the wage gap and the very narrow area of wage equality which suggests that segregation in employment is very strong. Between the other countries, the ranking is less obvious: Germany, Italy and the UK display close (and high) levels of gender economic inequality, but its composition differs so much from one country to the other that it is difficult to conclude. Each of these countries shows a pronounced weakness in one of the three dimensions of economic inequality between genders: economic activity in Italy, full-time/part-time work in Germany and wage inequality in the UK. France stands in an intermediate position, lagging behind Sweden in terms of women’s participation in the labor force but in a labor market that could be less segregated, and doing better than the three other countries because of the relatively low intensity of gender inequality in each of the three dimensions. These results are broadly consistent with the typology of welfare States – especially in its refined versions considering the gender contents of the articulation between work, family and the State: public policies aimed at facilitating the articulation between work and family, a problem still faced almost exclusively by women, are more advanced in Sweden and, under different modalities, in France than in the three other countries; they remain limited and of more recent concern in Germany, and almost non-existent in Italy essentially by lack of available public childcare, and the UK, essentially by lack of affordable childcare.

3. Gender inequality in earned incomes and gender inequality in living standards: mind the gap!

Compared to the gender gap in earned incomes, the gender gap in living standards is strikingly low: when the first one varies between 28% and 48%, the second one goes from non-existent in Sweden to a maximum of barely 7% in the UK (Fig. 5).

Figure 5 - Gender gap (*) in earned incomes and in living standards (%)



(*) Measured as (M-F)/M.

Source: EU-Silc 2009, Population: population of reference (individuals aged 20-59, students and pensioners excluded)

The big difference comes from a change of unit between the two notions: earnings are individual, while living standards, even though imputed to individuals, are measured at the household level. The usual methodology measures the living standard on the basis of the household disposable income¹³ and the size and composition by age of the household, assuming that all incomes are pooled and shared so that all the household members are equal and reach the same standard of living¹⁴. Under these assumptions, intra-household transfers are a crucial factor of reduction of gender inequality. In addition, the disposable income is not just divided by the number of persons in the household (“per head”); in order to take into account the economies of scale - the fact that the needs of two persons living together are less than twice the needs of one of these persons - an equivalence scale is used to compute the number of equivalent-adult (or consumption units). The equivalent scale currently used in the European statistics (sometimes called Oecd-modified), attributes a weight of 1 to one adult (any person at least 14 years old), a weight of 0.5 to any additional adult, and a weight of 0.3 to any child (less than 14 years old).

Starting from individual earnings, the standard of living can be thought of as the result of additional “correcting” factors (correcting either positively or negatively): intra-household transfers of earned income (the presence and earnings of a partner, the presence of dependent children, the economies of scale), other possible market incomes and inter-households transfers (e.g. alimonies), and finally State transfers through the tax-benefit system.

¹³ The disposable income is computed as the sum of the earnings and other market income (rents, interests), net inter-household transfers (e.g. alimonies) and social transfers received by all the household members minus social contributions and taxes on income and wealth (see Appendix 2).

¹⁴ These assumptions or the equivalence scale will not be discussed here.

At the micro level, the impact of intra-household transfers depends firstly, for a person, on the composition of her household: the number of active members, earnings of these persons, total number and age of the household members (intra-household redistribution of course can happen only for persons who live with others). At the macro level, it will depend firstly on the demographic structure of the households: shares of couples, without or with children, single parents, single persons households.

While, in the population studied, most individuals live in couples, men and women differ in the share of single parents, higher among women than men, and in the share of persons who live alone, this time higher among men than among women (Table 3).

Table 3 - Household composition by gender (%)

	No partner no child	Couple no child	No partner child(ren) (*)	Couple child(ren) (*)	Total couples	Total with child(ren) (*)
Men						
Germany	30.7	28.4	1.0	39.9	68.3	40.9
France	22.6	22.3	2.1	52.9	75.2	55.1
Italy	22.0	15.9	1.2	60.9	76.8	62.1
Sweden	34.7	21.0	4.3	40.1	61.1	44.4
U-Kingdom	26.9	26.6	2.5	44.1	70.7	46.5
Women						
Germany	26.6	26.7	7.9	38.9	65.6	46.8
France	16.4	21.9	9.6	52.1	74.0	61.7
Italy	14.2	16.2	7.6	62.1	78.3	69.6
Sweden	22.8	23.5	9.3	44.5	68.0	53.7
U-Kingdom	17.4	25.0	16.4	41.3	66.2	57.7

Source: EU-Silc 2009, Population: population of reference (individuals aged 20-59, students and pensioners excluded)
 (*) Dependent children, i.e. less than 25 years old and not economically active.

Living with a partner may have different effects for the individual, depending on the relative earnings of his/her partner: the one with the lowest earnings will benefit from the (assumed) pooling of incomes, while it will be the opposite for the one with the highest earnings; there can be nothing to pool if both earn nothing or no pooling effect at all if both earn the same amount. In all cases, both benefit equally from the (assumed) economies of scale. Children are additional dependent household members and have a negative impact for both parents. Social transfers constitute the other main factor in this sequence; these transfers tend to have a cumulative effect, since a large range of social benefits are related to the size and composition of the households or families and, in most countries, the income tax takes the household composition into account one way or the other. Living with children but no partner cannot result in positive intra household transfers for the parent; in this case, social benefits will be the most crucial corrective factor.

On average, the addition of all these “corrections” has different effects for women and for men (Fig. 6): compared with the distribution of their earned incomes, the distribution of women’s standard of living is generally “improved”, while it is quite the opposite for men. Finally, measuring inequality with the Gini coefficient, the living standards are much less unequal than the earned incomes, in general but especially among women (Fig. 7).

Figure 6 - Distribution of earned income and living standard by gender

Source: EU-Silc 2009, Population: population of reference (individuals aged 20-59, students and pensioners excluded)

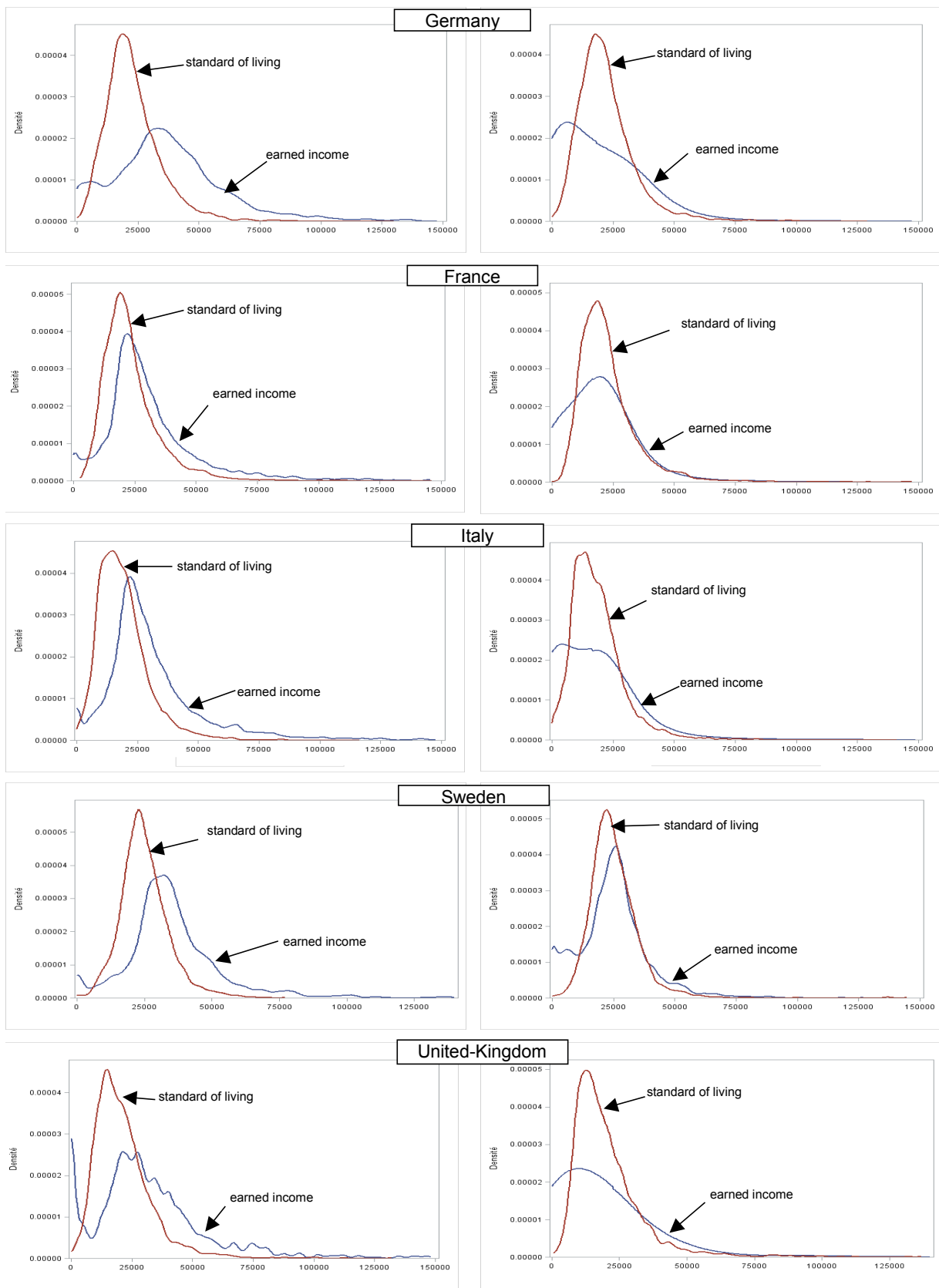
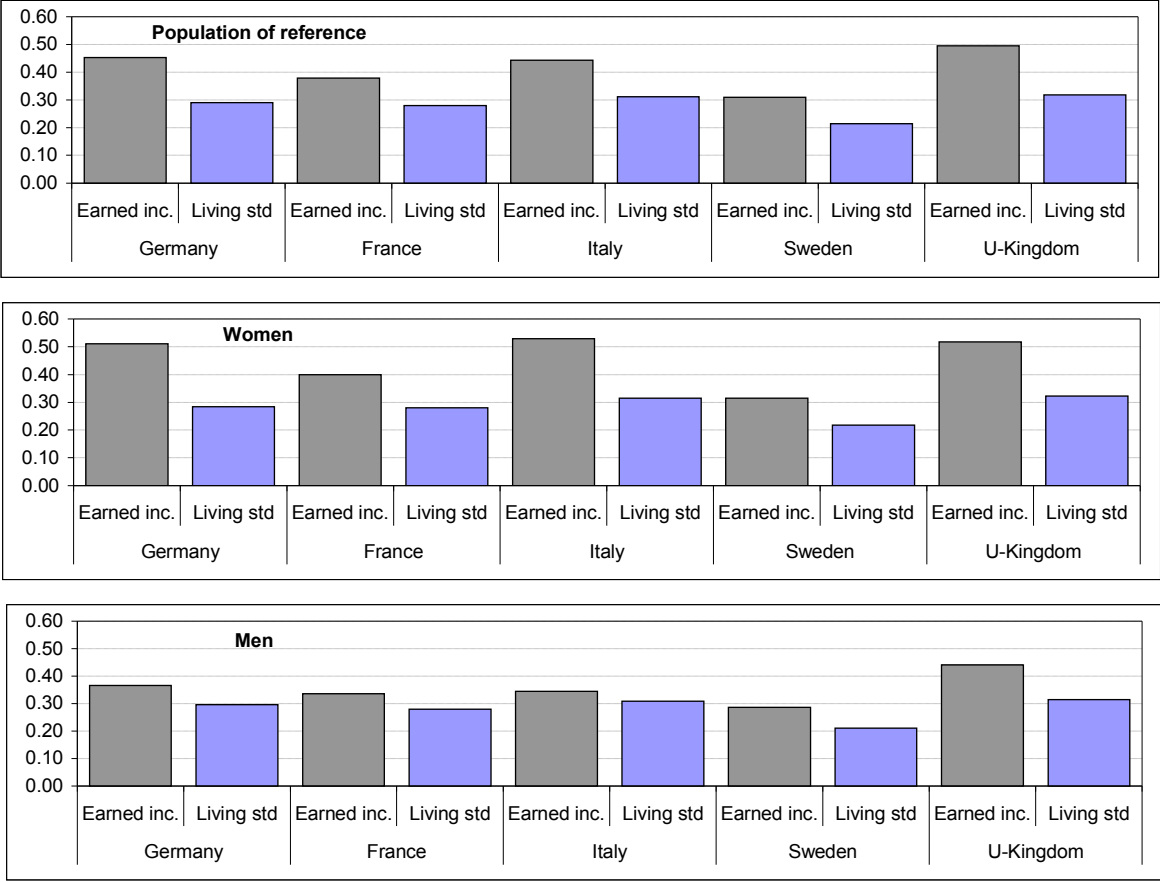


Figure 7 - Gini coefficients of the distribution of earned incomes and living standards



Source: EU-Silc 2009, Population: population of reference (individuals aged 20-59, students and pensioners excluded)

4. Earnings, partners, children and social transfers

To analyze the sequence from individual earnings to individual standard of living, the effects of the various “corrections” evoked above will be examined in three steps. Firstly, we focus on intra-household redistribution of earnings resulting from the pooling of earnings and the economies of scale; then we add the household’s private incomes (other market incomes and inter-household transfers), then State transfers¹⁵. However, non work private incomes and most State transfers are not available at the individual level, hence it is not possible to examine specifically gender discrepancies¹⁶; so in the second and third steps, differences between men and women result only from differences in the households’ structures.

We will use the following intermediary notions of income (notations use i for the individual, p a dummy for the presence of a partner, c the number of dependent children):

- the “*conjugal equivalent earned income*” (CE_i), defined as the standard of living an individual living with a partner would have if they had only their earnings to live on and no dependent children. The “*conjugal effect*” corresponds to the difference between a person’s conjugal equivalent earned income and her own earnings.

$$CE_i = \frac{\text{Individual earned income } (E_i) + \text{partner's earned income } (E_p)}{1 + 0.5 * p}$$

Conjugal effect = $CE_i - E_i$.

If there is no partner, $CE_i = E_i$ and the conjugal effect = 0.

- the “*family equivalent earned income*” (FE_i), defined as the standard of living individuals would have if they had only their earnings to live on once dependent children are taken into account; the “*children effect*” corresponds to the difference between a person’s family equivalent earned income and her conjugal equivalent earned income.

$$FE_i = \frac{\text{Individual earned income } (E_i) + \text{partner's earned income } (E_p)}{1 + 0.5 * p + 0.3 * c}$$

Children effect: $FE_i - CE_i$.

If there is no partner neither child, $FE_i = E_i$; if there is a partner and no child, $FE_i = CE_i$.

From here, the living standard is obtained by adding the other private incomes of the household (income from property and capital plus inter-household transfers net), which gives the usual notion of pre-transfers standard of living, then the adult-equivalent amount of State transfers (social transfers received minus social contributions and taxes on income and wealth divided by $1 + 0.5 * p + 0.3 * c$).

¹⁵ The calculation of the household disposable income is detailed in Appendix 2.

¹⁶ In EU-Silc, only the earnings, unemployment benefits, pensions, disability benefits and education allowance are provided at individual level. The other elements of the households’ income (income from property and capital, inter-household transfers, family, housing and other social transfers, social contributions and taxes) are not individualized. Some could rather easily be individualized: social contributions on individual earnings, alimonies, and some means tested social benefits. This would of course complicate data collection. Individualizing the other components (income from property and capital, family, housing and some social transfers, social contributions and taxes when they are based on the household’s income) would require being able to attribute them precisely to one or the other household member some social transfers. Even if it was the case, this would not solve the question of whether and how they are actually allocated in the household; what is missing here is the knowledge of a “sharing rule” hence the well known difficulty to escape the standard assumptions of income pooling and equal sharing even though it is generally acknowledged that they are not satisfying. Many studies, that will not be cited here, discuss the consequences of this lack of knowledge and its consequences in terms of targeting public policies (see for instance Bennett and Sutherland, 2011).

Using the intermediary notions defined above, the components of the living standard at individual level can be written as:

$$\begin{array}{c}
 \text{equivalent earned income} + \text{equivalent other private income} + \text{equivalent state transfers} \\
 \hline
 \underbrace{\dot{E}_i + (CE_i - E_i)}_{\text{conjugal effect}} + \underbrace{(FE_i - CE_i)}_{\text{children effect}}
 \end{array}$$

4.1 The conjugal effect: making women and men equal

In couples¹⁷, under the standard assumptions of income pooling and equal sharing, both partners have the same equivalent income. If partners had only their earnings and no child, their equivalent earned income would be equal to the sum of their earned incomes divided by 1,5. At the micro level, the conjugal effect (as defined above) depends, for each partner, of his/her partner's earnings; the more unequal the partners earnings, the strongest the positive conjugal effect for the partner who has the lowest earnings (both partners benefiting equally from the economies of scale). At the macro level, the conjugal effect depends on the economic composition of couples (*i.e.* the combination of activity status within couples) and on earnings inequality between partners, which itself results on average from the degree of social homogamy in couples, and from the degree of gender inequality in general.

In the five countries, men's earnings are higher than women's earnings in a large majority of couples (Table 4). As for the economic composition of couples, the share of couples in which both partners are economically active year round goes from about one half (Italy) to about 80% (Sweden), but the share of couples where both partners work full-time is much lower: from about one half in Sweden, the UK and France (though a bit lower), down to 40% in Italy and only 27% in Germany, which is consistent with the inequalities in participation and full-time employment examined in the first section.

The highest shares of couples where one of the partners is inactive full-year are found in Italy – also consistent with the lowest share of economically active women – then in Germany, the lowest as expected in Sweden. As for the wage gap (measured only between partners active full-year) it is lower than on average illustrating the effect of couples' homogamy. Sweden stands apart, which could reflect the strong wage segregation observed for this country (*cf.* Fig. 3); Italy stands apart too, by the size of the difference between intra-couples wage gap and the average wage gap.

All in all, the impact of the conjugal effect appears very asymmetrical between women and men, in an inverse reflection of gender economic inequality: on average, the conjugal equivalent earned income of women living in couple is much more improved, compared to their own earnings, than in the case of men (Fig. 8). This asymmetry results from a labor division between genders which is everywhere more favorable – in terms of individual economic outcome – to men. It is also the main factor of difference between the inequality in earned incomes and the inequality in standards of living at individual level.

¹⁷ The focus on gender inequality leads to consider only heterosexual couples. The very small number of observations of persons living in same sex couples (in the population of reference, about 0.8% of the individuals living in couples) would anyway have made impossible to take them into account in a separate analysis.

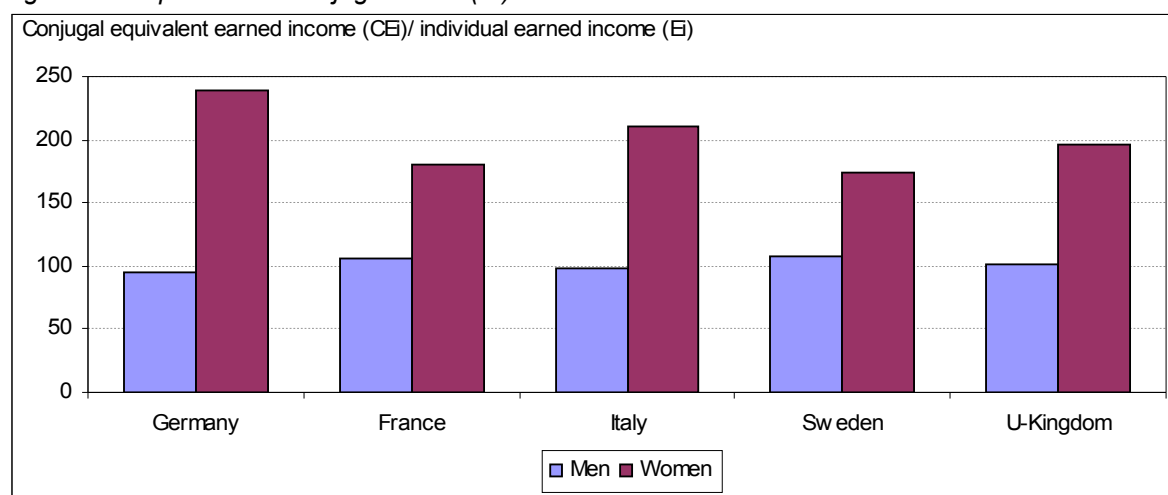
Table 4 – Economic activity and earnings inequality within couples (%)

	Germany	France	Italy	Sweden	U-Kingdom
Share of couples in which the man's earnings are higher than the woman's earnings	80.6	78.1	82.7	79.3	75.8
Combination of the partners' economic activity					
- both partners active full-year	58.3	68.8	52.6	82.7	76.5
in which					
<i>both full-time</i>	27.0	47.4	40.0	53.9	50.3
<i>1 full-time and 1 part-time</i>	31.3	21.4	12.5	28.8	26.3
- 1 active full-year and inactive 1 full-year	19.8	10.9	29.0	2.3	15.1
- 1 active full-year and 1 alternating	12.8	14.8	12.1	11.1	2.2
- neither active full-year (*)	9.1	5.5	6.3	3.9	6.2
	100.0	100.0	100.0	100.0	100.0
Wage gap (annual wage) between partners employed full-year					
All time status	31.3	11.7	9.6	27.3	19.9
Both full-time	2.9	4.5	0.0	19.3	9.4
Average wage gap (cf. figure 1)					
All	38.7	26.3	24.0	27.8	37.7
Full-time only	20.0	18.8	15.7	20.0	25.9

Source: EU-Silc 2009, Population: individuals of the population of reference (aged 20-59, students and pensioners excluded) living in couples.

(*) This category includes couples in which neither partner is active (the small number of observations did not allow to make a separate category).

Figure 8 – Impact of the conjugal effect (%)



Source: EU-Silc 2009, Population: individuals of the population of reference (aged 20-59, students and pensioners excluded) living in couples.

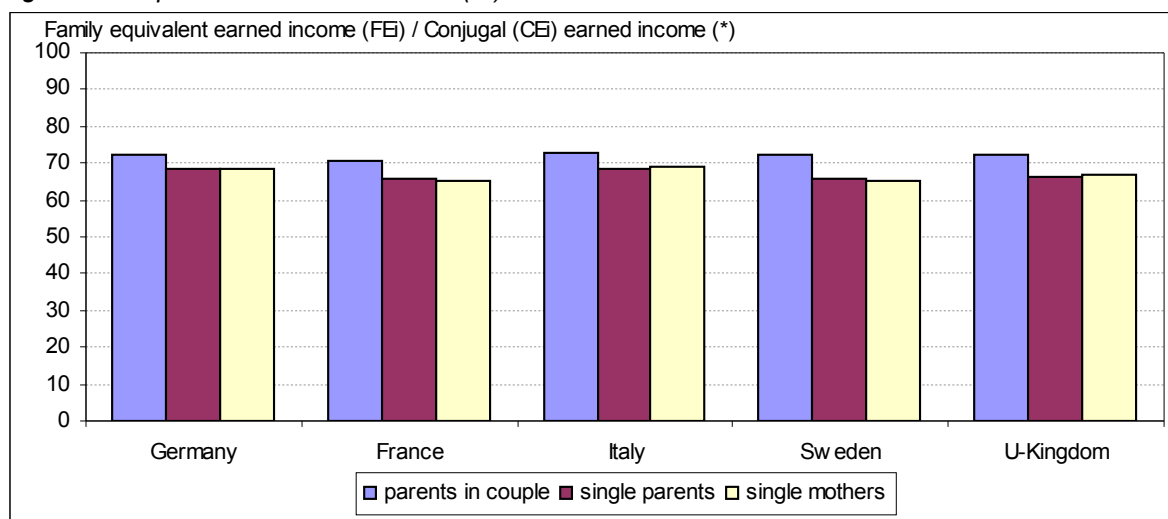
4.2 The children effect: slightly heavier on single parents

The basic impact of dependent children is to increase the number of persons between whom the family income is shared (however, this can be at least partly counterbalanced by state transfers – family allowances and/or taxation, *infra*), hence reducing the family equivalent earned income; it affects couples with children (adding to the conjugal effect) and single parents. For parents living in couple, its impact is of course exactly the same for both parents.

The children effect appears to have a comparable impact the five countries. It is slightly more pronounced for single parents, this resulting from the application of the equivalence scale: adding a child makes the number of equivalent adults go from 1.5 to 1.8 for couples, but from 1 to 1.3 for a

single parent, then has a greater impact on the equivalent income (Fig. 9). It is of the same magnitude between single fathers and single mothers – the main difference here is that of the incidence of the situation, much more frequent among women than among men.

Figure 9 – Impact of the children effect (%)

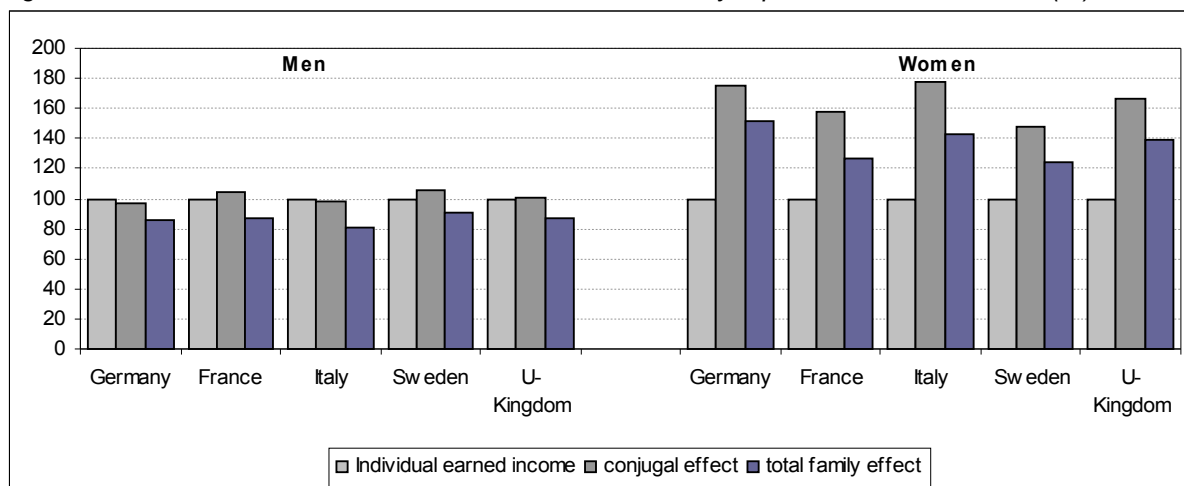


Source: EU-Silc 2009, Population: parents (of dependent children) of the population of reference (aged 20-59, students and pensioners excluded).

(*) For single parents, the conjugal equivalent earned income is equal to the individual earned income.

The conjugal effect applies only for couples, the children effect applies only for parents, both effects interact in the case of parents living in couples. At the macro level, the general impact of the family configuration will then depend on the distribution of men and women by household type (Fig. 9). The average impact of the conjugal effect appears lower on average than among couples only, especially for women; adding the children effect has a larger impact in the case of women than in the case of men, illustrating the unequal frequency of single parenthood.

Figure 10 – From individual earned income to individual family equivalent earned income (%)



Source: EU-Silc 2009, Population: individuals of the population of reference (aged 20-59, students and pensioners excluded).

Note: the total family effect is the addition of the conjugal and children effects.

4.3 Composition of the living standard by gender

From the family equivalent earned income to the average standard of living, two other components remain to be included. Following the methodology presented above, we add firstly the households'

other private incomes, then the state transfers. Table 5 presents the share each element represents in the individual standard of living of women and men.

As could be expected given the population studied, individual earnings are the main component of the standard of living; their share is higher for men than for women, reflecting the average gender gap in earned incomes. The conjugal effect is positive for women in the five countries; for men, it is slightly positive in France, Sweden and the UK (reflecting the average effect of the economies of scale) and negative in Germany and Italy (reflecting that the effect of the economies of scale is largely counterbalanced by that of unequal earned incomes). The more positive the effect for women, the more negative it is for men. The share of this effect in the standard of living is driven by the overall gender gap in earnings: Germany and Italy, the countries with the highest gender gap in earnings and the highest share of couples in which women earn less than men (due to, respectively, part-time work and inactivity) are then the countries where intra-household transfers have the strongest impact. The children effect is, of course, negative for both genders; its magnitude is about the same in the five countries (reflecting that the average number of dependent children by household is about the same). As for the small differences between women and men, they result from the unequal frequency of single parenthood between genders.

The shares of other private incomes are relatively low in the five countries¹⁸ and, by construction, they are very close for men and women. The share of inter-household transfers (net amount received) is very low on average, negative for men and, except in Germany, non-existent or positive for women. As expected, the share of social transfers is positive everywhere – however smaller in Italy than in the other countries¹⁹, and the share of contributions and taxes on income and wealth is negative and about comparable in the five countries with the exception of France, the difference being due to the fact that incomes are already net of social contributions in the data²⁰.

Examined separately by household type, the differences between men and women appear more pronounced – with the exception of the lower share of earned incomes for women in any household type. However, the gender gap in earned income seems to be lower among women and men of one person household; this may reflect the gendered impact of family configurations on economic outcomes, at least partly²¹.

The share of incomes from assets does not vary a lot between the different household types; compared to the national averages, it tends to be a bit lower among single mothers and higher among men and women living in couples with no dependent child. For single mothers, this could reflect that they own on average lesser assets than other categories of population; for couples without dependent children, it may reflect that they are more likely to be more advanced in the life cycle than on average then having accumulated more assets. An interesting difference is that of the share of inter-households transfers (essentially alimonies), which is positive and much higher in the case of single

¹⁸ It is notably higher in France than in the four other countries. This results from the adjustment with the Household Wealth survey and data from the French Central Bank, not done in other countries (cf. Eurostat Doc. LC-71-12 EN).

¹⁹ This could result from the fact that there is no general minimum income scheme in this country.

²⁰ This contributes also to the lower share of earned incomes, especially for men, than in the other countries.

²¹ It could also reflect the difference in the productive characteristics of men and women who live alone compared to those who live in couples.

mothers than in the other categories; it is likely that it is the counterpart of the negative and higher than on average share of these same transfers in the case of men living in one person households.

Table 5 – Composition of the living standard by gender and household type

	GE	FR	IT	SW	UK	GE	FR	IT	SW	UK
	Men					Women				
All household types										
Individual earned income	158.3	128.2	163.4	139.9	150.0	86.3	85.2	90.9	101.1	88.0
Conjugal effect	-4.9	6.1	-3.2	7.8	1.2	64.4	48.8	71.0	48.6	58.1
Family effect	-17.7	-23.4	-27.9	-20.5	-21.2	-19.5	-25.8	-31.9	-24.1	-23.2
Incomes from assets	2.7	10.4	3.5	3.0	2.4	2.8	9.9	3.2	3.2	1.9
Inter-h transfers (*)	-1.4	-0.6	-0.5	-0.1	-1.1	-0.2	0.0	0.8	0.2	0.3
Social transfers	5.8	6.1	2.5	9.2	7.7	6.7	7.5	2.7	10.4	11.2
Social contributions and taxes	-42.8	-26.8	-37.8	-39.3	-39.0	-40.6	-25.6	-36.7	-39.4	-36.3
Standard of living	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
One person households										
Individual earned income	143.2	113.6	137.4	128.1	128.4	136.2	108.9	133.3	126.4	124.0
Conjugal effect	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Family effect	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Incomes from assets	3.0	11.1	4.2	2.0	3.1	2.7	10.9	3.5	2.6	2.3
Inter-h transfers	-3.0	-1.0	-2.0	-0.3	-3.6	0.0	0.3	1.4	0.0	0.5
Social transfers	4.1	5.3	1.3	6.9	11.9	4.3	6.9	1.4	8.4	11.6
Social contributions and taxes	-47.4	-29.0	-41.0	-36.8	-39.8	-43.3	-26.9	-39.6	-37.4	-38.4
Standard of living	100	100	100	100	100	100	100	100	100	100
Couples no children										
Individual earned income	127.5	102.9	127.0	117.0	119.4	81.5	70.4	75.1	84.1	83.3
Conjugal effect	14.6	12.7	7.7	17.1	15.7	60.5	45.1	59.6	50.0	51.8
Family effect	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Incomes from assets	2.7	12.2	3.6	3.0	2.9	3.2	12.2	3.6	3.0	2.9
Inter-h transfers	-1.2	-0.6	-0.3	-0.1	-0.5	-1.5	-0.6	-0.3	-0.1	-0.5
Social transfers	2.3	1.8	1.3	3.1	2.3	2.2	1.8	1.3	3.1	2.3
Social contributions and taxes	-45.9	-29.0	-39.2	-40.0	-39.8	-45.9	-29.0	-39.2	-40.0	-39.8
Standard of living	100	100	100	100	100	100	100	100	100	100
Single parent households (**)										
Individual earned income	182.8	162.4	199.6	192.9	139.4	123.9	125.6	160.2	168.6	84.3
Conjugal effect	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Family effect	-61.0	-54.8	-65.6	-64.5	-48.6	-38.7	-43.4	-50.0	-59.0	-28.1
Incomes from assets	4.3	12.1	2.1	3.8	9.7	1.6	6.2	2.6	2.0	0.4
Inter-h transfers	-1.9	-2.9	-1.7	0.3	1.3	9.3	4.9	11.0	3.1	4.5
Social transfers	13.5	11.1	3.0	7.5	27.8	24.4	24.1	4.3	17.0	51.0
Social contributions and taxes	-37.7	-28.0	-37.3	-39.9	-29.5	-20.4	-17.3	-28.1	-31.7	-12.1
Standard of living	100	100	100	100	100	100	100	100	100	100
Couples with child(dren)										
Individual earned income	199.1	146.6	186.5	160.4	187.7	51.9	80.6	80.4	92.1	78.8
Conjugal effect	-27.8	5.0	-8.4	8.0	-9.9	120.1	70.9	97.7	76.2	99.0
Family effect	-47.7	-44.1	-48.8	-46.5	-49.4	-47.9	-44.1	-48.8	-46.5	-49.4
Incomes from assets	2.4	9.0	3.1	3.7	1.4	2.6	9.0	3.1	3.7	1.4
Inter-h transfers	-0.2	-0.3	0.2	0.0	-0.2	-0.3	-0.3	0.2	0.0	-0.2
Social transfers	10.3	8.5	3.4	15.3	8.8	10.2	8.5	3.4	15.3	8.8
Social contributions and taxes	-36.1	-24.6	-36.0	-40.8	-38.3	-36.5	-24.6	-36.0	-40.8	-38.3
Standard of living	100	100	100	100	100	100	100	100	100	100

Source: EU-Silc 2009, Population: population of reference (aged 20-59, students and pensioners excluded).

(*) Amount received minus amount paid.

(**) Comparisons between men and women should be cautious given the small number of observations of men in this situation.

As mentioned above, the shares of the other components of the living standard reflect mostly the slight differences in the distribution of men and women by household type; between countries, it reflects the general differences in the tax-benefits systems. The share of social transfers as well as that of taxes appears very sensitive to the presence of children: for parents, the share of social transfers in the standard of living is higher than on average and that of social contributions and taxes is lower than on average²² (with a smaller impact in Italy). The contribution of social transfers is especially high for single parents (still with the exception of Italy), and, within the limits due to the small number of men in this situation, it appears higher for mothers than fathers, particularly in the UK – this could illustrate the focus of public policies on children poverty.

Finally, social contributions and taxes on income and wealth (taken together since the data do not details between the two elements) appear more or less sensitive to family configurations: not at all in the UK and Sweden, where the income tax is individual, more in Germany, France and Italy, showing in the difference between couples with and without children, and also in Italy between one person households and couples despite the separate taxation of income (counterbalanced by generous tax credits for economically dependent members of the family including children but also not economically active wives).

²² This effect results almost only from taxes, not social contributions; but the data do not provide separately these two types of deductions.

5. Making gender inequality invisible

The very low level of the gender gap in living standards compared to the substantial level of the gender gap in earned incomes illustrates the levelling which results from assuming income pooling and equal sharing within households, i.e. no intra-household inequalities. As a result, the structure of inequalities in living standards is profoundly different from that of inequalities in earned income; the level of gender inequality is lowered because, given the initial inequality, women “benefit” more from the conjugal effect than men. As shown above, the change of perspective between earned incomes and living standards affects also the level of inequality within women and within men (cf. Fig 7). A decomposition of the Gini coefficient, based on Dagum’s and earlier work (Lambert and Aronson, 1993; Dagum, 1997) and implemented for the analysis of wage inequality in France by Koubi *et al.* (2005a; 2005b), allows to show the extent of the change.

Usually, inequality between groups of population (here men and women) is decomposed as the sum of inequality within each group and inequality between groups – our main focus. The interest of Dagum’s decomposition of the Gini coefficient is to measure explicitly as a third component a “residue” that occurs when the income distributions of the groups overlap. This third component corresponds to the inequality between the “richest” individuals of the less favoured group and the “poorest” individuals of the most favoured group. This methodology is particularly attractive since men’s and women’s earnings distributions overlap, the distributions of their living standards also, and our purpose here is precisely to examine how going from individuals’ earnings to individuals’ living standards changes the structure of inequality.

Using G_w for the within group component, G_b for the between group component and G_t for the component resulting from the overlap, the Gini coefficient can be written as follows:

$G = G_w + G_b = G_w + G_{nb} + G_t$, where G_{nb} is G_b net of the inequality in the area of overlapping²³.

This decomposition is applied at the main intermediary stages of the sequence from individuals’ earned incomes to their standard of living as described in section 4 (conjugal earned income and family earned income). The results are presented in Table 6.

The overall level of inequality (the Gini coefficient) first decreases with the conjugal effect, mostly under the effect of the decrease of inequality within women which drops sharply. Almost all the difference is already gained from this stage, showing the huge effect of the assumptions of income pooling and equal sharing – which result in partners’ equal conjugal earned incomes. The coefficient then re-augments slightly under the effect of taking children into account, and then it goes down with the addition of the other elements of the standard of living (essentially the effect of state transfers – showing, incidentally, their efficiency in the reduction of inequality).

Decomposing the Gini coefficient shows that in the process, inequality between groups (G_{nb}) becomes residual – what remains results from the fact that not all men and women live with a partner – and the only inequality left results from intra-group disparities (G_w) and inequality in the

²³ See a more detailed presentation of the Gini decomposition in Appendix 3.

overlapping of the distributions (Gt), both almost only due to inequalities between households, not between individuals. Gender inequality has become invisible.

Table 6 – Level and composition of Gini coefficients

	Gender gap (M-F)/M %	Gini coefficients			Components of the coefficient		
		Men	Women	Total	Gw	Gnb	Gt
1 – Individual earned incomes							
Germany	48.5	0.36	0.50	0.45	0.20	0.17	0.08
France	36.6	0.34	0.41	0.39	0.18	0.12	0.08
Italy	47.2	0.36	0.52	0.45	0.21	0.16	0.08
Sweden	27.7	0.28	0.31	0.31	0.15	0.09	0.07
U-Kingdom	45.5	0.44	0.53	0.51	0.23	0.16	0.11
2 – Conjugal equivalent earned incomes							
Germany	6.7	0.32	0.34	0.33	0.17	0.02	0.15
France	4.3	0.31	0.33	0.32	0.16	0.01	0.15
Italy	4.1	0.35	0.37	0.36	0.18	0.01	0.17
Sweden	-1.5	0.26	0.26	0.26	0.13	0.00	0.13
U-Kingdom	10.0	0.41	0.45	0.43	0.22	0.03	0.18
3 – Family equivalent earned income							
Germany	8.0	0.34	0.36	0.35	0.18	0.02	0.15
France	6.4	0.32	0.34	0.33	0.16	0.02	0.15
Italy	6.8	0.35	0.37	0.36	0.18	0.02	0.16
Sweden	1.2	0.27	0.28	0.28	0.14	0.00	0.14
U-Kingdom	12.0	0.41	0.47	0.44	0.22	0.04	0.18
4 – Living standard							
Germany	5.0	0.28	0.28	0.28	0.14	0.01	0.13
France	4.0	0.28	0.29	0.28	0.14	0.01	0.13
Italy	5.1	0.31	0.32	0.31	0.16	0.01	0.14
Sweden	-0.1	0.20	0.21	0.21	0.10	0.00	0.10
U-Kingdom	6.9	0.32	0.32	0.32	0.16	0.02	0.14

Source: EU-Silc 2009, Population: population of reference (aged 20-59, students and pensioners excluded).

Summary and discussion

Gender inequality in earned incomes remains considerable in the five countries studied: the lowest gender gap in earned incomes reaches 27%, and it stands between 45% and near 50% in three countries. Pillars of this inequality are unequal activity rates, unequal access to full-time employment and wage gaps in full-time employment. However these three factors contribute very differently to the total: Italy exemplifies the effect of women's low activity rate, Germany that of women stuck in part-time work and the UK specializes in large wage gaps. Sweden has the best performance in terms of overall inequality but the large share of it due to wage gaps in full-time employment suggests strong effects of sectorial and hierarchical segregation. France stands in an intermediary position due to a combination of low levels of the three factors. This ranking is rather consistent with the refined versions of Esping-Andersen's typology including a "Mediterranean regime" and more or less public support to women's access to employment. The decomposition of the gap in earned income suggests a sort of trade-off between inactivity and part-time employment on one hand, between access to employment and gender segregation in employment on the other hand... the road towards equality is definitely a very long one.

Shifting to gender inequality in living standards, the countries end up with gender gaps ranging from non-existent to barely 7%. This striking change from the sizable gender gaps in earned incomes is entirely due to the conceptual difference between the two notions. The sequence from earned incomes to family equivalent earned incomes, an intermediary notion which allows to consider separately the elements of households' incomes which are available at individual level, shows by construction the same pattern in all countries: on average the effect of (assumed) income pooling/equal sharing is more advantageous to women than to men. In the remaining of the sequence – the addition of the other components of the living standard – cross-country comparisons only show that countries are different in terms of demographic structures and tax-benefit systems. Finally, a decomposition of the Gini coefficient shows that the initial gender inequality is almost entirely erased at the end of the sequence.

The two approaches then lead to radically different assessments: in one case, gender inequality appears considerable; in the other, there is almost no gender inequality. While there is no mystery about the reason for such a difference (since a major share of individuals are living in couples, the methodology used to compute living standards results necessarily in almost equalizing men's and women's standards of living), the radical change of interpretation when using one measure or the other raises questions. One is that of the pertinent indicators to report gender inequality. Another is that of the huge impact the usual assumptions of income pooling and equal sharing have on the measurement of inter-individual inequality.

Assessments of economic inequality between men and women are most often based on the wage gap, comparisons of poverty rates and sometimes other gender ratios (e.g. inactivity, unemployment). The wage gap, the most routinely used indicator, is interesting as a measure of inequality between wage workers, but it is too narrow in many ways: firstly, it is not fully informative since it is most often

measured (e.g. the statistics provided on the Eurostat website²⁴) on the basis of hourly wages or only between full-time employees, which results in ignoring the effect of the differences in weekly hours worked by employed women and by men; secondly it excludes significant shares of the active population (the self-employed and the unemployed); thirdly, it also excludes the persons who are not in the labor force – disproportionately women. Adding indicators such as gender ratios of inactivity, unemployment, part-time employment is an improvement, but it does not give a measure of the combined effect of these inequalities. At the other end, as we have seen, approaching gender economic inequality on the basis of living standards results in virtually offsetting gender inequality. With regard to these limitations, an intermediary notion such as the earned income has the interest of providing a synthetic measure of the result of the three main factors of economic inequality between genders: the unequal participation in the labor force, the unequal access to full-time employment and unequal wages. It is also a meaningful measure of gender inequality in autonomy and control over resources of one's own. Note that the paper focused on the population of working age but considering the whole adult population and adding pensions (as entitlements based on previous earned incomes) would be meaningful too²⁵ – it is likely that the gender gap in earned incomes plus pensions would be larger.

As for the consequences of the measurement of living standards, it seems to us that the assumptions behind the standard methodology, based on the unitary model of the household, need to be questioned... again. It is nowadays widely acknowledged that these assumptions are not satisfying, a whole strand of theoretical literature results from questioning and discussing their conceptual basis, other models of the household have been developed, there is also a bulk of empirical proof that they are misleading, but there is no notable advance in the methodology since the issue started to be raised about 30 years ago. Of course, this raises the very complex question of intra-household allocation of resources – some surveys have been developed recently in Denmark, France and in a dedicated module of EU-Silc in 2010²⁶. These attempts put aside, being able to sort out between assumptions and analyze their consequences is even more complicated since statistical information on incomes and living conditions was until recently collected mostly at household level only. It may also be that the question has been neglected – for instance, EU-Silc (or other datasets) do not systematically provide the detailed information on individual incomes that would be easy to collect at individual level (e.g. inter-household transfers, especially alimonies, social contributions deducted on individual earnings, social benefits paid to individuals – especially means-tested benefits, etc.).

These shortcomings underline how far from optimal is the basis on which economic inequality between individuals is most often analyzed and monitored. While the current methodology may be justified to compare households (leaving aside the debate on the equivalence scale), it does not make it appropriate to compare individuals because it neglects possible intra-household inequality. Speaking of *possible* intra-household inequality introduces more questions. It is very likely that there is at least

²⁴ <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=fr&pcode=tsiem040&plugin=1>

²⁵ This option would require having available information to separate pensions from social benefits or social assistance to elderly people with low or no pension entitlements, which is not the case in EU-Silc.

²⁶ Danish Household Expenditure Survey (Bonke and Browning, 2009) ; French Time-use survey 2009-2010, module Decision making within couples (Ponthieux, 2012a); Eu-Silc 2010 module "Intra-household allocation of resources" (Ponthieux, 2012b).

some pooling in most households, but what if incomes are not pooled? Results from the recent surveys evoked above, based on answers to direct questions (do you pool all, some, none of your incomes) show that not all households report to pool all their incomes. But it cannot be excluded that non-pooling households may have other arrangements resulting in equality. Conversely, it is not possible to maintain that full-pooling results necessarily in equality – at least if “equality” is meant as equal access to and command over the pooled income. These are some of the complex issues behind intra-household allocations, the extent in which resources are shared and whether this results in actual equality or not between the household members – and equality of what.

Even admitting that incomes are actually fully pooled and equally shared so that intra-household transfers erase gender inequality, at least within couples, several questions remain. A crucial one, at real life level, is that the “family” equilibrium might be risky if individual earnings are very unequal: what if the main earner becomes unemployed or permanently incapacitated? what if the partners split? The household “corrects” the initial distribution of income only as long as the household exists and/or the main earner provides for those who earn nothing or have low earnings; social transfers can mitigate the effects of changes in the household’s composition or earnings, but a look at the poverty rates of jobless households or one parent families also shows that social transfers do not replace decent earnings.

The persistence of such a high level of gender inequality in earnings suggests finally that there is a high level of social tolerance for that inequality, inherent to a persistently unequal division of labor by gender and the ideology of men’s and women’s roles in the society. Expectations about the protecting/corrective role of the household, either at individual level by biasing the real costs and consequences of the unequal division of labor or more generally by biasing the social perception of how serious the inequality between men and women actually is, may contribute to its persistence.

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Appendix

1 – Population of reference

The population studied is basically that of men and women aged from 20 to 59 years, who were not students or retired during the period of reference or at the time of interview. Some other selections have been added in order to keep the number of family configurations manageable, to avoid complicated intra-household configurations with more than 2 earners. This lead to exclude: the individuals living in complex households, those with economically active children, those living with a partner either retired or student. In addition, the observations for which the retrospective information on activity was incomplete (i.e. calendars with less than 12 months filled) or was not consistent with the information on incomes were also excluded. In order to keep the information on incomes consistent between the individual and the household levels, the exclusion of an individual lead to the exclusion of all the corresponding household. Finally, households with negative disposable income were also excluded.

	Germany	France	Italy	Sweden	U-Kingdom
Total number of households (EU-Silc 2009)	13087	10603	20492	7544	8362
Exclusions on demographic criteria	6832	5537	12492	4398	4845
<i>Of which</i> <i>Complex households</i>	1447	1285	5657	1195	1291
<i>Households including retired individuals</i>	5002	4497	9993	2709	3918
Exclusions on income/activity criteria	134	161	288	710	1025
<i>Of which</i> <i>Active children in the household</i>	114	75	91	293	56
<i>Inconsistencies individual income / activity status</i>	10	66	163	177	34
<i>Less than 12 months in the reference period</i>	0	17	0	83	902
<i>Negative disposable income</i>	10	3	34	157	33
Number of households in the population of reference	6121	4905	7712	2436	2492
% of total number of households	46.8	46.3	37.6	32.3	29.8
Individuals					
Population of reference	9687	8141	12835	3998	3848
<i>men</i>	4646	3953	6370	2032	1774
<i>women</i>	5041	4188	6465	1966	2074
% of the population aged 20-59	66.0	61.6	47.0	42.9	41.4
% of the 20-59, neither student nor retired	78.7	80.0	58.1	64.2	49.2

2 – Income definitions

Individual earned income (gross, period of reference) =

employees cash and near cash income + net profits of self-employment + unemployment benefits

Household disposable income (net, period of reference) =

sum of all the household members' gross individual earned incomes

+ gross income from rental of a property or land + gross interests, dividends, profit from capital investments in unincorporated business

+ income received by people aged under 16

+ regular inter-household cash transfers received - regular inter-household cash transfer paid

+ education-related allowances + family/children related allowances + housing allowances + other social benefits

+ survivor's benefits + sickness and disability benefits

- (social insurance contributions, tax on income and regular taxes on wealth)

3 – Decomposition of the Gini coefficient

This appendix refers mostly to:

- Koubi et al. (2005b), <http://www.cairn.info/revue-economie-et-prevision-2005-3-page-139.htm>

- Mussard S., F. Seyte and M. Terraza (2003), "Decomposition of Gini and the generalized entropy inequality measures, *Economics Bulletin*, 4(7): pp. 1–6. <http://www.accessecon.com/pubs/EB/2003/Volume4/EB-03D30001A.pdf>

The program used in the main text can be accessed online: <http://www.lameta.univ-montp1.fr/online/gini.html>

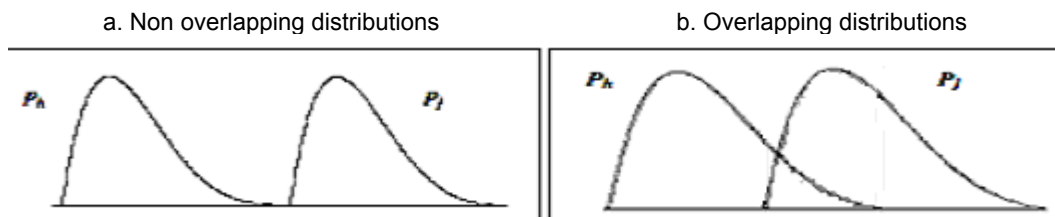
A list of thematic references can be found online: <http://www.lameta.univ-montp1.fr/online/articles/bibliographieUK.htm>

A short survey of the history of Gini decompositions can be found in Mussard S., M-N Alperin, F. Seyte and M. Terraza, *Extensions of Dagum's Gini decompositions, Statistica & Applicazioni Vol. IV, special issue n° 2, 2006.* http://chiara.eco.unibs.it/~stateap/vol4-nspec2/06Mussard_et_al_Extensions_of.pdf

The Gini coefficient is a measure of inequality of the distribution of income in a population. It can be computed on the basis of the Lorenz curve, which represents the cumulated shares of income received by cumulated shares of population; it corresponds to half the Gini mean difference (the average absolute difference between any pair of incomes). The value of the coefficient stays in the [0,1] interval: the closer to 1 the greater the inequality and concentration of the distribution (a value of 0 would correspond to an egalitarian distribution).

Usually, inequality indexes are decomposed as the sum of within groups inequality (Gw) and between groups inequality (Gb), this corresponding to the inequalities in means between the groups. Decomposing the Gini coefficient into within and between groups inequality then raises a special problem when the groups' distributions overlap (see figure b) because the Gini mean difference (computed between any pair of individuals from one and the other group) includes incomes differences of a sign opposite to that between the sub-group means, i.e.

$y_{ij} < y_{rh}$ and $\mu_j > \mu_h$ with y_{ij} (resp. y_{rh}) the income of individual i in population P_j (resp. individual r in population P_h) and μ_j (resp. μ_h) the mean income in P_j (resp. P_h).



Let's P a population with n income units, y_i the income of individual i , μ the mean income of the population.

The Gini coefficient can be written:
$$G = \frac{\sum_{i=1}^n \sum_{r=1}^n |y_i - y_r|}{2n^2 \mu}$$

It is decomposed into G_w , the contribution of inequality within each subgroup of population (the weighted mean of intra-group inequalities) and G_b , that of inequality between the subgroups (between pairs of subgroups when there are more than two subgroups): $G = G_w + G_b$.

Dagum's decomposition (Dagum, 1997) identifies G_b as a term of interaction and, referring to the notions of transvariation and gross and relative economic affluence, separates the contribution of the relative economic distance between the subgroups from that due to the overlapping of the distributions (the area where the income differences are of a sign opposite to that between the sub-group means): $G_b = G_{nb} + G_t$, with G_t the contribution of inequalities in the overlapping of the distributions.

- G_w , the contribution of inequality within subgroups is written:

$$G_w = \sum_{j=1}^k G_{jj} p_j s_j$$

with G_{jj} the Gini within P_j , $p_j = n_j/n$ the share of individuals in P_j and n_j the number of individuals in the subgroup P_j , $s_j = (n_j \mu_j)/(n \mu)$ the share of total income going to P_j and μ_j the mean income of P_j

$$G_{jj} = \frac{\sum_{i=1}^n \sum_{r=1}^n |y_{ij} - y_{rj}|}{2n_j^2 \mu_j}, \text{ with } y_{ij}, y_{rj} \text{ the incomes of individuals of } P_j.$$

- G_b , the total contribution of the inequality between subgroups P_j and P_h is written:

$$G_b = \sum_{j=2}^k \sum_{h=1}^{j-1} G_{jh} (p_j s_h + p_h s_j),$$

with G_{jh} the total inequality between P_j and P_h :
$$G_{jh} = \frac{\sum_{i=1}^{n_j} \sum_{r=1}^{n_h} |y_{ij} - y_{rh}|}{n_j n_h (\mu_j + \mu_h)}$$

- G_b is decomposed into net inequality (G_{nb}) and transvariation (G_t - due to the overlap of the distributions) using the notion of economic distance D_{jh} :

$$D_{jh} = \frac{\left(\sum_{y_{ji} < y_{hr}} (y_{rh} - y_{ij}) \right) - \left(\sum_{y_{ji} > y_{hr}} (y_{ij} - y_{rh}) \right)}{\sum_{i=1}^{n_j} \sum_{r=1}^{n_h} |y_{ij} - y_{rh}|}, \forall \mu_j, \mu_h$$

It is equal to 0 if the subgroups distributions are the same, equal to 1 if there is absolutely no overlap (as in figure a).

G_{nb} , the net contribution of between groups inequality is
$$G_{nb} = \sum_{j=2}^k \sum_{h=1}^{j-1} G_{jh} (p_j s_h + p_h s_j) \cdot D_{jh}$$

and G_t the transvariation term is
$$G_t = \sum_{j=2}^k \sum_{h=1}^{j-1} G_{jh} (p_j s_h + p_h s_j) \cdot (1 - D_{jh}).$$