

Wives' work and income distribution in European countries

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June 2001

Abstract:

Women's participation in the labour market varies substantially across Europe. In Northern countries female participation is usually higher, while, as we move towards the South of Europe, more traditional household models are still predominant and women are more devoted to domestic than to labour-market activities.

At the same time we find that income is distributed more equally in North Europe (except the UK and Ireland) than in Southern Europe.

The paper analyses the impact of wives' work on income distribution in a cross-national perspective using ECHP (European Community Household Panel) data for 1995.

The decomposition of inequality by type of household shows that almost everywhere income is distributed more equally among *dual-earner* than among *man-breadwinner* households. As the percentage of *dual-earner* families is higher in Northern Europe countries, this contributes to equality. Sub-group analysis shows also that *within-group* inequality is the main source of inequality in all countries, while *between-groups* inequality has a lower impact.

Decomposition by sources of income reveals that in European countries women's earnings explain a lower proportion of total inequality than men's earnings and the impact of women's work on income distribution is mainly due to the "employment effect": where women work less, inequality in women's earnings distribution is higher because of the presence of many zeros in the distribution.

Moreover, the analysis of the inequality among working wives shows that female labour income is distributed more equally where women's employment rates are higher and *vice versa*.

Finally, using counterfactual distributions, it is possible to show how an increase in women's participation in the labour market can decrease inequality in household income distribution

Theme: Inequality

Keywords: Female employment, Inequality decomposition

JEL-Code: D3, J21

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 ERBCHRXCT980248). I also gratefully acknowledge support from Compagnia San Paolo.

Introduction

Women's participation in the labour market differs substantially across Europe. In Northern countries female participation is usually higher, while, as we move towards the South of Europe, more traditional household models are still predominant and women are more devoted to domestic than to labour-market activities.

Female work has important consequences for income distribution. A higher proportion of working women increases the percentage of dual earner families and, if income is distributed more equally (unequally) in the group of dual earner households than in the group of single earner households, we can have a more equal (unequal) distribution of household income. However, in order to explain the polarisation of income distribution, we should take into account not only *within-group* but also *between-groups* inequality. Greater between-groups inequality entails a larger gap between the income of dual earner and single earner households.

Moreover, the level of inequality in household income distribution is also affected by inequality in the distribution of female earnings, but the proportion of total inequality explained by female labour income depends on the proportion of total household income earned by women, and on the correlation between women's earnings and other sources of income.

In this paper, the ECHP (European Community Household Panel) data set is used for a cross-countries analysis. ECHP is (at the moment) a short panel of three annual waves (1994-1996) that includes 14 European countries¹. Only the third wave has been used here since changes in income distribution cannot be observed over a short period of three years. The data set provides information on the individual characteristics of all household members older than 14, on individuals' working status in the current year and in the year previous to the survey, and on the sources of income of households in the year prior to the survey.

Some countries have been excluded for different reasons: Luxembourg, because the sample is too small, while the Netherlands and France have been included only in some descriptive statistics on wives' and husbands' activity status, but then excluded because French data report gross incomes, while for the other countries we have net incomes, and Netherlands data on participation in the labour market and on incomes refer to different periods.

In order to answer to the question "does wives' work have an equalising impact on income distribution?", the analysis should be made using the sample of married couples in which women are of working age. Since retirement ages and regulations vary across European countries, in order to use standard criteria to select couples in which both spouses may potentially be in the labour force, only cases of couples in which the woman is less than 61 and neither of the spouses is retired are considered.

The effect of women's work is analysed by decomposing total inequality by type of household (Section 3) and by source of income (Section 4). Before that, however, patterns of male and female employment rates and inequality measures are presented (Sections 1 and 2) in order to better characterise differences and similarities among European countries. In Section 5, some counterfactual distributions are used to show the direction of inequality changes when female participation in the labour market is assumed to increase (or decrease). Conclusions follow.

¹ See Appendix A for samples' sizes.

1. Wives' and husbands' participation in the labour market

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

In the 1996 ECHP questionnaire, household members were asked about their present employment status and about their most frequent activity in the previous year. Since data on income refer to the year prior to the survey, we also consider data on participation in the same period.

Table 1 shows participation rates of women younger than 61 in 1995. Countries can be considered in three groups. In the first, which includes Denmark and Finland (North European countries with a social-democratic welfare regime), the percentage of working women is high (more than 70%) and few women are inactive.

In the middle group of female participation (where 50-70% of women work), we find mainly Central European countries and Portugal, while there are lower proportions of working women in Southern Europe (with the exception of Portugal) and Ireland.

Looking at female unemployment rates, we observe that they are high in Belgium, in those countries where participation is high (Denmark and Finland) and in Spain, which has the lowest female employment rate.

The activity status of men in 1995 is shown in Table 2 (here a "man" is defined as the husband of a woman below the age of 61). The data show that the percentage of working men is below 80% only in Italy and Spain, but it is not high either in Finland, Austria, and Ireland. In Ireland and Spain the low employment rate for married men is due to the high unemployment rate (9.5% and 9.2% respectively), while in Finland, Austria and Italy we find high percentages of retired men. In the case of Italy, this is the consequence of industrial restructuring which, as from the mid-1980s, caused the loss of jobs for many men in their fifties, while people fired for redundancy were allowed to retire earlier (*pre-pensionamento*).

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 the highest rates of male unemployment are found in Ireland and in Spain, where female employment rates are the lowest. Of the countries examined, Finland can be considered the only exception, with high female participation, a relatively low male employment rate and a fairly high rate of male unemployment.

Table 1

**Activity status in 1995 of married women aged less than 61 years
in European countries (%)**

	<i>Working</i>	<i>Unemployed</i>	<i>Inactive</i>	<i>Retired</i>
Denmark	77.7	7.9	9.4	5.0
Finland	72.3	8.8	12.8	6.1
United Kingdom	63.6	0.9	31.9	3.6
France	62.4	6.9	28.6	2.1
Belgium	60.4	10.1	26.5	3.0
Netherlands (*)	59.8	4.8	n.a.	n.a.
Portugal	59.6	5.3	31.0	4.1
Austria	56.4	2.4	35.0	6.2
Germany	54.6	5.0	35.9	4.5
Greece	44.3	6.0	46.6	3.1
Italy	41.7	4.1	48.4	5.8
Ireland	37.2	0.8	61.8	0.2
Spain	31.9	9.3	58.5	0.3

(*) = referred to 1996

Table 2

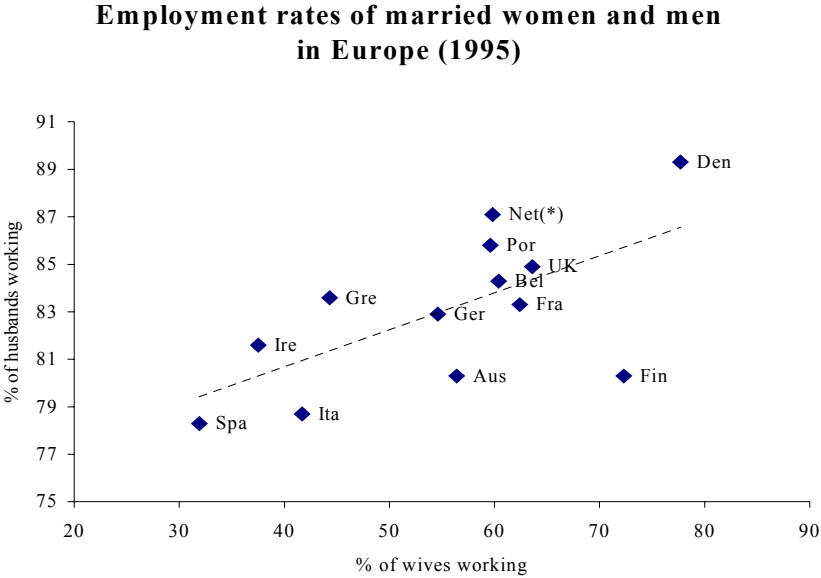
**Activity status in 1995 of men married to women aged less than 61
years in European countries (%)**

	<i>Working</i>	<i>Unemployed</i>	<i>Inactive</i>	<i>Retired</i>
Denmark	89.3	3.7	1.2	5.8
Finland	80.3	6.7	2.3	10.7
United Kingdom	84.9	4.4	4.6	6.1
France	83.3	3.7	2.4	10.7
Belgium	84.3	4.6	2.8	8.3
Netherlands (*)	87.1	1.8	n.a.	n.a.
Portugal	85.8	3.0	2.4	8.8
Austria	80.3	2.6	1.1	16.1
Germany	82.9	3.0	2.8	11.3
Greece	83.6	2.1	0.9	13.4
Italy	78.7	4.2	1.3	15.8
Ireland	81.6	9.5	3.0	5.9
Spain	78.3	9.2	5.8	6.8

(*) = referred to 1996

In figure 1 men and women’s employment rates are presented together: the proportion of working women seems to be low where also men’s employment rate is low. This seems to confirm the absence of an *added worker effect* in the European countries².

Figure 1



(*) = refers to 1996

2. Income inequality in Europe

In this section, some measures of inequality in income distribution for the various countries are presented. France³ has been excluded. The Netherlands have also been excluded because data on income refer to 1995 while data on participation refer to 1996.

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 coefficient⁴ is a

² Pasqua (2001) 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.

³ As already mentioned in the introduction, French data refer to gross incomes while, for the other countries, we have net incomes.

quite commonly used index of inequality that measures the area enclosed by the Lorenz curve and the diagonal line of perfect equality. I_2^5 , on the contrary, has been chosen for this analysis because, as a member of the class of Generalised Entropy inequality indices (with the Theil index and mean logarithmic deviation) it can be decomposed by sub-groups and by source of incomes (Shorrocks, 1982, 1984).

Both measures decrease if we redistribute income from a richer household to a poorer one, and therefore lower values mean lower inequality. However, the two measures differ in their sensitivity to income inequality in different parts of the distribution (Atkinson, 1972; Jenkins, 1991). In fact, 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. In our case, as we can see from Table 3, the ranking does not change much.

In this section, inequality in income distribution is calculated using equivalent household cash income post-direct taxes and including transfers payments. Therefore, income includes both labour and non-labour income of all household members, not only of the spouses. Equivalent household net income has been calculated according to the OECD scale, i.e. by dividing total household net income by the number of equivalent adults in the household⁶.

Equivalent income has been preferred to total income because, following Jenkins (1995a, p. 43), it “[...] provides a better feeling for differences in economic well-being”. However, as we shall see in Section 4, total household net income has to be used in the decomposition of inequality by sources of income.

Cash income does not represent an ideal measure because wages do not include non-cash benefits that are particularly relevant for high-income groups (Atkinson, 1996). Moreover, it excludes capital gains, home production, indirect taxes and housing costs. However, household disposable cash income corrected by household size (or by the number of equivalent adults) has been mostly used in the literature on inequality as the best proxy for distribution analyses (Buhman *et al.*, 1988; Bishop *et al.*, 1991; Jenkins, 1995a, 1996).

Table 3 shows different measures of inequality for equivalent household net income considering the whole sample and the sub-sample of individuals living in households in which both spouses are present and the wife is younger than 61. Countries are ordered by increasing inequality measured by half of the squared coefficient of variation (I_2) for couples of working age (third column).

⁴ See Appendix B, (a).

⁵ See Appendix B, (b).

⁶ 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.

Table 3

Inequality measures for equivalent household net income (1995)

	<i>All individuals</i>		<i>Individuals living in households in which wife<61</i>			
	I_2	<i>Gini coeff.</i>	I_2	<i>Gini coeff.</i>	<i>% of individuals living in households with income<50% of average income</i>	<i>% of individuals living in households with income>200% of average income</i>
<i>Denmark</i>	0.115	0.242	0.079	0.200	8.1	2.6
<i>Finland</i>	0.118	0.250	0.106	0.238	8.4	3.4
<i>Belgium</i>	0.152	0.280	0.115	0.251	11.0	3.6
<i>Austria</i>	0.150	0.277	0.124	0.262	10.2	4.3
<i>Germany</i>	0.163	0.291	0.126	0.264	11.3	4.4
<i>Italy</i>	0.198	0.327	0.180	0.318	18.1	5.8
<i>Ireland</i>	0.212	0.323	0.182	0.305	18.7	5.8
<i>United Kingdom</i>	0.219	0.328	0.189	0.306	16.7	6.3
<i>Greece</i>	0.237	0.346	0.193	0.318	17.3	6.6
<i>Spain</i>	0.236	0.350	0.211	0.337	19.3	7.3
<i>Portugal</i>	0.298	0.371	0.268	0.363	21.9	8.3

Inequality calculated for all individuals in the data sets (columns 1 and 2) is higher than inequality calculated for the sub-sample of households in which both spouses are present and of working age in all countries. The result is quite obvious if we think that the poorest households are generally those consisting of a single parent with children or of elderly people living on pensions⁷. However, the relative positions of the countries do not change much. Greece, Denmark, Belgium and Germany 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 in which the spouses are of working age.

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 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, we again find Denmark and Finland at the top: these countries are characterised by low inequality; these are followed by Central European countries, with the exception of the UK and Ireland, which are in the high-inequality group, together with Southern European countries.

Atkinson (1996) found similar results using the LIS (Luxembourg Income Study) data set.

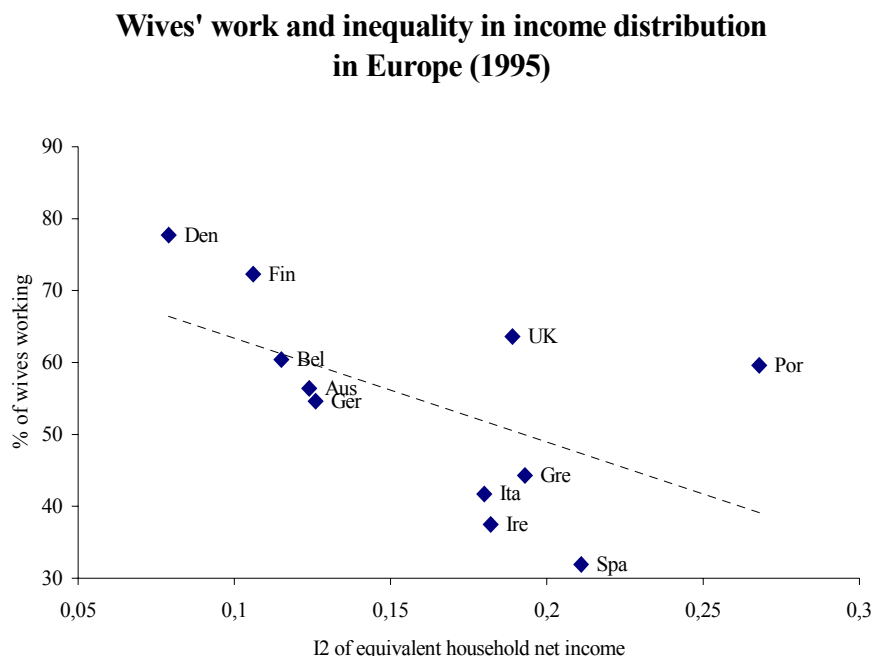
Portugal and Spain are countries in which around 20% of individuals live in households whose income is lower than half the average income. In these countries we also find the highest percentages of individuals living in households with income which is more than double the average. This confirms the polarisation of income distribution.

In figure 2, the percentage of working women and the level of inequality (measured by I_2) are plotted in the same diagram. A higher female employment rate would appear to be associated

⁷ Johnson (1996) also found that inequality is higher when we consider total income rather than wages alone.

with more equal income distribution. Only the UK and Portugal seem to have high percentages of working women and high inequality.

Figure 2



It is however too early to assert that women’s work has an equalising impact on income distribution because we have “no proof” of the causal relationship between the two facts and it is necessary to investigate in depth how women’s earnings contribute to total inequality, using the decomposition of inequality measures by types of household and by sources of income.

3. Decomposition of inequality by type of household

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 household.

From the sample of households in which the wife is younger than 61, couples in which one or both spouses are retired have been excluded. This is necessary in order to isolate the effect of earnings inequality from the effect of differences between levels of earnings and pensions. Pension systems vary considerably in European countries and household income is affected by the level of pensions when one or both spouses are retired. This also has consequences in terms of income distribution. Moreover, the situation of a retired person is anomalous in this type of analysis because he/she is not working (but he/she used to work) and he/she contributes to household income with a pension that is often linked in some way to previous labour incomes.

In this section, the sample is split into three mutually exclusive groups: *dual earner* (DE) households, *man breadwinner* (MB) families and *other types* of households (OT). The woman breadwinner group was too small in most of the countries to be considered as a separate group and has been included in the *other types* category.

If we consider different sub-groups of population, I_2 can be decomposed as the sum of *within-group* and *between-groups* inequalities⁸. Table 4 shows the results of this decomposition. As a consequence of the change in the sample, I_2 values are different from those reported in Table 3. In the first part of the table, I_2 for each sub-group is presented with the corresponding asymptotic standard error (Cowell, 1989).

The analysis of Table 4 shows some analogies between countries with similar levels of inequality.

Denmark and Finland are characterised by low inequality because income is distributed quite equally among individuals living in all types of households. In Belgium, Germany and Austria, income is distributed more unequally among *man breadwinner* (MB) household than among DE ones. As the percentage of individuals living in *dual earner* households in these countries is higher than the percentage of individuals living in MB households, the level of total inequality is quite low. In Belgium and Germany we find greater inequality among people living in *other types* of households, while in Austria the OT group is characterised by lower within-group inequality than in the MB group.

Moving to the group of high-inequality countries, we again find that inequality is higher in the group of *man breadwinner* households than in the *dual earner* one.

Since individuals living in MB households in these countries (with the exception of the UK and Portugal) represent the highest percentage of the sample, we find higher values of inequality.

UK and Portugal are characterised by different situations. In UK we observe a big difference between the value of I_2 calculated for DE households and for MB families. Therefore, even though income is not distributed very unequally among individuals living in dual earner households and they represent more than 59% of the population, inequality is still high because it is very high among MB household members.

In Portugal, as in the UK, people living in dual earner households represent around 59% of the population, but here we do not observe such a big difference between the value of I_2 calculated for DE households and for MB families. Therefore, inequality in Portugal seems to be high because it is high for all sub-groups.

As in Jenkins (1995), *within-group* inequality dominates *between-groups* inequality and it explains more than 10% of total inequality only in Italy (21.8%), Spain (21.7%), Ireland (18.5%) and Portugal (10.9%). If we compare population shares with income shares, we find that people living in DE households in Italy represent only 42.4% of the population but 56.2% of total income, while individuals living in MB households represent 51.5% of the population and 40.7% of income. In Spain the situation is similar, with 56.8% of individuals living in MB households and receiving 50.2% of total income, and members of DE families representing 27.2% of our sample and obtaining 40.1% of total income.

⁸ See Appendix B, (c).

Table 4

Decomposition of inequality by type of household – equivalent household net income

	<i>Denmark</i>	<i>Finland</i>	<i>Belgium</i>	<i>Germany</i>	<i>Austria</i>	<i>Ireland</i>	<i>Italy</i>	<i>United Kingdom</i>	<i>Greece</i>	<i>Spain</i>	<i>Portugal</i>
<i>I₂ total</i>	0.079	0.109	0.114	0.127	0.128	0.184	0.188	0.192	0.199	0.216	0.265
<i>I₂</i>											
<i>Dual earner (DE)</i> <i>(std. error)</i>	0.074*** (0.0082)	0.103*** (0.0063)	0.089*** (0.0069)	0.108*** (0.0062)	0.114*** (0.0069)	0.114*** (0.0098)	0.106*** (0.0057)	0.131*** (0.0105)	0.164*** (0.0094)	0.139*** (0.0074)	0.215*** (0.0118)
<i>Man breadwinner (MB)</i> <i>(std. error)</i>	0.074*** (0.0179)	0.090*** (0.0099)	0.134*** (0.0209)	0.132*** (0.0092)	0.127*** (0.0119)	0.176*** (0.0170)	0.197*** (0.0156)	0.287*** (0.0444)	0.206*** (0.0191)	0.164*** (0.0089)	0.255*** (0.0364)
<i>Other households (OT)</i> <i>(std. error)</i>	0.068** (0.0228)	0.105*** (0.0163)	0.157*** (0.0275)	0.176*** (0.0309)	0.120*** (0.0216)	0.102*** (0.0130)	0.315*** (0.0040)	0.232*** (0.0440)	0.320*** (0.1141)	0.232*** (0.0183)	0.262*** (0.0429)
<i>Population share (%)</i>											
<i>Dual earner</i>	79.6	69.3	62.4	52.9	58.8	31.6	42.4	59.4	47.4	27.2	59.0
<i>Man breadwinner</i>	15.3	21.6	30.2	40.9	37.7	53.6	51.5	30.7	49.8	56.8	35.5
<i>Other households</i>	5.1	9.1	7.4	6.2	3.5	14.8	6.1	9.9	2.8	16.0	5.5
<i>Income share (%)</i>											
<i>Dual earner</i>	83.3	74.2	68.9	58.3	64.9	42.0	56.2	67.2	55.0	40.1	70.7
<i>Man breadwinner</i>	12.9	19.1	26.5	36.9	32.7	49.9	40.7	26.9	43.3	50.2	25.9
<i>Other households</i>	3.8	6.7	4.6	4.8	2.4	8.1	3.1	5.9	1.7	9.7	3.4
<i>Within-group inequality</i>	0.074	0.102	0.103	0.120	0.120	0.150	0.147	0.176	0.186	0.169	0.236
<i>Between-group inequality</i>	0.005	0.007	0.011	0.007	0.008	0.034	0.041	0.016	0.013	0.047	0.029

*** = significant at 99%

** = significant at 95%

The decomposition of inequality by types of household seems therefore to indicate that an increase in wives' participation in the labour market, by increasing the percentage of dual earner families, may help in reducing inequality in household income distribution.

4. Decomposition of inequality by sources of income

In order to isolate the effect of women's earnings on total inequality, we can decompose I_2 also by sources of income⁹. Each source contribution to total inequality depends on three factors: the level of inequality that characterises the distribution of that particular source, the relative factor share (χ_s) and the correlation between the source and total income (ρ_s).

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 the spouses and other household members (capital income, social benefits, pensions, etc.).

Since we are now considering different sources of household income, total net income is used because measures of inequality for husbands' or wives' "equivalent" earnings are not very significant and interpretable.

In the first part of Table 5, inequality measures, factor shares and correlation between the different sources of income and total income are reported, while the last part summarises the proportion of households in which each source of income is present and, for every source, the inequality in the sub-groups of those with positive values. Inequality for one source of income can in fact be high because of the presence of many zeros (as in Betson and van der Gaag, 1984, and in Cancian *et al.*, 1992). This is particularly relevant for women's earnings 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 level of inequality between women's and men's earnings.

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

In the group of low-inequality/high-female-employment-rate countries (Denmark and Finland), both men's and women's earnings are distributed fairly equally and, particularly when we consider only recipients, women's labour income is distributed more equally than men's labour income. In these countries inequality is explained mainly by men's earnings 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 big proportion of total household income and they are weakly correlated with total income.

When we move to the group of middle-inequality countries (Germany, Austria and Belgium), I_2 for wives' earnings starts to increase. However, the contribution of women earnings to total inequality is even lower than in Finland because female labour income represents a lower portion of total household income. If we look at I_2 of recipients, we discover that the high values found for I_2 of wives' earnings are due more to the "employment effect" (*i.e.* the

⁹ See Appendix B, (d).

presence of many zeros) than to actual inequality in the distribution of women's labour incomes.

In Germany, husband's earnings explain more than 70% of total inequality, while in Austria and Belgium it accounts for around 50%. Also other sources of income are important causes of inequality, especially in Austria and Belgium, where they explain more than 20% of total household income inequality.

In Germany, on the contrary, other sources contribute little to overall inequality, because, even though they are very unequally distributed, they represent a low proportion of total household income and they are weakly correlated with it.

In the group of high-inequality countries, we find both countries where the female employment rate is low (Italy, Ireland, Greece and Spain) and countries where the percentage of working women is high (UK and Portugal).

From the table we can observe that the values of I_2 of wives' earnings is particularly high in those countries in which women's employment rate is low as a consequence of what we defined before as the "employment effect". On the contrary, when we consider only working women, the values of I_2 are much more lower and particularly in Italy where wives' earnings are distributed even more equally than in Finland.

Despite this, it is only in Italy that women's labour incomes explain 30% of total inequality, while in the other high-inequality/low-employment countries the contribution of women's earnings to total inequality is lower. This is a consequence of the relatively low proportion of total income earned by wives. Ireland, where wives contribute to household income only by 15.7%, is in fact characterised by the lowest proportion of total inequality due to women's labour incomes (only 12%).

Italy is the country with the most equal distribution of husbands' labour income, and this explains why this source accounts only for 47.3% of overall inequality.

Finally, in the group of high-inequality countries, only in Italy and in Greece do *other sources* contribute more than 20% to total inequality, even though this source does not represent a high proportion of total household income.

The UK and Portugal show instead different characteristics. In the UK, wives' earnings explain 20.8% of total inequality. As we can see, I_2 computed only for working women is the highest among European countries, and also inequality in working men's earnings distribution is one of the highest in Europe. For women this is probably due to the high percentage of part-time jobs (more than 35% of married women in our sample).

In Portugal, on the contrary, wives' earnings explain almost 33% of total inequality, and this is due to the high relatively percentage of household income earned by women and to the high correlation between female labour income and total household income.

Table 5

Decomposition of inequality by sources of income – total household net income

	<i>Denmark</i>	<i>Finland</i>	<i>Germany</i>	<i>Austria</i>	<i>Belgium</i>	<i>United Kingdom</i>	<i>Italy</i>	<i>Ireland</i>	<i>Greece</i>	<i>Spain</i>	<i>Portugal</i>
<i>I₂ total</i>	0.069	0.093	0.110	0.111	0.116	0.160	0.163	0.164	0.190	0.209	0.246
<i>I₂ factors:</i>											
<i>Husband's earnings</i>	0.199	0.243	0.203	0.193	0.206	0.320	0.194	0.368	0.214	0.325	0.355
<i>Wife's earnings</i>	0.201	0.360	0.604	0.781	0.502	0.551	0.936	1.208	1.539	1.621	0.880
<i>Other sources</i>	0.606	0.484	0.986	0.729	0.814	0.923	1.933	0.905	2.035	1.316	1.363
<i>% contribution to total household income (χ_s):</i>											
<i>Husband's earnings</i>	53.0	50.9	64.9	56.3	53.8	59.2	62.4	60.6	67.4	62.1	56.3
<i>Wife's earnings</i>	31.7	28.3	19.8	17.7	24.1	24.1	22.5	15.7	17.2	17.3	25.8
<i>Other sources</i>	15.3	20.8	15.3	26.0	22.1	16.7	15.1	23.7	15.4	20.6	17.9
<i>Correlation between sources of income (ρ_s):</i>											
<i>Husband / total</i>	0.832	0.791	0.799	0.670	0.715	0.832	0.696	0.795	0.721	0.741	0.796
<i>Wife / total</i>	0.407	0.463	0.327	0.372	0.477	0.466	0.557	0.283	0.493	0.528	0.674
<i>Other / total</i>	0.069	0.186	0.308	0.494	0.423	0.241	0.436	0.283	0.482	0.332	0.316
<i>% of I₂ (c_s·100) due to:</i>											
<i>Husband's earnings</i>	74.9	65.3	70.6	49.7	51.2	69.6	47.3	72.2	51.4	57.4	53.8
<i>Wife's earnings</i>	22.0	25.9	15.2	17.4	23.8	20.8	30.0	12.0	24.2	25.5	32.9
<i>Other sources</i>	3.1	8.8	14.2	32.9	25.0	9.6	22.7	15.8	24.4	17.1	13.3
<i>% with non-zero values of:</i>											
<i>Husband's earnings</i>	95.8	92.7	96.1	95.1	89.5	93.5	95.0	88.7	95.0	86.1	91.5
<i>Wife's earnings</i>	86.8	79.3	68.5	57.4	67.4	78.2	47.0	45.1	37.2	37.0	56.1
<i>Other sources</i>	87.2	92.2	88.6	94.3	92.5	90.3	50.4	94.4	52.4	70.5	86.2
<i>I₂ for non-zero values of:</i>											
<i>Husband's earnings</i>	0.169	0.189	0.176	0.159	0.132	0.267	0.159	0.270	0.178	0.210	0.282
<i>Wife's earnings</i>	0.109	0.182	0.267	0.235	0.175	0.321	0.176	0.270	0.259	0.285	0.274
<i>Other sources</i>	0.464	0.407	0.815	0.658	0.715	0.785	0.725	0.826	0.829	0.780	1.104

The previous analysis shows that in all high-inequality countries, except the UK, I_2 of women's earnings is high, but this is mainly due to the presence of many zeros in the distribution (except in Portugal). However, since the contribution to total inequality coming from women's labour income depends not only on I_2 of women's earnings, but also on the proportion of total household income earned by women and on the correlation between this source and total income, we do not observe a clear trend in the contribution of wives' earnings to inequality when we move from low-inequality to high-inequality countries.

Moreover, we can observe that I_2 of working women 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 in different countries. We can in fact suppose that where female participation is low we find in the labour market either highly educated women (that want to work) or less educated ones (who need to work). As women's participation increases, also women with a medium level of education enter in the labour market¹⁰ and this help to reduce inequality in female earnings distribution.

5. Counterfactual income distributions

Counterfactual distributions are usually used to show the effects on total inequality of changes in employment rates, population sub-group composition, and inequality in the distribution of a particular source of income (Cancian *et al.*, 1992; Cancian and Reed, 1998). While this kind of analysis gives some ideas of what can happen if, for example, all women started to work, conclusive answers are not possible since it does not consider changes in behaviour. In the case of women's participation in the labour market, if we assume that all women start to work and we substitute I_2 of women's earnings with the same value of I_2 computed on women's earnings after excluding zeros (as in Counterfactual 1 in Table 6), we obtain an income distribution that does not exist, and that never will. In fact, even if all women started to work, husbands' labour supply would probably change. Moreover, to impute to all women the same level of inequality as working ones means assuming that inequality in the distribution of women's earnings does not change when all women enter the labour market. This implicitly entails the assumption that the distribution of characteristics is the same for working and non-working women. Therefore the inequality level obtained in the counterfactual distribution can not be considered as the value which could be reached if all women started to work.

Counterfactual distributions are useful only to outline the direction of inequality movements when some changes occur. In our case, they can help to show the effect of an increase or a decrease in women's employment.

In this section, three 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 – all women work If we assume that all women work, in calculating total inequality¹¹ we have to use I_2 found for working of women's earnings (that was computed excluding zeros) in place of I_2 computed for all women's earnings. The second column of Table 6 shows that, under this assumption, inequality decreases in all countries and particularly in Italy (-16.6%) in Spain (-14.8%), in Portugal (-14.6%)

¹⁰ Juhn and Murphy (1997) observe that middle-class women's participation in the labour market increased in the U.S. between 1969 and 1989.

¹¹ Following the equations in Appendix B, (d).

and in Greece (-14.2). The decrease in inequality that we obtain in the other high-inequality countries is much lower (-6% in Ireland and -4.3% in the UK). In the UK, in fact, women's earnings are distributed very unequally among recipients, and both in the UK and in Ireland the main source of high inequality are men's earnings.

Counterfactual 2 – lowest inequality in the distribution of women's earnings in all countries

In the third column I_2 is computed under the assumption that in all countries inequality in the distribution of wives' earnings has the value that we found for Denmark (the lowest in Europe, see Table 5). Once again inequality decreases especially in high-inequality countries (-17.1% in the Portugal, -16.7% in Spain, -15.9% in Italy and -15.3% in Greece). In Ireland and the UK, the inequality reduction obtained is lower (-6.7% and -4.3% respectively) because of the lower impact in these countries of women's earnings on total inequality.

In the fourth column not only is I_2 calculated for all countries using I_2 of Danish women, but also the value of the correlation between wives' earnings and total income is set for all countries equal to the value for Denmark. Under this further assumption, inequality in highly-unequal countries decreases even more, reaching a decrease of 23.6% in Portugal.

Counterfactual 3 - highest inequality in women's earnings distribution in all countries

If we assume that in all countries wives' earnings are distributed as unequally as in Spain¹² (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 bigger where the true value of I_2 for women's earnings is lower: in Denmark we have an increase of 59.4% in total inequality, and in Finland an increase of 28.6%.

When we also impute to all countries the same coefficient of correlation between women's earnings and total income that we found in Spain (last column), inequality increases even more in all countries.

Table 6

**Inequality in counterfactual distributions –
 I_2 of total household net income**

	<i>True</i>	<i>Counterfactual 1</i>		<i>Counterfactual 2</i>		<i>Counterfactual 3</i>	
		<i>All women working</i>	<i>I_2 of wives as In Denmark</i>	<i>I_2 of wives and correlation as in Denmark</i>	<i>I_2 of wives as in Spain</i>	<i>I_2 of wives and correlation as in Spain</i>	
Denmark	0.069	0.065	0.069	0.069	0.097	0.110	
Finland	0.093	0.086	0.087	0.084	0.119	0.127	
Germany	0.110	0.104	0.103	0.105	0.120	0.137	
Austria	0.111	0.102	0.102	0.102	0.120	0.131	
Belgium	0.116	0.105	0.106	0.104	0.138	0.144	
UK	0.160	0.153	0.147	0.145	0.184	0.192	
Italy	0.163	0.136	0.137	0.131	0.179	0.176	
Ireland	0.164	0.154	0.153	0.156	0.167	0.187	
Greece	0.190	0.163	0.161	0.158	0.191	0.195	
Spain	0.209	0.178	0.174	0.170	0.209	0.209	
Portugal	0.246	0.210	0.204	0.188	0.275	0.251	

¹² 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 Spain.

All these simulations seem to confirm that increases in female employment rates may reduce inequality in household income distribution.

Conclusions

In the paper, the effect of wives' work on income distribution has been investigated from different points of view in a transnational analysis.

In Europe, both figures on women's participation in the labour market and 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, with the sole exception of Ireland). At the same time we have low-inequality countries (all in North Europe) and countries in which the distribution is more unequal. These are all Southern Europe countries, UK and Ireland. As a consequence, the cross-countries analysis offers the opportunity to investigate if there is any relationship between women's work and inequality in household income distribution.

In order to isolate the effect on income distribution of labour incomes from the effect of pensions, only families in which both spouses are present, neither is retired and the wife is younger than 61 are considered.

The first attempt to determine the effect of women's work on inequality is made by decomposing total inequality by type of household. For each country, the sample is split into three sub-groups: *dual earner* (DE), *man breadwinner* (MB) and *other type* (OT) of household (a residual category that also includes *woman breadwinner* families). *Within-group* and *between-groups* inequality for equivalent household net income have been computed. In all countries except Denmark and Finland, income is distributed more equally among individuals living in *dual earner* families than among individuals living in *man breadwinner* ones.

Only in Ireland and Denmark is income more equally distributed among OT household members than among DE ones.

From this result we can expect that growth in female employment rate reduces inequality, by increasing the percentage of *dual earner* households in the population.

In all countries, income share of DE household members is greater than their population share, but the difference increases as we move from low-inequality countries to high-inequality ones. Indeed, *between-groups* inequality generally explains a higher portion of total inequality in high-inequality countries.

However, decomposition by type of household does not allow direct measurement of the impact of wives' earnings on total inequality. This can be made using a decomposition by sources of income. In the paper, three sources of income are considered: husbands' earnings, wives' earnings and "other sources", a residual category that includes both non-labour incomes and incomes from other household members.

In low-inequality countries, the highest percentage of inequality is explained by husbands' earnings and, since labour income is distributed quite equally both among men and among women, inequality in total income distribution proves to be lower.

In middle-inequality countries we start to find higher values for I_2 of women's earnings, but this is due more to the "employment effect" (*i.e.* the presence of many zeros in the distribution) than to an effective inequality in the way in which labour income is distributed among working wives. In these countries, a higher percentage of inequality than in low-inequality countries is explained by "other sources of income".

In countries with high levels of inequality, I_2 of women's earnings is high, especially in those countries in which the employment rate is lower. However, we do not observe an increase in the contribution of wives' earnings to total inequality because in these countries female labour income represents a small fraction of total household income and is weakly correlated with it.

Moreover, in high-female-employment countries I_2 for working women is generally lower than in low-female-employment countries. As women's participation in the labour market increases, inequality in women's earnings distribution seems to decrease.

The results presented seem therefore to indicate that an increase in women's work reduces inequality in income distribution and this is also confirmed by the counterfactual distribution analysis. Similar results were found for 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.* (2000).

Appendix A

ECHP data set - Sample dimension (wave 3 - 1996)

	<i>All households</i>	<i>Couples in which wife < 61</i>	<i>Couples in which wife < 61 and neither of the spouses is retired</i>
Germany	4593	2252	1894
Denmark	2955	998	911
Netherlands	5179	2296	-
Belgium	3210	1409	1265
Luxembourg	933	509	-
France	6600	2847	-
UK	3775	1604	1476
Ireland	3173	1700	1600
Italy	7132	4224	3443
Greece	4908	2733	2299
Spain	6268	3362	3114
Portugal	4850	2531	2235
Austria	3291	1619	1325
Finland	4139	2043	1776

Appendix B

In this appendix we present the formulas of the inequality indexes used and how to decompose I_2 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:

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

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-group* (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_s) 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, such that

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

Therefore, each source contribution to total 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.

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