
Wives' work and income distribution in European countries

Silvia Pasqua¹
Università di Torino
and
CHILD – Collegio Carlo Alberto

Abstract

Women's participation in the labour market varies substantially across Europe. While female participation rates are usually high in Northern countries, they decline as one moves South, where more traditional household models still predominate and women devote more time to domestic rather than to labour-market activities.

At the same time, income is more equally distributed in Northern than in Southern European countries.

This paper takes a cross-country approach to analyse the impact of wives' work on income distribution, using the last wave of the ECHP (European Community Household Panel) data set. Decompositions of inequality measures and counterfactual distributions are used to assess the impact of higher female employment rates on inequality in household income distribution.

The decomposition of inequality by household type shows that income in all the countries studied is distributed more equally among *dual-earner* than among *male-breadwinner* households. Since the percentage of *dual-earner* families is higher in Northern European countries, inequality is lower. Sub-group analysis also shows that *within-group* inequality is the main source of inequality in all countries concerned, while *between-groups* inequality has a lower impact.

Decomposition by sources of income reveals that, in European countries, women's earnings account for a lower proportion of overall inequality than men's earnings and that the impact of women's work on income distribution is mainly due to the "employment effect": wherever women work less, inequality in women's earnings distribution is higher, due to the higher number of zero values in the distribution. Moreover, analysis of inequality among working wives shows that female labour income is often distributed more equally where women's employment rate is higher.

Finally, counterfactual distributions are used to show that an increase in women's participation in the labour market can cause a decrease in household income distribution inequality.

JEL-Code: D3, J21

Keywords: Female employment, Inequality decomposition

¹ Dipartimento di Scienze Economiche e Finanziarie "G. Prato", Corso Unione Sovietica 218 - 10134 Torino - ITALY - Fax: +39-0116706062, e-mail: silvia.pasqua@unito.it

I would like to thank Stephen Jenkins, Daniela Del Boca, Elena Bardasi and Gian Paolo Gallizio for their useful comments and suggestions. Any errors are my own.

I benefited from the support of the EU/TMR LivinTaX Network (Contract Number ERBCHRXT980248).

1. Introduction

Over the course of the 20th century, increasing levels of education encouraged ever greater numbers of women to enter the labour market. In fact, female activity rates in all European countries have been increasing constantly since the 1960s, while male activity rates have gradually declined. Because female participation in the labour market persisted even during recession periods, women are no longer considered to make up the so-called “workers reserve” (Maruani, 2000), *i.e.* precarious workers taken on during periods of economic expansion or limited labour supply, but then fired during crises and recessions. Women are therefore becoming an increasingly important component of the labour force.

Even if female participation rates have increased throughout Europe, women’s employment rates still vary widely among the different countries. In the North, female participation is usually high, while in the South, women are still more involved in domestic activities and their employment rates are lower. This outcome derives from the different characteristics of the labour markets and the different social policies implemented (Del Boca and Pasqua, 2005; Del Boca, Pasqua and Pronzato, 2005).

However, since female earnings are becoming a more relevant share of total household income, it is interesting to analyse how they affect inequality in income distribution and whether they may help explain the differences in the inequality in household income distribution observed across European countries.

Few studies have been done on the effects of women’s work on household income distribution in a cross-countries perspective. This paper uses a cross-section approach to assess the impact of wives’ work on inequality in household income distribution in the European countries that are characterised by both different female employment rates and different levels of inequality in income distribution. A unique source of comparable data across European countries is used: the ECHP (European Community Household Panel), a dataset based on a homogeneous questionnaire and, therefore, particularly suitable for cross-countries analysis. The analysis is conducted using both decomposition of inequality in household income distribution by sources of income, by population sub-groups and by using counterfactual distributions. This is to take into account the different possible impacts of women’s earnings on household income distribution.

The paper is organised as follows: Section 2 presents a review of the literature; Section 3 discusses the focus of the paper and the main research questions, while Section 4 describes the dataset and sample selection; patterns of male and female employment rates and inequality measures are presented in Sections 5 and 6, in order to better characterise differences and similarities across European countries; Section 7 contains the analysis of the effect of women’s work on household income distribution by decomposing overall inequality by type of household, while in Section 8 the results of the decomposition by sources of income are presented. In Section 9, some counterfactual distributions are used to show the direction of changes in inequality when female participation in the labour market is assumed to increase. Conclusions follow.

2. Previous researches and results

The impact of women's work on income distribution has mainly been analysed by considering a single country in a period of time when a relevant increase in the female employment rate has been observed (Karloy and Burtless, 1995, for the U.S. between 1959 and 1989; Cancian and Reed, 1999, for the U.S. in the period 1968-1995; Del Boca and Pasqua, 2003, for Italy during the period 1977-1998; Amin and Da Vanzo, 2004, for Malaysia between 1976 and 1988).

Most of these studies use the decomposition of a measure of inequality by sources of income to measure the impact of the increase in women's participation in the labour market on household income distribution. By decomposing the measure of inequality by sources, in fact, it is possible to measure the proportion of overall inequality that can be explained by female labour income. The main finding of these researches is that women's work has an equalising impact on income distribution: despite the increase in inequality in men's earnings distribution and the increase in the correlation between spouses' labour income due to the increase in the percentage of women with positive earnings, women's work contributes little to overall inequality (Shaw, 1992; Blackburn and Bloom, 1994; Karloy and Burtless, 1995; Reed and Cancian, 2001; Pencavel, 2006) and it prevents inequality from being even higher (Cancian and Reed, 1999; Del Boca and Pasqua, 2003; Amin and DaVanzo, 2004; Aslaksen *et al.*, 2005).

Another possible way to assess the impact of women's work on household income distribution is by considering a "life-cycle stage analysis", that is, to analyse the impact of wives' work on income distribution by decomposing total inequality by sub-groups of households at different stages of their life-cycle (*i.e.* between marriage and childbearing, during childbearing and childrearing periods, when children are of school age). We know in fact that women's labour force participation in many countries varies substantially during the life-cycle, decreasing during childbearing and childrearing periods. Using this type of analysis, Lehrer and Nerlove (1984) found that the employment of wives in the U.S. tends to reduce inequality in household income distribution in all life-cycle periods. On the contrary, Amin (2003) for Malaysia found that the equalising effect is greater in the post-child-bearing period.

To determine the effect of women's work on income distribution, many researches have also used counterfactual distributions (Betson and van der Gaag, 1984; Cancian and Schoeni, 1998; Burtless, 1999; Cancian and Reed, 1999; Reed and Cancian, 2001; Del Boca and Pasqua, 2003; Amin, 2003; Amin and DaVanzo, 2004): inequality is measured under different assumption on women's employment rates or computed on total household income less women's earnings. The main result of these studies is that inequality in households' income distribution would be higher without women's earnings.

Few researches, on the contrary, make use of the decomposition of inequality measures by population sub-groups to assess the impact of women's work on inequality in household income distribution (Betson and van der Gaag, 1984).

Moreover, few studies have been done on the effects of women's work on household income distribution in a cross-countries perspective: Blackburn and Bloom (1994) examine the structure of income inequality in the U.S., Canada and Australia at various points during the 1980s while Cancian and Schoeni (1998) use the LIS

(Luxemburg Income Study) data set for ten different developed countries in the 1980s. Using decomposition of inequality by sources of income, they both found that wives' work always has an equalising impact on households' income distribution, despite the different inequality that characterises female and male earnings distributions, the different correlation between spouses' earnings and the different participation rates in the countries analysed.

3. Research questions

This paper uses a cross-section approach to study the impact of wives' work on inequality in household income distribution in the European countries that are characterised by both different female employment rates and different levels of inequality in income distribution.

A higher proportion of working women means a higher percentage of dual-earner families with respect to single-earner ones. Differences in inequality in the distribution of income *within* each of these sub-groups may affect the level of overall inequality. Moreover, we also need to take into account *between-groups* inequality: a greater between-groups inequality, in fact, entails a larger gap between the income of dual-earner and single-earner households. Women's work can reduce inequality in the sub-group of dual-earner households, but it can increase inequality between dual-earner and other types of households, with ambiguous effects on overall inequality.

What we expect is that the relationship between inequality and female employment is U-shaped: when female employment is low, the labour market is comprised of only highly-educated women who *want* to work, together with poorly-educated ones who *need* to work. Since *assortative mating* is relevant in most countries (Juhn and Murphy, 1997; Hyslop, 2001; Aslaksen *et al.* 2005), highly-educated women are usually married to highly-educated/high-income men while less-educated ones are married to less-educated/low-income men. As a consequence, women's work increases inequality in household income distribution. However, Juhn and Murphy (1997) show that in the U.S. the negative relationship between the husband's wage and the wife's likelihood to be employed found in the 1960s changed in the 1990s with wives married to men in the middle of the wage distribution working the most. Therefore, it seems that when women's participation is higher, women with a medium level of education are also employed, with an equalising impact on income distribution (Betson and van der Gaag, 1984; Bourguignon *et al.*, 2001). But a higher female employment rate may increase the correlation between spouses' earnings, with a negative impact on the inequality in household income distribution (Gronau, 1982; Cancian and Schoeni, 1998, Burtless, 1999). The final result depends on which effect prevails.

The equalising impact of women's earnings found in many studies seems to suggest that the turning point of the U-shaped curve showing the relationship between women's work and inequality occurs at low levels of female employment rate and therefore, in most of the countries, we are already beyond this turning point.

Here both decomposition by sources of income and decomposition by type of household are considered, as well as some counterfactual distributions useful for grasping the possible dynamic effects of an increase in female employment in low-female-participation countries.

This is only an accounting exercise that does not consider either the effect of wives' earnings on husbands' labour supply (spouses' behavioural interactions), or the relationship between male and female employment and earnings or marriage patterns (Cancian and Reed, 1999). Moreover, in the cross-countries analysis we do not consider that income distribution is affected by many different factors (fiscal policies, demographic factors, welfare system characteristics...) and therefore ours is only a partial analysis that does not intend to explain why inequality in income distribution differs across countries.

However, the results can give address to the possible effects of women's work on the distribution of household income and they seem to confirm the equalising impact of women's earnings already found in the longitudinal analyses.

4. Data and sample selection

To analyse the effect of women work on household income distribution in a cross-countries perspective, we use the ECHP (European Community Household Panel). The ECHP is a panel of eight annual waves (1994-2001) and includes fifteen European countries². Only the last wave has been used here since the panel is too short for a longitudinal analysis of income distribution.

The unit of analysis of the ECHP are the families and, within the households, all individuals older than 16. In almost every country the concept of family is based on the two criteria of the co-division of the house and on the common daily matters. The data set provides information on individual characteristics of all household members, on individuals' working status in the current year and in the year previous to the survey, and on the sources of household income in the year prior to the survey (Locatelli, Moscato and Pasqua, 2001). Therefore the data on income we use refers to the year 2000.

Some problems exist for item nonresponse to questions on income components. However, where possible, missing information on income have been imputed by Eurostat, but only for some of the income variables chosen according to the importance of the variable, the percentage of item nonresponse and the predictability of the variable in the statistical sense.

In Appendix A, Table A2 reports information on imputation for the income components relevant to this study. Even if the percentage of household for which a part of the income has been imputed is not negligible, Cheti and Peracchi (2001) show that, both for wages and salaries and for self-employment income, the impact of imputation on the estimates of earnings structure is not very important, and only for earnings dynamics it can cause some modifications in the tails of the distribution. Therefore the data we use seem to be reliable.

Some of the fifteen countries have been excluded for a variety of reasons: Luxembourg is excluded because it is too small a country, with a peculiar economic structure, while France and Finland are excluded from the analysis of the decomposition by sources of inequality in household income distribution because the dataset reports total income in net value, while labour incomes are reported in gross values.

² See Table A1 in Appendix A for samples' sizes.

To answer the question “does wives’ work have an equalising impact on income distribution?” the analysis should be done by using the sample of married or cohabitating couples in which women are of an appropriate working age (Karloy and Burtless, 1995; Cancian and Schoeni, 1998; Burtless, 1999; Reed and Cancian, 2001). Since retirement age and rules vary considerably across European countries, our sample includes only couples where the woman is aged between 24 and 56, in order to include in the analysis only couples where both spouses³ are potentially eligible for the labour force.

5. Wives’ and husbands’ participation in the labour market

In this section, data on married women and men’s participation in the labour market are presented. Data on men’s participation is useful for determining whether women tend to work more where men work less, or *vice versa*. In these two different cases, in fact, the effect of women’s work on income distribution may be different.

Table 1 reports the percentage of women aged 24-56 and their husbands who were employed in 2000⁴. We define an individual as “employed” when either she declared to be employed or she has positive labour incomes. It is worth noting that the employment rates so obtained differ from the official statistics reported by the Labour Force Survey because of the different definition of “employed person” used⁵.

From Table 1 we can divide European countries into three groups. In the first group, which includes Sweden, Denmark and Finland (all characterised by a Social-Democratic welfare regime, according to the definition given by Esping-Andersen, 1990) the percentage of working women is very high (more than 90%).

The second group includes countries with “middle” levels of female employment, where 60-80% of women work. Here we find the U.K., France, Belgium, the Netherlands, Germany, Portugal, Austria and Ireland. In the third group we have the countries with the lowest proportion of women working, below the Lisbon target of 60% set by the European Commission for the year 2010. This group includes all Southern European countries with the exception of Portugal.

This grouping has some similarities with the three-fold clustering of welfare states proposed by Esping-Andersen in 1990 and widely used to describe the relationships between states, labour markets, and families, and therefore also to analyse policies to reconcile women’s work and family responsibilities (Del Boca and Wetzels, 2008).

When we look at the husbands, the data show how the percentage of working men is lower in all Southern European countries (and in particular in Italy and Greece) with respect to the rest of Europe, but it is also not high in Austria and Germany.

3 We use the term “spouses” also for individuals living in consensual unions.

4 It is well known that the ECHP panel suffers from problems related to attrition that may reduce the representativeness of the sample used. However, results are not different when performed using other waves (see Pasqua, 2002).

5 The LFSs define as “employed” individuals who were working in a particular week of the year. Therefore, the employment rates they report are lower than those obtained with our elaborations.

Table 1 - Percentage of wives (24-56) and their husbands working in 2000

	Wives	Husbands
Sweden	92.1	94.0
Denmark	91.2	96.9
Finland	90.8	94.8
United Kingdom	81.4	92.3
France	76.2	92.2
Belgium	76.1	92.3
Netherlands	74.1	93.7
Germany	73.7	91.3
Portugal	66.6	91.7
Austria	63.9	89.3
Ireland	63.2	92.4
Spain	50.2	91.6
Italy	48.6	87.3
Greece	42.2	88.6

Note: Sample sizes are reported in Appendix A

Table 2 reports the activity status of non-working wives and husbands⁶. Where women work more we find higher percentages of unemployed women (Denmark, Finland, Belgium), while in countries where the female employment rates are lower most of the non-working women are inactive.

When we look at non-working men we find that in those countries in which men work less, the percentage of retired men is higher. In the case of Italy, for example, this is the consequence of industrial restructuring that, from the mid-1980s on, caused the loss of jobs for many men in their fifties, while people fired for redundancy were allowed to go into early retirement.

In Germany, on the contrary, 41% of non-working men are unemployed.

⁶ Information was obtained using the variable "most frequent activity status" in the year previous to the survey.

Table 2 Status of non-working wives (24-56) and non-working husbands in 2000 (*)

	Wives				Husbands			
	Unemployed	Retired	Inactive	N. obs.	Unemployed	Retired	Inactive	N. obs.
Denmark	28.4	23.4	48.2	82	25.9	40.8	33.3	27
Finland	21.4	16.1	62.5	112	24.1	70.7	5.2	58
United Kingdom	3.5	3.3	93.2	337	14.8	25.2	60.0	135
France	13.9	2.1	84.0	505	24.1	54.8	21.1	166
Belgium	21.0	2.7	76.3	219	32.4	39.2	27.0	71
Netherlands (**)	7.5	-	92.5	440	3.0	-	97.0	99
Germany	19.5	9.1	71.4	528	41.1	48.4	10.5	209
Portugal	8.8	8.6	82.6	685	15.7	67.2	17.1	140
Austria	3.9	4.8	91.3	332	16.0	80.2	3.8	106
Ireland	2.0	0.0	98.0	253	21.6	15.7	62.7	51
Spain	6.7	0.0	93.3	1,083	25.0	15.1	59.9	172
Italy	6.5	4.8	88.7	1,361	19.7	71.0	9.3	335
Greece	4.0	3.5	92.5	875	8.2	84.7	7.1	183

(*) Sweden has been excluded since the dataset does not contain the information on the most frequent activity status in the year previous to the survey and, given that the Swedish sample is not a panel, this information cannot be found in the previous wave.

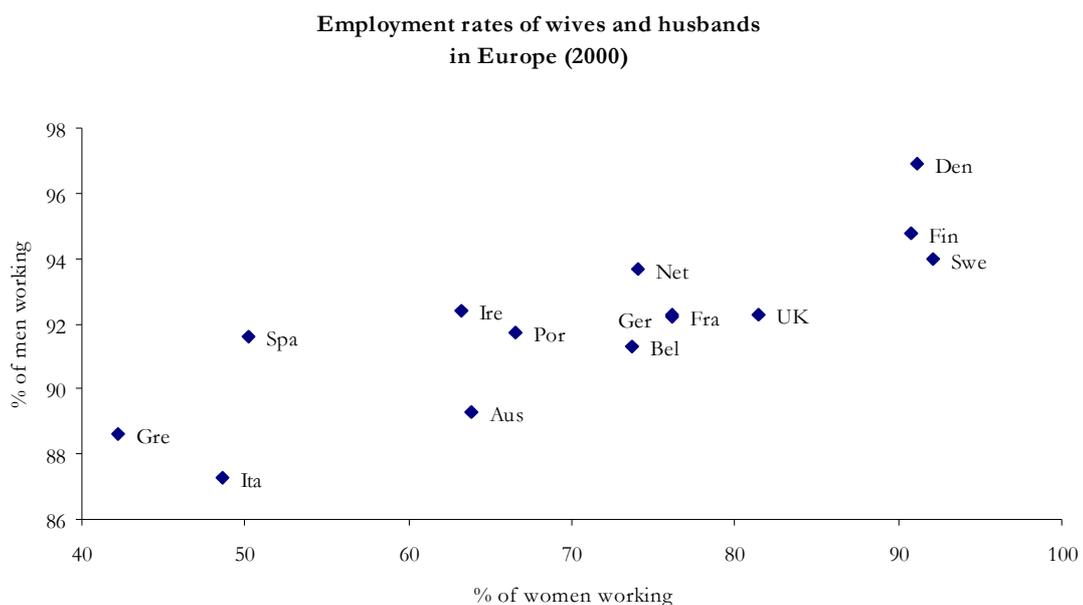
(**) For the Netherlands, the dataset does not contain the information on the most frequent activity status in the year previous to the survey and therefore information was taken from the previous wave. For the Netherlands, the category "Inactive" also includes retired people.

The comparison between the employment patterns of men and women shows that women do not seem to work more where men work less and, in fact, high percentages of male unemployment are found both where the female employment rate is low (in Ireland and Spain), and in Denmark, Finland, France, Belgium and Germany, where female employment is higher.

In Figure 1, men and women's employment rates are presented together: the proportion of women working is low where the men's employment rate is also low. This seems to confirm the absence of an *added worker effect* in European countries: women do not seem to work in order to compensate for the lack of work or income of their husbands.⁷

However, we have to take into account that the employment status of women may have different effects on household income depending on the "intensity" of labour supply. In many countries the percentage of women working part-time is in fact particularly high. According to Eurostat (2001), in 2000 41% of employed women in the Netherlands worked part-time, while more than 20% of women held a part-time job in the U.K., Denmark, Sweden and Belgium.

Figure 1



⁷ Pasqua (2003) tested the *added worker effect* hypothesis (the increase in the wife's participation in the labour market as a response to her husband's unemployment and low income) vs. the *discouraged worker effect* hypothesis (unemployed men's wives do not even try to find a job) in European countries and found no evidence of added worker effect in most of the countries. Prieto-Rodriguez and Rodriguez-Gutierrez (2003), on the contrary, found a weak added worker effect in Europe that, however, decreases with the age of the woman.

6. Income inequality in Europe

In this section, different measures of inequality in income distribution for the various countries are presented.

Many different measures can be used to evaluate inequality in income distribution. Sen (1973) classified measures of inequality in two main categories:

“[...] positive measures which make no explicit use of any concept of social welfare, [and] normative measures which are based on an explicit formulation of social welfare and the loss incurred from unequal distribution” (p. 24).

In this work, only positive measures are considered and, among them, only half of the squared coefficient of variation (I_2) and the Gini coefficient are computed. The Gini coefficient (see Appendix B, point *a*) is a quite commonly used index of inequality that measures the area enclosed by the Lorenz curve and the diagonal line of perfect equality. I_2 (see Appendix B, point *b*), on the other hand, has been chosen for this analysis because, as a member of the class of Generalised Entropy inequality indexes (with the Theil index and mean logarithmic deviation), can be decomposed both by population sub-groups and by sources of income (Shorrocks, 1982, 1984). Both measures can handle zero incomes.

These measures decrease if we redistribute income from a richer household to a poorer one, and therefore a lower value means lower inequality. However, the two measures differ in their sensitivity to income inequality in different parts of the distribution (Atkinson, 1972; Jenkins, 1991): I_2 is more sensitive to income differences at the top of the distribution, while the Gini coefficient is more sensitive to differences in the centre of the distribution. This is why we usually do not obtain a unique ranking when we use the two different indexes to compare inequality in different countries. However, in our case, as we can see from Table 3, the rankings do not change much.

In this section, inequality in income distribution is calculated using equivalent household cash income post-direct taxes and including transfers payments. The ECHP, in fact, provides for most of the countries' net incomes alone.⁸ Therefore, incomes considered include both labour and non-labour income of all household members and not only spouses' income. Data on income used are annual. Equivalent household net income has been calculated using the OECD scale, *i.e.* by dividing total household net income by the number of equivalent adults in the household.⁹

As in other studies (Karloy and Burtless, 1995; Burtless, 1999), here equivalent income has been preferred to total income because, according to Jenkins (1995a, p. 43), it “[...] provides a better feeling for differences in economic well-being.”

Cash income does not represent the best measure of individuals' and households' welfare because wages do not include non-cash benefits, particularly relevant for high-income groups (Atkinson, 1996). Furthermore, it excludes capital gains, home production, indirect taxes and housing costs. However, household

⁸ A coefficient for transforming net into gross values is provided, but it is quite imprecise since it is the same for all household members and for all the different sources of income.

⁹ The OECD scale assigns value one to the first adult in the household, 0.7 to other adults and 0.5 to children younger than 14.

disposable cash income corrected by household size (or by the number of equivalent adults, as in our case) has been mostly used in the literature on inequality as the best proxy to analyse income distribution (Buhman *et al.*, 1988; Bishop *et al.*, 1991; Jenkins, 1995a, 1996).

Finally, inequality has been computed on income distribution amongst individuals and not amongst households: each person has been attributed with the equivalised net household income of the family she belongs to (Karloy and Burtless, 1995; Jenkins, 1996; Burtless, 1999; Reed and Cancian, 2001). This means implicitly assuming that intra-household distribution is egalitarian (in fact, we are not interested here in the distribution of resources within the families).

Individuals belonging to the 1st and to the 99th centile groups of the distribution have been excluded to avoid the strong impact that outliers have on the value of I_2 , the measure of inequality used for the decomposition by type of households and by sources presented in the following sections.

Table 3 shows two different measures of inequality for annual equivalent household net income by first considering the whole sample in the data set and then only the sub-sample of individuals living in households in which both spouses are present and the wife is 24-56 years old. This to check if the countries' ranking changes when we restrict the sample to couples. Countries are ordered by increasing inequality measured by half of the squared coefficient of variation (I_2) for couples of working age (third column). As a further test of robustness of the ranking obtained in Table 3, Table A3 (in Appendix A) reports the values of other inequality measure (Theil entropy measure, CV and 90/10 ratio).

Table 3 - Inequality measures for annual equivalent household net income (2000)

	All individuals		Individuals living in households in which wife is 24-56			
	I_2	Gini coeff.	I_2	Gini coeff.	% of individuals living in households with income < 50% of average income	% of individuals living in households with income > 200% of average income
Denmark	0.073	0.208	0.055	0.182	2.1	0.6
Sweden	0.081	0.218	0.084	0.217	5.6	3.3
Germany	0.097	0.233	0.086	0.220	5.1	2.9
Belgium	0.108	0.242	0.087	0.222	6.9	2.5
Austria	0.103	0.241	0.090	0.229	6.3	3.3
Netherlands	0.101	0.242	0.090	0.228	6.0	3.2
Finland	0.110	0.243	0.094	0.224	5.8	3.1
Ireland	0.130	0.272	0.102	0.249	12.3	2.5
France	0.117	0.260	0.111	0.253	11.5	3.9
United Kingdom	0.148	0.287	0.121	0.265	12.0	5.2
Italy	0.138	0.285	0.133	0.283	14.8	5.0
Spain	0.152	0.293	0.147	0.290	15.1	5.6
Greece	0.167	0.308	0.153	0.296	16.5	5.7
Portugal	0.216	0.331	0.197	0.323	18.7	7.3

Note: Sample sizes are reported in Appendix A

In all countries (except Sweden, when inequality is measured using I_2) inequality calculated for all individuals in the data sets (columns 1 and 2) is greater than inequality calculated only for the sub-sample of households in which both spouses are present and of an appropriate working age (columns 3 and 4). This is quite obvious if we consider that the poorest households are generally those consisting of a single parent with children or of elderly people living mostly on pensions (Brandolini and D'Alessio, 2003).¹⁰ Given our sample selection, both these types of households are excluded from our sub-sample of columns 3-6. However, the relative positions of the countries do not change much. Ireland, the U.K., Belgium and Portugal are the countries with the greatest difference between inequality calculated for all individuals and inequality calculated only in the sub-sample of individuals living in households where the wife is between 24 and 56 years old.

Since we are interested in the relationship between female employment and inequality, we have to focus our attention on households where both spouses are present and of an appropriate working age. As we can see by comparing Table 3 with Table 1, there are some analogies when we rank the countries according to the percentage of working women and when we rank them according to the level of inequality in household income distribution. In Table 3, in fact, Denmark and Sweden again appear at the top: these countries are characterised by low inequality and high female employment rates. These are followed by Germany, Belgium, Austria, the Netherlands and Finland. When we move to Ireland, France and the U.K. inequality starts to be higher, while the more unequal countries are all Southern European countries, also characterised (with the only exception of Portugal) by lower female employment rates.

Atkinson (1996), and Smeeding and Grodner (2000) found similar results using the LIS (Luxembourg Income Study) data set. Nolan and Maitre (1999), and Deding and Schmidt (2002), using the ECHP data set, also found that inequality is lower in Scandinavian countries while it is higher in Southern European countries, in the U.K. and in Ireland.

In high inequality countries more than 12% of individuals live in households whose income is lower than half of the average income computed for individuals living in households where the wife is 24-56 years old (column 5, Table 3). In these countries (with the only exception of Ireland) we also find the highest percentages of individuals living in households with income that is more than twice the average value.

However, the last two columns of Table 3 indicate that countries seem to vary at the bottom of the income distribution much more than at the top: the differences between countries in the share of "poor" people are greater than the difference in the share of "wealthy" people.

In Figure 2, the percentage of working women and the level of inequality (measured by I_2) in the distribution of the annual equivalent household net income (computed for the sample of individuals living in households where both spouses are present and the wife is 24-56 years old) are plotted on the same diagram. As we can see, higher female employment rates appear to be associated with a more equal income distribution. Only Portugal seems to have a relatively high percentage of working

¹⁰ Johnson (1996) also found that inequality is higher when we consider total income rather than wages alone.

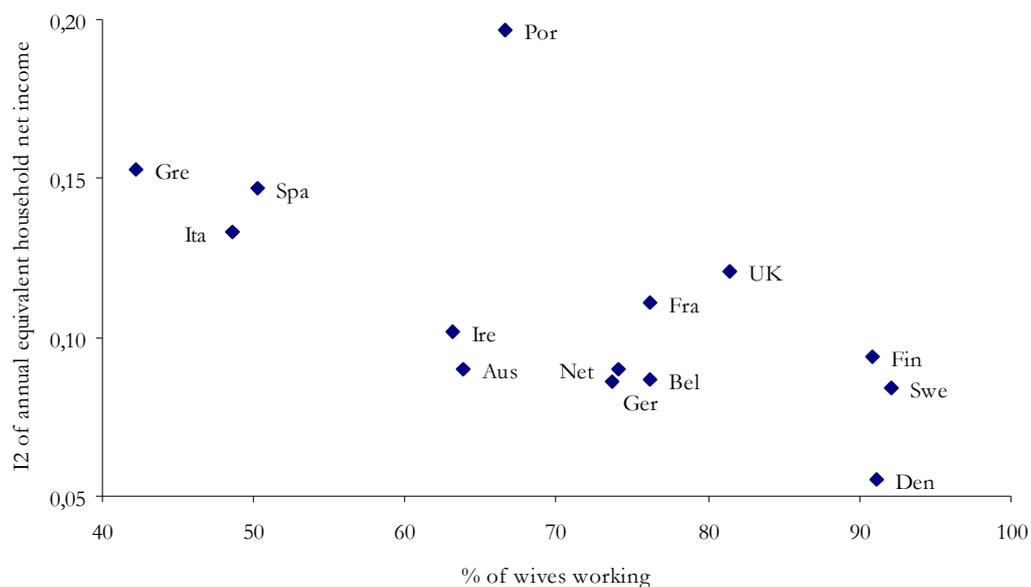
women and high inequality. If we exclude this country, the negative relation between female employment and inequality becomes even stronger.

The negative relationship observed in Figure 2 does not invalidate the hypothesis of a U-shaped relationship between inequality and women's work. This, in fact, can be the downward part of a U-shaped curve that has its turning point at a value of wives' employment rate lower than those observed for the European countries in the year 2000.

However, it is premature to conclude that women's work has an equalising impact on income distribution because this correlation does not prove the existence of a causal relationship between wives' employment and inequality in household income distribution. It is therefore necessary to investigate in depth how women's earnings contribute to overall inequality, by decomposing inequality measures by types of household and by sources of income, by understanding the role of correlation between spouses' earnings and by using counterfactual distributions. This will be done in the following sections.

Figure 2

Wives' work and inequality in annual equivalent household net income distribution among individuals in Europe (2000)



7. Decomposition of inequality by type of household

In order to better understand the impact of female employment on income distribution it is worth investigating how income is distributed among individuals living in different types of households, and in particular to compare income distribution within and between dual and single earner groups of households. A higher proportion of working women, in fact, leads to an increase in the percentage of dual-earner families with respect to single-earner ones. Differences in inequality in the distribution of income *within* each of these sub-groups may affect the level of overall inequality.

Moreover, we also need to take into account *between-groups* inequality: a greater between-groups inequality, in fact, entails a larger gap between the income of dual-earner and single-earner households. Higher women's employment can correspond to lower inequality in the sub-group of dual-earner households, but it can produce higher inequality between dual-earner and other types of households, with ambiguous effects on overall inequality.

When the wife works, some of the services provided by the housewife are bought on the market (typically cleaning and childcare) and therefore an accurate analysis should compare single earner households' income with dual-earner households' income net of the costs of these services. Unfortunately, no information is provided in the dataset concerning household expenses for cleaning and childcare, so this kind of analysis is not possible.

In this section, the sample of households in which the wife is 24-56 years old is divided into four mutually-exclusive groups: *dual earner* (DE) households, *male breadwinner* (MB) families, *female breadwinner* (FB) families and *no earners* households (NE). The female breadwinner and the no earners groups are very small in many countries and therefore the results for these groups of households should be taken with caution (in the table of the results these values are in italics).

If we consider different sub-groups of population, I_2 can be decomposed as the sum of *within-group* and *between-groups* inequalities. Moreover, we can compute "within each group" inequality. Appendix B (c) shows how within each group inequality depends on the population share belonging to that particular population sub-group (v_k), on the ratio between the average income of the group and the average income of the whole population (λ_k) and on the level of inequality that characterises the distribution of income in that particular sub-group (I_{2k}).

Table 4 shows the results of this decomposition. In the first part of the table, I_2 for each sub-group are presented with the corresponding asymptotic standard error computed using bootstrap technique with 1000 replications (Cowell, 1989).

In all countries but Sweden, Denmark and Finland income is distributed more equally in the sub-group of individuals living in dual-earner households than in the sub-group of individuals living in male breadwinner ones or in female breadwinner households.

Moreover, the analysis of Table 4 shows important analogies between countries with similar levels of inequality.

In low inequality countries, in fact, income is distributed equally among individuals living in all types of households, while when we move to middle-inequality countries (in particular Germany, Belgium and the Netherlands), we observe that inequality is lower among DE households than among MB, FB and NE households. However, in these countries individuals living in dual-earner families are the majority of the population (66% in Germany, 73% in Belgium and 70% in the Netherlands) and therefore inequality is not too high. Ireland, France and the U.K., on the contrary, show a much greater difference between inequality measured in the sub-group of DE households and inequality measured in the group of MB ones. But again, given the prevalence in the population of individuals living in dual earners families (57% in Ireland, 70% in France and 75% in the U.K.), inequality is lower than in the countries where women work less. In fact, in Italy, Spain and Greece where MB households represent the highest percentage of the sample, inequality is high.

It is worth noting that, when compared to the other high-inequality countries, Italy is characterised by the lowest inequality among DE households, with a value of I_2 close to that found for the countries characterised by lower inequality.

In Portugal, we find the highest value of I_2 in all population sub-groups.

Not much can be said about the contribution of FB and NE households to total inequality, since in almost all countries the groups are too small to produce significant results.

Within-group inequality dominates *between-groups* inequality and the latter explains more than 10% of overall inequality only in high-inequality countries (and Austria). In particular, between-groups inequality represents almost 20% of overall inequality in Italy and 15% in Spain and in Greece.

It is also possible to compare population shares with the corresponding income shares for the different population sub-groups. In the high-inequality countries DE households represent a portion of the population lower than the portion of income received while the opposite is true for MB households: in Italy, DE represent 41.4% of the population but 52.4% of total income, while MB households are 46.1% of the population and only 36.6% of income; analogously, in Spain MB are 48.3% of the population and receive 39.8% of total income, while DE families represent 42.9% of the sample and obtain 53.3% of total income; also in Greece and Portugal, population shares and income shares differ for about 10 percentage points in favour of dual earner household.

The decomposition of inequality by types of household seems, therefore, to indicate that higher percentages of working wives, corresponding to higher percentages of dual earner families, reflect into lower inequality in household income distribution, since income is usually distributed more equally among DE than among MB families groups.

Table 4 - Decomposition of inequality by type of household – annual equivalent household net income (*)

	Denmark	Sweden	Germany	Belgium	Netherlands	Austria	Finland	Ireland	France	United Kingdom	Italy	Spain	Greece	Portugal
I ₂ total	0.055	0.084	0.086	0.087	0.090	0.090	0.094	0.102	0.111	0.121	0.133	0.147	0.153	0.197
I₂														
Dual earner (DE) (std. error)	0.053 (.0025)	0.078 (.0030)	0.073 (.0027)	0.072 (.0045)	0.077 (.0027)	0.067 (.0039)	0.088 (.0055)	0.073 (.0052)	0.085 (.0031)	0.099 (.0039)	0.074 (.0034)	0.114 (.0054)	0.097 (.0058)	0.151 (.0073)
Male breadwinner (MB) (std. error)	0.044 (.0088)	0.077 (.0136)	0.088 (.0085)	0.107 (.0120)	0.099 (.0073)	0.087 (.0871)	0.079 (.0182)	0.130 (.0130)	0.156 (.0136)	0.140 (.0157)	0.147 (.0074)	0.120 (.0063)	0.167 (.0100)	0.225 (.0197)
Female breadwinner (FB) (std. error)	<i>0.046</i> (.0122)	<i>0.097</i> (.0157)	<i>0.137</i> (.0190)	<i>0.097</i> (.0229)	<i>0.134</i> (.0244)	<i>0.142</i> (.0287)	<i>0.105</i> (.0188)	<i>0.087</i> (.0216)	0.175 (.0214)	<i>0.147</i> (.0202)	0.138 (.0155)	<i>0.117</i> (.0165)	<i>0.182</i> (.0292)	<i>0.280</i> (.0389)
No earners (NE) (std. error)	<i>0.012</i> (.0031)	<i>0.041</i> (.0076)	<i>0.098</i> (.0296)	<i>0.164</i> (.0415)	<i>0.098</i> (.0173)	0.141 (.0546)	<i>0.147</i> (.0636)	<i>0.115</i> (.0285)	<i>0.230</i> (.0420)	<i>0.197</i> (.0693)	0.162 (.0187)	0.228 (.0323)	0.142 (.0163)	<i>0.203</i> (.0283)
Population share (%)														
Dual earner	89.3	88.1	66.0	73.2	69.8	54.9	86.3	57.3	70.4	75.2	41.4	42.9	38.0	59.6
Male breadwinner	7.9	6.4	26.4	19.8	24.8	35.8	9.0	35.2	22.9	17.0	46.1	48.3	51.8	31.9
Female breadwinner	1.7	3.6	4.6	3.2	2.9	5.4	3.5	3.1	3.6	3.7	5.2	3.9	4.1	4.3
No earners	1.1	1.8	3.0	3.8	2.5	3.9	1.2	4.4	3.1	4.1	7.3	4.9	6.1	4.2
Income share (%)														
Dual earner	91.3	91.1	71.0	78.3	75.0	62.2	89.7	63.6	76.7	82.0	52.4	53.3	48.0	69.6
Male breadwinner	6.6	4.8	22.7	17.0	20.5	29.5	6.6	31.5	17.6	13.2	36.6	39.8	42.8	23.3
Female breadwinner	1.3	3.1	4.3	2.4	2.7	5.4	2.8	2.7	3.4	2.7	5.4	3.4	4.2	3.9
No earners	0.8	1.0	2.0	2.3	1.8	2.9	0.9	2.2	2.3	2.1	5.6	3.5	5.0	3.2
Within-group inequality	0.053	0.079	0.080	0.079	0.083	0.079	0.089	0.091	0.101	0.107	0.106	0.125	0.131	0.176
Between-group inequality	0.002	0.005	0.006	0.008	0.007	0.011	0.005	0.011	0.010	0.014	0.026	0.022	0.022	0.021

(*) Standard errors have been computed using bootstrap technique (with 1000 replications)

Notes: Values in *italics* when the sub-group is too small (less than 100 households)

Sample sizes are reported in Appendix A

8. Decomposition of inequality by sources of income

In order to isolate the effect of women's earnings on overall inequality, we can decompose I_2 also by sources of income. In fact, inequality in household income distribution is affected by how equally each source of household income is distributed. Each source's contribution to overall inequality depends on three factors: the level of inequality that characterises the distribution of that particular source (I_{2s}), the correlation between the source and total income (ρ_i) and the relative factor share (χ_s).¹¹

In this analysis, three sources of income are considered: husband's earnings, wife's earnings and a residual category, "other sources," that includes both labour income of other family members (children, parents, etc.) and non-labour incomes of both spouses and of other household members (capital income, social benefits, pensions, etc.). Here the annual total net income is used instead of the annual equivalent household net income used before, because measures of inequality for husbands or wives' "equivalent" earnings are not very significant and interpretable.

The results of the decomposition by sources of income are presented in Table 5. France and Finland have been excluded from this analysis since the dataset reports total household income in net value while labour earnings are in gross values, and therefore it is not possible to compute the value of "other sources".

In the first part of the table, inequality measures for each source, factor shares, correlations between the different sources of income and total income and correlation between husband's and wife's earnings are reported, while the last part of the table summarises the proportion of households for which each source of income has a non-zero value and, for every source, the inequality in the sub-groups of those with positive values. Inequality for one source of income, in fact, can be high because of the presence of many zero values in the distributions¹² and this is particularly relevant for women's earnings in those countries where the proportion of working women is low. It is therefore important to isolate the "effect of employment" from the effect of inequality in the distribution of earnings among working people. In our case, this is also relevant in order to compare the inequality between currently working women and men's earnings distributions.

From Table 5 we can again conclude that some similarities exist among countries with similar levels of inequality.

In Denmark, a low-inequality/high-female-employment-rate country, both men's and women's earnings are distributed fairly equally. This probably compensates the increasing-inequality effect of the high correlation between spouses' earnings.

Here it is mainly men's earnings that explain inequality because they represent a higher proportion of total household income and they are highly correlated with total household income. Other sources of income contribute little to inequality because, even though they are more unequally distributed than labour incomes, they do not represent on average a large proportion of total household income and they are weakly correlated with total income.

¹¹ See Appendix B, (d).

¹² As in Betson and van der Gaag (1984), in Cancian et al. (1992) and in Karloy and Burtless (1995).

When we move to the group of middle-inequality countries, I_2 for wives' earnings starts to increase, especially in the countries where wives' employment rate is lower: where the female employment rate is lower, in fact, there are more zero values in the distribution of wives' earnings and the value of I_2 increases. And, indeed, if we look at the values of I_2 for only the recipients, they are much lower. In Ireland and in Austria (characterised by the lowest rate of female employment within this group of countries) the "employment effect" is more evident.

However, in middle-inequality countries the contribution of women's earnings to overall inequality is lower than in Denmark because female labour income represents a lower portion of total household income. The role of the income share of women's earnings in explaining total inequality appears also when we note that in the group of middle-inequality countries the lowest portions of overall inequality explained by women's labour income are found in Austria and Ireland, the countries in the group with the lowest female employment rates.

We should, however, take into account that the share of household income earned by the wife depends strongly on the "intensity" of labour supply (gender wage gap and part-time jobs may in fact reduce women's contribution to household income).

If we look at correlation between spouses' earnings, we find that it is negative in Germany and the Netherlands (and in Ireland, but the absolute value is very small). In the Netherlands this can be explained by the high percentage of Dutch women working part-time, and it is probably due to the fact that wives of men with higher labour incomes are more likely to work part-time, and therefore to have lower earnings. On the contrary, the correlation between spouses' income is particularly high in Sweden. However, in Sweden inequality is kept low by the low value of I_2 computed on all wives, that is, by the "employment" effect.

If we look at Southern European countries (excluding Portugal) where inequality is high and female participation is low, I_2 s of wives' earnings are very high. But when we consider only working women, the values of the I_2 s decrease dramatically. Italy, for example, is the only country among those considered in which inequality in working wives' earnings distribution is even lower than inequality in husbands' earnings distribution.

In this group of countries women's labour income explains a relatively high proportion of overall inequality, but always less than husbands' earnings, since again women's earnings represent only a small portion of total income (around 20%).

The situation of Portugal is different from that of the other high-inequality countries since here the female employment rate is relatively high and the contribution of wives' earnings to total household income is close to 30%. As a consequence, the share of total inequality explained by wives' labour incomes is the highest among the all the countries considered.

Moreover, in Portugal we find the highest coefficient of correlation between spouses' earnings, and this contributes to explain the high level of inequality.

Table 5 - Decomposition of inequality by sources of income – total household net income

	Denmark	Netherlands	Sweden	Germany	Belgium	Austria	United Kingdom	Ireland	Italy	Spain	Greece	Portugal
I ₂ total	0.044	0.061	0.065	0.068	0.083	0.090	0.093	0.100	0.125	0.143	0.145	0.177
I₂ factors:												
Husband's earnings	0.106	0.125	0.196	0.190	0.170	0.180	0.189	0.212	0.225	0.209	0.256	0.291
Wife's earnings	0.148	0.459	0.217	0.457	0.370	0.571	0.382	0.666	0.772	1.002	1.072	0.685
Other sources	0.705	1.063	0.458	0.632	0.680	0.605	0.969	0.897	1.432	1.459	1.223	1.177
% contribution to total household income (χ_s):												
Husband's earnings	51.3	62.4	47.6	56.1	52.9	50.1	55.2	56.2	56.5	59.4	58.5	50.2
Wife's earnings	34.5	24.3	30.8	24.0	27.4	19.5	27.3	19.2	22.0	20.3	19.4	27.5
Other sources	14.2	13.3	21.6	19.9	19.7	30.4	17.5	24.6	21.5	20.2	22.1	22.3
Correlation between sources of income and total income (ρ_s):												
Husband / total	0.774	0.678	0.773	0.670	0.677	0.541	0.709	0.648	0.552	0.637	0.621	0.689
Wife / total	0.510	0.470	0.553	0.359	0.525	0.389	0.495	0.316	0.506	0.538	0.525	0.654
Other / total	0.111	0.148	0.092	0.246	0.323	0.537	0.301	0.428	0.420	0.394	0.373	0.354
Wife/Husband	0.166	-0.079	0.247	-0.169	0.051	0.040	0.066	-0.003	0.055	0.136	0.059	0.314
% of I₂ (c_s*100) due to:												
Husband's earnings	61.5	60.5	63.8	62.8	51.3	38.5	55.7	52.9	41.8	45.7	48.4	44.3
Wife's earnings	31.2	31.2	30.9	22.3	30.5	19.1	27.3	15.7	27.6	28.9	27.7	35.3
Other sources	6.3	8.3	5.3	14.9	18.2	42.4	17.0	31.4	30.6	25.4	23.9	20.4
% with non-zero values of:												
Husband's earnings	96.9	93.7	94.0	91.3	92.3	89.3	92.3	92.4	87.3	91.6	88.6	91.7
Wife's earnings	91.2	74.1	92.1	73.7	76.1	63.9	81.4	63.2	48.6	50.2	42.2	66.6
Other sources	90.6	87.1	98.3	98.8	90.8	94.6	91.6	96.4	54.3	94.4	56.8	86.4
I₂ for non-zero values of:												
Husband's earnings	0.087	0.085	0.154	0.130	0.118	0.108	0.136	0.158	0.132	0.149	0.170	0.225
Wife's earnings	0.091	0.210	0.160	0.205	0.162	0.184	0.218	0.236	0.118	0.254	0.178	0.289
Other sources	0.591	0.860	0.441	0.618	0.570	0.559	0.845	0.846	0.549	1.348	0.479	0.949

Note: Sample sizes are reported in Appendix A

The previous analysis shows that in all high-inequality countries I_2 of women's earnings is high, but this is mainly due to the presence of many zero values in the distribution. However, when we compute the contribution of wives' earnings in explaining overall inequality, this does not seem to be systematically higher in low-female-employment countries with respect to high-female-employment ones because in low-female-employment countries women's earnings represent a lower share of total household income. Therefore, in assessing the impact of women's work on income distribution, we should consider more the "employment effect" rather than the percentage contribution of wives' earnings to total inequality

Moreover, we can observe that I_2 of women's earnings amongst recipients is generally lower in those countries where female employment rates are higher and *vice versa*. This is probably due to the different individual characteristics of working and non-working women in different countries and to the different incidences of part-time. As already mentioned, where female participation is low, in fact, we find in the labour market either highly-educated women (who want to work) or less-educated ones (who need to work). When women's participation is higher, even women with a medium level of education enter the labour market¹³ and this makes the distribution of female earnings less unequal. However, where many women work part-time (in the Netherlands and U.K.) the level of inequality in working women's earnings distribution can result higher.

9. Counterfactual income distributions

Counterfactual distributions are usually used to show the effects on overall inequality of changes in employment rates, population sub-group composition, and inequality in the distribution of a particular source of income.

The decomposition of inequality measures of the previous sections is static and therefore counterfactual distributions can help to figure out the possible dynamic effects of an increase in female employment in low-female-participation countries. If the results of the static analysis are confirmed, we expect counterfactual income distributions obtained under the assumption of more women working to be more equal than actual distributions.

However, this kind of analysis cannot give conclusive answers since it does not take into account changes in behaviour (Aslaksen *et al.*, 2005). In our case, for example, if we assume that all women start to work we can compute overall inequality in the counterfactual distribution by substituting I_2 of women's earnings with the same value of I_2 computed on women's earnings after excluding zeros (as in Counterfactual 2 in Table 6) and by correcting the share of household income earned by women. What we obtain is an income distribution that does not exist, and that never will. In fact, even if all women started to work, the husbands' labour supply would probably change. Moreover, to impute to all women's earnings the same level of inequality as that of currently working ones means implicitly assuming that inequality in the distribution of women's earnings would not change if all women entered the labour market. This entails the assumption that the distribution of the characteristics is the same between

13 Juhn and Murphy (1997) observe that middle-class women's participation in the labour market increased in the U.S. between 1969 and 1989.

working and non-working women. Therefore, the inequality level obtained in this counterfactual distribution cannot be considered as the value that could be reached if all women start to work. However, it can be useful in indicating the direction of inequality movements due to an increase in women's employment.

In this section, four counterfactual distributions are assumed and, for all of them, I_2 of total household net income is computed and compared with the *actual* value of I_2 . Table 6 reports the results obtained.

Counterfactual 1 – no women work

In this counterfactual distribution we assume that no women work and therefore we compute the inequality measure on total household income minus wives' labour income. This type of counterfactual distribution has been widely used in the literature to assess the impact of women's wages on household income distribution.¹⁴ Results are reported in the second column of Table 6 and they show that inequality increases in all countries when we assume that women do not work, but it increases more in those countries where female participation is higher. Therefore, we can conclude that income distribution would be more unequal in all countries if no women worked.

Counterfactual 2 – all women work

If we assume that all women work, when we calculate overall inequality¹⁵ we have to use I_2 as found on working women's earnings (computed excluding zeros) rather than I_2 computed for all women's earnings. Moreover, since the increase in women's employment rate increases both the average income earned by women and the average total household income, we have to compute the new wives' contribution to total household income under the assumption that the newly-employed wives earn on average the same labour income as the wives already employed. This value has to be substituted to the actual χ_i value when computing I_2 for this counterfactual distribution.

The third column of Table 6 shows that, under this assumption, inequality decreases in all countries and particularly in Italy (-40.8%), Greece (-38.6%) and in Spain (-38.6%), while it decreases less in Portugal (-23.7%), where the percentage of working women is higher.

Counterfactual 3 – lowest inequality in the distribution of women's earnings in all countries

In column four, Table 6, I_2 is computed under the assumption that inequality in the distribution of wives' earnings in all countries takes the value that we found for Denmark (the lowest in Europe, see Table 5). Once again, inequality decreases more in high-inequality countries (-33.9% in Portugal, -32.2% in Spain, -31.7% in Greece, and -28.8% in Italy) with respect to the low-inequality/high-female employment ones (-13.2% in Sweden, -17.6% in Germany).

In the fifth column not only is I_2 calculated for all countries using the I_2 of Danish women, but also the value of the correlation between wives' earnings and total income for all countries is set equal to the value found for Denmark.

14 Betson and van der Gaag, 1984; Cancian and Reed, 1998 and 1999; Del Boca and Pasqua, 2003; Amin and Da Vanzo, 2204.

15 Following the equations in Appendix B, (d).

Under this further assumption, inequality in highly unequal countries decreases even more, reaching -40% in Portugal.

Counterfactual 4 - highest inequality in women's earnings distribution in all countries

If we assume that wives' earnings in all countries are distributed as unequally as in Greece¹⁶ (where women's labour income, according to Table 5, shows the highest value of I_2), we obtain an increase in inequality in all countries. Obviously, the increase is greater where the actual value of I_2 for women's earnings is lower: in Denmark, for example, we have an increase of 138.6% in the value of I_2 for total household income, +82.4% in Sweden.

When we also impute to all countries the same coefficient of correlation between women's earnings and total income found in Greece (last column), inequality increases even more in most of the countries. Exceptions are Sweden, Spain and Portugal, where, in fact, the value of the correlation between wives' earnings and total households' income is higher than in Greece.

Taken all together, these simulations seem to confirm in a more dynamic sense the results obtained in the static analysis of the previous sections: increases in female employment rates may reduce inequality in household income distribution.

Using analogous techniques, Cancian and Reed (1999) for the U.S. and Amin and Da Vanzo (2004) for Malaysia found a small equalising effect of women's earnings.

Table 6 - Inequality in counterfactual distributions – I_2 of total household net income

	True	Counterfactual 1	Counterfactual 2	Counterfactual 3		Counterfactual 4	
		No women work	All women work	I_2 of wives as in Denmark	I_2 of wives and correlation as in Denmark	I_2 of wives as in Greece	I_2 of wives and correlation as in Greece
Denmark	0.044	0.076	0.038	0.044	0.044	0.105	0.109
Netherlands	0.061	0.085	0.049	0.046	0.047	0.083	0.091
Sweden	0.068	0.094	0.059	0.059	0.056	0.124	0.118
Germany	0.068	0.110	0.055	0.056	0.062	0.085	0.111
Belgium	0.083	0.114	0.065	0.065	0.064	0.122	0.122
Austria	0.090	0.119	0.070	0.074	0.079	0.103	0.121
U.K.	0.093	0.134	0.079	0.075	0.076	0.131	0.137
Ireland	0.100	0.142	0.080	0.085	0.093	0.109	0.138
Italy	0.125	0.147	0.074	0.089	0.089	0.138	0.141
Spain	0.143	0.160	0.099	0.097	0.095	0.146	0.144
Greece	0.145	0.156	0.089	0.099	0.098	0.145	0.145
Portugal	0.177	0.196	0.135	0.117	0.106	0.210	0.178

¹⁶ In computing I_2 for total income, the I_2 value of women has been set in all countries equal to the value found for Greece.

10. Conclusions

In Europe, figures of women's participation in the labour market and of inequality in income distribution are not very homogeneous: countries with high percentages of working women (typically Northern countries) coexist with countries characterised by low female participation (usually in the South). At the same time, we have low-inequality countries (all in Northern Europe) and countries where the distribution is more unequal. These are again mainly Southern European countries. As a consequence, cross-country analysis offers the opportunity to investigate if there is any relationship between women's work and inequality in household income distribution.

In this paper the effect of wives' work on income distribution has been investigated from different points of view in a cross-country analysis, using the last wave of the European Community Household Panel.

First, overall inequality has been decomposed by type of household (dual earner, male breadwinner, female breadwinner and other type of households) to ascertain whether a higher share of working women, and therefore a higher share of dual-earner households in the population with respect to male breadwinner households, produces lower inequality in income distribution.

Results indicate that in almost all the countries, income is distributed more equally among individuals living in dual earner families than among individuals living in male breadwinner ones and therefore where DE families represent a higher percentage of population inequality is lower. Furthermore, *between-groups* inequality generally accounts for a higher portion of overall inequality in high-inequality countries.

Then, decomposition by source of income has been used to measure the contribution of wives' earnings to overall inequality. This contribution does not seem to be higher in low-female employment countries with respect to high-female employment ones. However, an "employment effect" seems to emerge since inequality in wives' earnings distribution is greater where fewer women work due to the presence of more zero values in the distribution. The equalising tendency of wives' earnings emerges despite the relevance in some countries of the assortative mating effect that produces high correlation between spouses' earnings and that has been emphasized as potential source of increasing inequality.

Finally, counterfactual distributions have been used to analyse the possible effects on income distribution of changes in wives' employment rates. Results indicate that if women did not work, inequality would be higher, while increases in female employment rates may reduce inequality in household income distribution.

These results, all together, seem to indicate that more women employed corresponds to lower inequality in income distribution.¹⁷ Similar results were found for the U.S. by Betson and van der Gaar (1984), Cancian *et al.* (1992), Cancian and Reed (1998) and Lehrer (2000), for Norway by Aslaksen *et al.* (2005), by Del Boca and Pasqua (2003) for Italy.

17 Results are not different when performed using other waves of the ECHP dataset (in Pasqua 2002 the wave referred to 1995 is used. Results for 1998 are available upon request).

Appendix A

Table A1 - ECHP data set - Sample sizes (wave 8 - 2001)

	All households	Couples in which wife is 24-56
Austria	2,483	1,078
Belgium	2,276	985
Denmark	2,234	936
Finland	3,042	1,288
France	5,163	2,299
Germany	5,366	2,476
Greece	3,818	1,804
Ireland	1,723	723
Italy	5,414	2,788
Netherlands	4,728	2,136
Portugal	4,498	2,052
Spain	4,850	2,270
Sweden	4,984	2,286
U.K.	4,654	1,827

Table A2 - ECHP data set – % of households for which income has been imputed (wave 8 – 2001)

	Total income					Wages and salaries					Self-employment earnings				
	No income imputed	Less than 30% of income imputed	Between 30% and 50% of income imputed	Between 50% and 80% of income imputed	Between 80% and 100% of income imputed	No income imputed	Less than 30% of income imputed	Between 30% and 50% of income imputed	Between 50% and 80% of income imputed	Between 80% and 100% of income imputed	No income imputed	Less than 30% of income imputed	Between 30% and 50% of income imputed	Between 50% and 80% of income imputed	Between 80% and 100% of income imputed
Austria	80.6	16.2	1.9	0.5	0.8	88.8	11.1	0.1	-	-	95.0	0.1	0.1	0.2	4.6
Belgium	80.7	17.1	1.6	0.3	0.3	91.9	8.8	0.1	-	-	96.3	-	0.1	0.3	3.5
Denmark	87.8	11.6	0.4	0.1	0.1	96.3	3.6	0.1	-	-	99.2	-	0.1	-	0.7
Finland	99.3	0.6	0.1	-	-	100	-	-	-	-	100	-	-	-	-
France	89.9	9.5	0.3	0.2	0.1	99.7	0.3	-	-	-	99.6	-	-	-	0.4
Germany	87.2	12.2	0.5	0.1	-	95.8	4.0	0.1	0.1	-	99.6	-	-	-	0.4
Greece	85.3	6.5	2.4	2.3	3.5	99.2	0.7	0.1	-	-	88.9	0.6	1.0	0.5	9.0
Ireland	93.1	4.4	1.7	0.4	0.4	100	-	-	-	-	98.1	0.1	-	-	1.8
Italy	79.1	13.6	2.4	1.9	3.0	95.1	4.9	-	-	-	90.6	0.5	0.4	0.4	8.1
Netherlands	94.8	3.8	0.8	0.3	0.3	99.9	0.1	-	-	-	99.2	-	-	0.1	0.7
Portugal	86.4	8.9	1.6	2.0	1.1	97.4	2.6	-	-	-	93.1	0.3	0.5	0.3	5.8
Spain	87.1	6.7	1.8	1.9	2.5	100	-	-	-	-	91.7	0.1	0.3	0.2	7.7
Sweden	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
U.K.	96.8	2.0	0.8	0.4	-	100	-	-	-	-	100	-	-	-	-

Table A3 - Inequality measures for annual equivalent household net income (2000)

	All individuals			Individuals living in households in which wife is 24-56		
	Theil entropy measure	CV	90/10 ratio	Theil entropy measure	CV	90/10 ratio
Denmark	0.070	0.383	2.85	0.052	0.331	2.43
Sweden	0.077	0.403	2.86	0.077	0.409	2.84
Germany	0.089	0.440	3.09	0.079	0.415	2.85
Belgium	0.096	0.464	3.30	0.080	0.417	3.04
Austria	0.095	0.453	3.28	0.085	0.425	3.00
Netherlands	0.094	0.449	3.13	0.084	0.425	3.02
Finland	0.099	0.470	3.21	0.083	0.434	2.87
Ireland	0.119	0.509	4.06	0.099	0.453	3.81
France	0.109	0.484	3.73	0.102	0.472	3.47
United Kingdom	0.135	0.544	4.13	0.113	0.492	3.69
Italy	0.132	0.526	4.01	0.128	0.515	4.25
Spain	0.139	0.552	4.23	0.136	0.541	4.38
Greece	0.152	0.578	5.02	0.140	0.553	4.48
Portugal	0.182	0.658	4.93	0.172	0.627	4.91

Appendix B

In this appendix we present the formulas of the inequality indexes used and how I_2 can be decomposed by types of households and by sources of income.

(A) *The Gini coefficient* for distribution of household incomes (y_i) over n families (where $i = 1, \dots, n$) can be expressed as:

$$G = \frac{1}{2n^2\mu} \sum_{i=1}^n \sum_{j=1}^n |y_i - y_j|$$

where μ is the average income. The Gini coefficient is therefore exactly one-half of the arithmetic average of the absolute values of differences between all pairs of incomes (Sen, 1973).

(B) *Half of the squared coefficient of variation* (I_2) is given by:

$$I_2 = \frac{1}{2} \left(\frac{\frac{1}{n} \sum_{i=1}^n (y_i - \mu)^2}{\mu} \right) = \frac{\sigma^2}{2\mu^2}$$

where σ^2 is the variance of y_i .

(C) *Decomposition of I_2 by types of household*: if we consider K ($k = 1, \dots, K$) sub-groups of population, I_2 can be decomposed as the sum of *within-group* (I_{2W}) and *between-groups* (I_{2B}) inequalities:

$$I_2 = \sum_{k=1}^K v_k (\lambda_k)^2 I_{2k} + \sum_{k=1}^K v_k [(\lambda_k)^2 - 1] = I_{2W} + I_{2B}$$

where I_{2k} is half of the square coefficient of variation for the group k (within-group k inequality), $\lambda_k = \mu_k / \mu$ is the ratio between the mean income of group k and the mean income for the whole sample, and v_k is the population share (Blackorby *et al.*, 1981; Shorrocks, 1984; Jenkins, 1995a).

(D) *Decomposition of I_2 by sources of income*: let us consider S ($s = 1, \dots, S$) sources of household income. I_2 for total income, which can be decomposed as:

$$I_2 = \sum_{s=1}^S C_s$$

that is I_2 is the sum of absolute factor contributions to overall inequality (C) which are given by:

$$C_s = \rho_s \chi_s \sqrt{I_{2s} \cdot I_2}$$

where ρ_s is the coefficient of correlation between component s and total income, χ_s is s 's factor share in total income, I_{2s} is half of the squared coefficient of variation for source s (Shorrocks, 1982; Jenkins 1995a). If $C_s > 0$ source s has a disequalising impact; when $C_s < 0$ source s has an equalising impact. We can also define $c_s = C_s/I_2$ as the proportional factor contribution, so that

$$\sum_{s=1}^S c_s = 1$$

Therefore, each source contribution to overall inequality depends on three factors: the level of inequality that characterises the distribution of the source, the relative factor share and the correlation between the source and total income.

Bibliography

- Amin S. (2003), 'Life-Cycle Labour Supply of Married Women and Family Income Inequality in Malaysia', *Journal of the Asia Pacific Economy*, **8**, 1-18
- Amin S. , Da Vanzo J. (2004), 'The Impact of Wives' Earnings on Earnings Inequality Among Married-Couples Households in Malaysia', *Journal of Asian Economics*, **15**, 49-70
- Aslaksen I., Wennemo T., Aaberge R. (2005), 'Birds of a Feather Flock Together: The Impact of Choice of Spouse on Family Income Inequality', *Labour*, **19**, 491-515
- Atkinson A. B. (1972), 'On the Measurement of Inequality', *Journal of Economic Theory*, **2**, 244-263
- Atkinson A. B. (1996), 'Income Distribution in Europe and the United States', *Oxford Review of Economic Policy*, **12**, 15-28
- Bishop J., Formby J., Smith J. (1991), 'International Comparison of Income Inequality Tests for Lorenz Dominance Across Nine Countries', *Economica*, **58**, 461-477
- Blackburn M.L., Bloom D.E. (1994), 'Changes in the Structure of Family Income Inequality in the United States and Other Industrialized Countries in the 1980s', *W.P. NBER*, **4754**
- Blackorby C., Donaldson D., Auersperg M. (1981), 'A New Procedure for the Measurement of Inequality Within and Between Population Subgroups', *Canadian Journal of Economics*, **14**, 665-685
- Bourguignon F., Fourier M., Gurgand M. (2001), 'Fast Development with a Stable Income Distribution: Taiwan, 1979-94', *Review of Income and Wealth*, **47**, 139-163
- Brandolini A., D'Alessio G. (2003), 'Household Structure and Income Inequality in Italy: A Comparative European Perspective', *Women Work, the Family and Social Policy – Focus on Italy in an European Perspective*, Del Boca D. and Repetto R. G. , Lang, New York
- Buhman B., Rainwater L., Schmanus G., Smeeding T. M. (1988), 'Equivalence Scales, Well-being, Inequality, and Poverty: Sensitivity Estimates Across Ten Countries Using the Luxembourg Income Study (LIS) Database', *Review of Income and Wealth*, **34**, 115-142
- Burtless G. (1999), 'Effects of Growing Wage Disparities and Changing Family Composition on the U.S. Income Distribution', *European Economic Review*, **43**, 853-865
- Cancian M., Reed D. (1998), 'Assessing the Effect of Wives' Earnings on Family Income Inequality', *Review of Economics and Statistics*, **80**, 73-79

-
- Cancian M., Reed D. (1999), 'The Impact of Wives' Earnings on Income Inequality: Issues and Estimates', *Demography*, **36**, 173-184
- Cancian M., Schoeni R. F. (1998), 'Wives' Earnings and the Level and Distribution of Married Couples' Earnings in Developed Countries', *Journal of Income Distribution*, **8**, 45-61
- Cancian M., Danziger S., Gottschall P. (1992), 'Working Wives and Family Income Inequality Among Married Couples', *Uneven Ties – Rising Inequality in America*, Danziger S. and Gottschall P., NY, Russel Sage Foundation, 195-221
- Cheti N. and Peracchi F. (2001), *Sample Participation and Income Nonresponse in the ECHP*, mimeo
- Cowell F.A. (1989), 'Sampling Variance and Decomposable Inequality Measures', *Journal of Econometrics*, **42**, p. 27-41
- Deding M. C., Schmidt T. D. (2002), 'Differences in Income Inequality Across Europe – Market Driven or ...?', *EPAG Working Paper*, **37**
- Del Boca D., Locatelli M., Pasqua S. (2003), 'Earnings and Employment of Italian Husbands and Wives in the European Context', *Women Work, the Family and Social Policy – Focus on Italy in an European Perspective*, Del Boca D. and Repetto R. G., New York, Lang
- Del Boca D., Pasqua S. (2003), 'Employment Patterns of Husbands and Wives and Family Income Distribution', *Review of Income and Wealth*, **49**, 221-245
- Del Boca D., Pasqua S. (2005), 'Labour Supply and Fertility in Europe and the U.S.', *Women at Work. An Economic Perspective*, T. Boeri, D. Del Boca and C. Pissarides, Oxford, Oxford University Press
- Del Boca D., Pasqua S., Pronzato C. (2005), 'Fertility and Employment in Italy, France and the U.K.', *Labour*, **19**, 51-77
- Del Boca D., Wetzels C. (2008), *Social Policies, Labour Markets and Motherhood: a Comparative Analysis of European Countries*, Cambridge, Cambridge University Press
- Esping-Andersen G. (1990), *The Three Worlds of Welfare Capitalism*, Cambridge, Polity Press
- Eurostat (2001), *Statistics in Focus*
- Gronau R. (1982), 'Inequality of Family Income: Do Wives' Earnings Matter?', *Population and Development Review*, **8**, 119-136
- Hyslop D.R. (2001), 'Rising U.S. Earnings Inequality and Family Labour Supply: The Covariance Structure of Intrafamily Earnings', *The America Economic Review*, **91**, 755-777
- Jenkins S. (1991), 'The Measurement of Income Inequality', *Economic Inequality and Poverty: International Perspective*, Osberg L., New York, M. E. Sharpe
- Jenkins S. (1995), 'Accounting for Inequality Trends: Decomposition Analyses for the UK, 1971-86', *Economica*, **62**, 29-63
- Jenkins S. (1996), 'Recent Trends in the UK Income Distribution: What Happened and Why?', *Oxford Review of Economic Policy*, **12**, 29-46
- Jenkins S. (1999), 'Analysis of Income Distributions', *Stata Technical Bulletin*, **48**, Stata Corporation
- Juhn C., Murphy K. (1997), 'Wage Inequality and Family Labor Supply', *Journal of Labor Economics*, **15**, 72-97
- Karloy L. A., Burtless G. (1995), 'Demographic Change, Rising Earnings Inequality, and the Distribution of Personal Well-Being, 1959-1989', *Demography*, **32**, 379-405
- Lehrer E., Nerlove M. (1984), 'A Life-Cycle Analysis of Family Income Distribution', *Economic Inquiry*, **22**, 360-374
- Lehrer E. L. (2000), 'The Impact of Women's Employment on the Distribution of Earnings Among Married-Couple Households: a Comparison Between 1973 and 1992-1994', *The Quarterly Review of Economics and Finance*, **40**, 295-301
-

-
- Locatelli M., Moscato V., Pasqua S. (2001), 'The European Community Household Panel (ECHP): Elements for Users with Special Focus on Labour and Household Economics', *CHILD WP*, **24**, www.child-centre.it/papers/child24_2001.pdf
- Maruani M., (2000), *Travail et emploi des femmes*, Repères, La Documentation Française
- Nolan B., Maitre B. (1999), 'The Distribution of Income and Relative Income Poverty in the European Community Household Panel', *EPAG Working paper*, **3**
- Pasqua S. (2002), 'Wives' Work and Income Distribution in the European Countries', *CHILD WP*, **1**, www.child-centre.it/papers/child01_2002.pdf
- Pasqua S. (2003), *The Added Worker Effect: a Comparison Between European Countries*, mimeo
- Pencavel J. (2006), 'A Life Cycle Perspective on Changes in Earnings Inequality Among Married Men and Women', *The Review of Economics and Statistics*, **88**, 232-242
- Prietro-Rodriguez J., Rodriguez-Gutierrez C. (2003), 'Participation of Married Women in the European Labor Markets and the "Added Worker Effect"', *Journal of Socio-Economics*, **32**, 429-446
- Reed D., Cancian M. (2001), 'Sources of Inequality: Measuring the Contribution of Income Sources to Rising Family Income Inequality', *Review of Income and Wealth*, **47**, 321-333
- Sen A. (1973), *On Economic Inequality*, Oxford, Clarendon Press
- Shaw K.L. (1992), 'The Life-Cycle Labour Supply of married Women and its Implications for Household Income Inequality', *Economic Inquiry*, **30**, 659-672
- Shorrocks A. F. (1982), 'Inequality Decomposition by Factor Components', *Econometrica*, **50**, 193-211
- Shorrocks A. F. (1984), 'Inequality Decomposition by Population Subgroups', *Econometrica*, **52**, 1369-1385
- Smeeding T. M., Grodner A. (2000), 'Changing Income Inequality in OECD Countries: Updated Results from the Luxemburg Income Study (LIS)', *The Personal Distribution of Income in an International Perspective*, Hauser R. and Becker I., Berlin, Heiderlberg, Springer