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Tax-benefit Systems and Gender Gap. An Across-Europe Study*

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Abstract

Important international organizations, such as the United Nations or the European Commission, have at the core of their agendas the objective of achieving gender equality in order to ensure fair social development through equity and, ultimately, stable economic growth.

Our main objective is to broaden the perspective from which the gender pay gap is analysed by considering gender differences in disposable income, the gender income gap. We introduce the idea that public intervention through tax-benefit policies can contribute to a reduction in the gender income gap as well as providing empirical evidence that a decrease in this gap fosters the reduction of social inequality in general.

The aim is to quantify the effect that each policy of the tax-benefit system has on the gender income gap. An analysis is done for all countries of the European Union. The database used is EUROMOD, a tax-benefit microsimulation model for the European Union. We have analysed how gender income gap changes by country, by type of benefit (contributory *vs*. non-contributory), by policy and according to sociodemographic characteristics. In addition, we aim to determine if the reduction of the gender income gap is related to a reduction in the levels of inequality in European countries.

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The results presented here are based on EUROMOD version H1.0. EUROMOD is maintained, developed and managed by the Institute for Social and Economic Research (ISER) at the University of Essex, in collaboration with national teams from the EU member states.

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In short, the results obtained provide empirical evidence that public intervention through tax-benefit policies can contribute to a reduction in the gender income gap. They also endorse the idea that social inequality reduces with a decrease in the gender income gap.

Keywords: Gender income gap, tax-benefit system, gender gap, public policies.

JEL Classification: H50, H53, I38.

1. Introduction

The economic independence of women is central to guaranteeing equality between men and women as well as a requisite for achieving stable and sustainable economic growth and a fairer social development in terms of equality (Duflo, 2012; Bárcena-Martín and Moro-Egido, 2013; Kabeer, 2015; Grosh and Baker, 1995). The prime objective of important international agendas, such as the Sustainable Development Goals agenda presented by the United Nations (UN) or the Europe 2030 Strategy of the European Commission, is to ensure equal opportunities in economic life and the proposal of initiatives for achieving this goal.

There are many studies that focus on the situation of women in the labour market. These studies quantify the gender pay gap, determine the factors which explain this difference and identify actions that help to reduce the gap (Goldin, 1992; Weichselbaumer and Winter-Ebmer, 2005; Arulampalam *et al*., 2007; Azmat *et al*., 2006; Del Rio *et al*., 2008; Figari *et al*., 2011b; Cuberes and Teignier, 2016; Eurostat, 2017; World Economic Forum, 2019; Brindusa *et al*., 2019). Over the last thirty years, governments have been adopting legislation to ensure that any difference in wages is not as a result of gender bias (Vosko, *et al.*, 2010; EUROFOUND, 2016). But despite efforts made to reduce the gender pay gap, both by public administrations and the scientific community, this problem continues to persist even in the most developed countries.

Economic independence depends on the income received form the labour market but is also affected by the tax-benefit system. Any benefits received and taxes paid modify an individual's disposable income. This could have a direct effect on a woman's economic independence and, indirectly, on gender equality. In general, tax-benefit systems do not distinguish by gender but they have been seen to have a different impact on men and women (Keane *et al*., 2014). Therefore, it is essential to include the effect of tax-benefit policies when analysing problems related to gender.

Recent studies that focus on this problem (Keane *et al*., 2014; Avram *et al*., 2016) endeavour to determine how disposable income and poverty level are modified following a change to the tax-benefit system, in particular the effect this has by gender. By collating individual incomes of a household, income can be differentiated by gender to make it easier to assess the impact of government policies. These studies introduce the gender perspective in analysing the impact of changes in the tax-benefit system, but they do not relate it to the concept of gender pay gap.

Our main objective is to complement and broaden the analysis of gender gaps by focussing on *income*. Not just income from employment (as in the literature on gender pay gaps mentioned above), but a comprehensive definition of income, including different sources of *market income*[1], *taxes*, and *benefits*. In particular, we aim to quantify the effect that each policy has on the *gender income gap* and determine if public intervention through different policies contributes to gender equality. A comparative analysis is done for all countries of the European Union in order to identify different patterns of policies and to highlight those countries where the tax-benefit system appears to be more effective in reducing the gender income gap. We also look at the gender income gap in relation to specific characteristics, such as level of education, employment situation and marital status.

Furthermore, we measure any redistributive effect that occurs between the two groups, men and women, in terms of a reduction in inequality when the tax-benefit system is applied. This reduction is explained by two components: a between-groups component, the intergroup perspective that measures inequality *between* the two groups, men and women; and a within-groups component, the intragroup perspective that quantifies inequality *within* the group of men and *within* the group of women. We want to determine whether the reduction in inequality comes from a reduction between groups or a reduction within groups for each country of the European Union. Finally, we aim to show that a reduction in the gender income gap and a reduction in overall inequality are related phenomena, with the view that a smaller gender income gap contributes to a fairer social development in terms of equality in general.

The structure of this paper is as follows. Following the introduction, the second section presents the methodology and data. In the methodological part, we define the gender income gap, the tax-benefit policies taken into account and the process applied to obtain the disposable income. The database used is EUROMOD, a tax-benefit microsimulation model for the European Union. In the third section, we analyse the effect of the tax-benefit system on the gender income gap by comparing this gap in the labour market with its value once the tax-benefit system has been applied, and from this we identify patterns and causes. Also, sociodemographic characteristics are considered. In the fourth section, the problem of inequality is addressed, considering both the intragroup and the intergroup perspectives. Finally, we conclude with the main findings of this paper.

2. Methodology and data

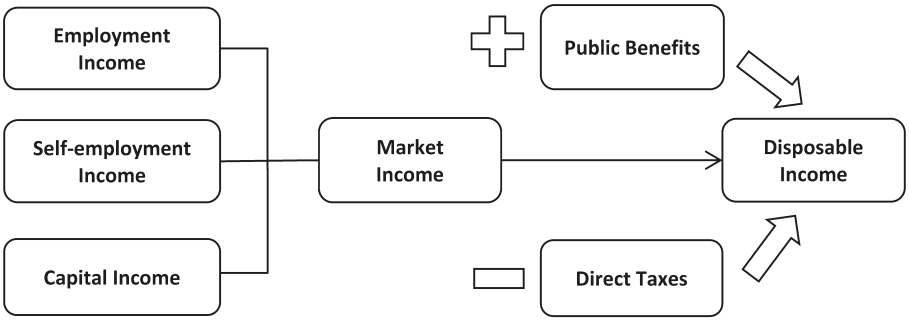
In this section, we explain the methodology and the data used to obtain the results. Furthermore, we provide some descriptive statistics of the different EU-28 countries to contextualize our study.

2.1. Gender income gap methodology

Figure 1 shows the steps taken to identify and collate different categories of income and payments in order to calculate a disposable income. The starting point is the income of men

and women in the market. This income includes employment income, the conventional figure used to calculate the gender pay gap, but also takes into account other sources of income, such as self-employment or capital income (rents, interests or dividends).

Figure 1
FROM MARKET INCOME TO DISPOSABLE INCOME



Source: Compiled by the authors.

The market income of both men and women is modified by policies developed by the public sector. Policies can be identified as either those related to public expenditure or those concerned with direct taxation. The former increases the disposable income of citizens while the latter reduces it. There are also policies, such as the setting of a minimum wage, which influence market income, although we do not focus on these policies in our study as we want to analyse the effect of the tax-benefit system and not determine the political elements that influence the distribution of market income.

Added to income are the public monetary benefits received by individuals and families, leaving out in-kind benefits provided by the welfare state, as this information is not available in our database (we refer to Aaberge and Langorgen, 2006; De Wulf, 1981; Goerlich, 2016 for a discussion that includes in-kind benefits to the analysis). It would also require a complex imputation procedure to estimate the value of each in-kind service according to the cost of production included in the National Accounts of each country analysed. Many in-kind policies are universal services (education, health...) that benefit both men and women in the same way, so the introduction of in-kind benefits in the analysis would cause a greater decrease in the gender income gap. In absolute terms these in-kind policies do not change the gender gap but, as the gender income gap is a relative measure, a universal in-kind policy would reduce it.[2]

The public monetary benefits analysed are the following: unemployment benefits, old-age pensions, survivor pensions, sickness, disability, family, social exclusion, education and housing. The individual benefits (unemployment, pensions, survivor and disability benefits) are assigned directly to the person who has the right to receive the benefit, whereas the household benefits (family, social exclusion and housing) are allocated between the members of the household according to EUROMOD criteria[3,4].

In our analysis, we have also differentiated between contributory and non-contributory benefits. This is an important consideration as in contributory pensions the amount of benefits is dependent on the person's previous situation in the labour market. In the literature, a number of authors consider contributory pensions as, in some cases, deferred income and not simply a government transfer (Lusting, 2018; Alvaredo, 2011; Breceda *et al*., 2008; Immervoll *et al*., 2009).

Our analysis includes the two most important direct taxes that have a clear effect on disposable income: personal income tax and workers' social contributions. Indirect taxes, such as VAT or excise duties, are not included as these are taxes paid after attaining a disposable income.

The different categories of income, defined as market income and disposable income, allow us to determine different measures of the gender gap on which to focus the analysis[5].

There are several ways of defining the gender income gap. The most obvious one is the absolute difference in income between men and women. This difference may be useful for giving a general perspective for a national currency but it does not allow an international comparison or a longitudinal analysis. We prefer to use a relative measure of the income gap as the difference between the average income for men ($\bar{Y}_m$) and women ($\bar{Y}_f$) relative to the average income of men:

$$\frac{\bar{Y}_m - \bar{Y}_f}{\bar{Y}_m} * 100 \quad (1)$$

A positive value of this index indicates a better position for men, with regards to average income, relative to women and this position is stronger the closer this figure is to 100, its highest possible value.

The starting point of the analysis is the gender market income gap. Once the average market income for men and women is obtained, using individual data from every man and woman, we have calculated the average market income. Once it is obtained, the gender market income gap is calculated with the formula of equation (1). From this starting point, we study how, due to monetary benefits and taxes, market income changes into disposable income.

First, we calculate the gender income gap for each EU28 country. Then, taking into account sociodemographic characteristics, we calculate the gender market income gap and the gender disposable income gap for each group in order to find out the effect of the tax-benefit system on each category. The categories under consideration are: educational level (primary, secondary or tertiary), labour market situation (self-employment, employed, pensioner or unemployed) and marital status (single or married). This analysis is done for each group and each country[6] but, in order to focus on the sociodemographic analysis, the results are presented as the averages of all countries.

With this information, it is possible to evaluate the contribution of each policy to the reduction or widening of the gender gap. This way of assessing the variation of the gap follows

the "gender budgeting approach" (Stotsky, 2007), which aims to introduce a gender perspective on the analysis of public policy effects so that gender inequalities can be addressed through a better and more conscious budgeting design.

2.2. Inequality methodology

To calculate the redistributive effect of the tax-benefit system we use the Reynolds-Smolensky (1977) index (Π_{RS}), as the difference between market income inequality (G_Y) and disposable income inequality (G_{Y_D}), in terms of the Gini index:

$$\Pi_{RS} = G_Y - G_{Y_D} \tag{2}$$

In order to determine the actual distributive effect between the two groups, men and women, we follow the decomposition of the Gini coefficient for the whole population into different k groups proposed by Dagum (1997):

$$G = \sum_{j=1}^{k} G_{jj} P_j S_j + \sum_{j=1}^{k} \sum_{h=1}^{j-1} G_{jh}(P_j S_h + P_h S_j) = G_w + G_b \tag{3}$$

where G_b measures the contribution of inequality *between* groups, under the assumption that individuals of the same group have the same income level (the average income) *and* G_w measures the contribution of inequality *within* groups. P_j represents the $j\text{-}th$ group share in total population, and S_j the $j\text{-}th$ group income share.

Alvaredo (2011) applies this decomposition for the two-group case:

assuming that $P_2 = (1 - P_1)$; $S_2 = (1 - S_1)$; and $G_{12} = G_{21}$.

$$G = G_{11} PS + G_{22}(1 - P)(1 - S) + G_{12}[P(1 - S) + (1 - P)S] = G_w + G_b \tag{4}$$

Simplifying expression (4), we obtain:

$$G = G_{11} PS + G_{22}(1 - P)(1 - S) + (S - P) = G_w + G_b \tag{5}$$

In this paper, we apply this decomposition to gender instead of to different income levels. Doing so, expression (5) changes to:

$$G_Y = G_Y^m p S_Y + G_Y^w (1 - p)(1 - S_Y) + (S_Y - p) \tag{6}$$

where G_Y^m and G_Y^w stand for the Gini coefficient for men's market income and for women's market income, respectively; p the men's share in total population; and S_Y the men's share in total market income Y.

Allowing for differences between men and women, as Onrubia *et al*. (2019) do in the case of the top earners of the population, we can express the Reynolds-Smolensky index as:

$$\Pi_{RS} = (G_Y^B - G_{YD}^B) + p(S_Y G_Y^m - S_{YD} G_{YD}^m) + (1-p)[(1-S_Y)G_Y^W - (1-S_{YD})G_{YD}^W] \quad (7)$$

G_Y^B and G_{YD}^B being the Gini coefficient *between* men and women for market income and for disposable income; G_Y^m the Gini index *within* men for market income; p the male population (obviously, it does not change from market income to disposable income); S_Y and S_{YD}, the male share of the total market income and disposable income, respectively.

After several rearrangements, the final formula for decomposing the Reynolds-Smolensky index is the following:

$$\Pi_{RS} = \Pi_{RS}^B + pS_Y\Pi_{RS}^m + (1-p)(1-S_Y)\Pi_{RS}^w + (S_Y - S_{YD})[pG_{YD}^m - (1-P)G_{YD}^w] \quad (8)$$

where Π_{RS}^B represents the redistributive effect *between* men and women, a measure of change in gender income gap. There are also two weighted *within* effects for men and women, and finally an interaction term.

2.3. Database

The most appropriate data for this type of analysis at a European level is considered to be the European Union Statistics on Income and Living Conditions (EU-SILC), which includes numerous variables on income, labour, education, gender and other socio-economic characteristics for all individuals of the survey. In addition, EUROMOD[7], a tax-benefit microsimulation model for the European Union (Sutherland and Figari, 2013), is used to obtain the data related to tax-benefit systems, since this model complements the EU-SILC data.

EUROMOD is based on the EU-SILC microdata and simulates tax and benefit policies, that is, applies arithmetically the fiscal rules in place in a given country at a given point in time. EUROMOD has several advantages for analysing the gender income gap. Firstly, all the income and benefits received by each household are individualised[8] and, therefore, it is possible to obtain different values for men and women within the same household. Secondly, EUROMOD compares the results of simulations (in terms of number of taxpayers/benefit recipients and aggregate revenue/cost) with official external numbers. In addition, the recalculation completed by the model allows the personal income tax and the social contribution paid by each person to be separated. The third advantage is the upgrade of data: the EU-SILC survey has a delay of approximately two years between the interviews and the publication of results while, with EUROMOD, it is possible to estimate the results for the public policies from the previous year. In this paper, we use the 2016 information (updated to 2018) to simulate the public policies in force in 2018 in each country of the European Union.

Using EUROMOD, it is possible to simulate reforms in tax-benefit policies. This is a very interesting tool because it allows the most effective policies of one country to be replicated in another.

All individuals in the EUROMOD survey are included in our study with the sole condition being that they are adults (18 years or older)[9]. The results are presented, taking into account weighting factors to represent the whole population of each country.

2.4. European framework

In this section we provide some descriptive statistics of the different EU-28 countries related to the study and relevant for our analysis. The first two columns of Table 1 show the employment population rate by gender. These figures represent the labour market gap in terms of participation. Also included in Table 1 is information on monthly minimum wages and hourly earnings in Purchasing Power Standard (PPS), and the type of personal income tax with respect to the highest statutory tax rates and the type of tax basis.

Table 1
DESCRIPTIVE STATISTICS OF THE DIFFERENT EU-28 COUNTRIES

	Active population % (2018)		Monthly minimum wages	Hourly earnings € in PPS (2014)		Personal income tax	
	Men	Women	€ in PPS (2018)	Men	Women	Top statutory tax rates 2019 (%)	Type of tax basis
Austria	84.80	75.00	—	16.58	12.90	50.00	individual
Belgium	78.80	69.30	1,406.91	18.85	17.62	53.10	individual
Bulgaria	81.00	71.60	515.63	5.27	4.52	10.00	individual
Croatia	75.90	66.10	679.44	9.05	8.26	42.50	individual
Cyprus	86.30	75.40	—	13.26	11.38	35.00	individual
Czech Republic	88.90	74.20	671.96	9.40	7.29	15.00	individual
Denmark	85.30	78.70	—	21.68	18.22	55.90	individual
Estonia	87.90	79.80	624.32	9.11	6.55	20.00	individual
Finland	84.10	79.80	—	17.81	14.53	51.10	individual
France	82.40	74.20	1,358.12	17.44	14.74	51.50	joint
Germany	87.20	78.10	1,439.80	19.58	15.21	47.50	individual/joint
Greece	82.70	64.80	811.92	11.79	10.31	55.00	individual
Hungary	85.00	69.50	693.21	8.70	7.38	15.00	individual
Ireland	84.90	71.90	1,267.49	21.43	18.44	48.00	individual/joint
Italy	80.70	60.10	—	15.40	14.46	47.20	individual
Latvia	86.40	80.00	582.78	6.98	5.77	31.40	individual
Lithuania	85.00	81.20	608.47	6.70	5.81	27.00	individual
Luxembourg	79.90	72.10	1,578.80	19.46	18.41	45.80	joint
Malta	89.10	66.20	909.07	12.79	11.44	35.00	individual/joint
Netherlands	87.20	76.90	1,422.19	17.68	14.84	51.80	individual
Poland	82.50	67.60	858.59	10.52	9.71	32.00	individual/joint
Portugal	84.40	77.80	779.92	9.92	8.44	53.00	individual/joint

(*Continued*)

	Active population % (2018)		Monthly minimum wages	Hourly earnings € in PPS (2014)		Personal income tax	
	Men	Women	€ in PPS (2018)	Men	Women	Top statutory tax rates 2019 (%)	Type of tax basis
Romania	82.60	62.70	772.74	5.37	5.13	10.00	individual
Slovakia	84.20	70.40	683.39	8.70	6.98	25.00	individual
Slovenia	82.90	76.00	992.11	11.19	10.41	50.00	individual
Spain	84.30	73.20	928.43	13.82	11.76	43.50	individual/joint
Sweden	89.90	85.20	—	17.69	15.24	57.20	individual
United Kingdom	86.90	76.50	1,261.24	17.23	13.63	45.00	individual
EU-28	84.40	72.40	—	15.93	13.16	39.00	

Source: compiled by the authors based on EUROSTAT and EUROMOD.

The first columns of Table 1 show participation rates for men and women in the labour market, compared to total employment. Women participation is lower in all EU-28 countries by an average difference of 12 percentage points. In Nordic countries, such as Finland, Latvia and Sweden this difference is lower than 5 percentage points. However, in some Mediterranean or Eastern counties, such as Malta, Greece, Italy, Romania, Hungary and Czech Republic, the difference is above 15 percentage points.

As highlighted previously, there are policies, such as the minimum wage, that influence market income. For example, Luxembourg has established a minimum wage of 1,578€ whereas the Bulgarian wage is only 515€. In general, countries with lower minimum wages do not show significant differences between the salaries of men and women.

In terms of hourly earnings, men receive a higher wage than women, with an average difference of 2.77€. This disparity is more striking in the Czech Republic, Austria, and Germany, with a difference of almost 30 percentage points. In Estonia, the situation is even worse, with a difference of almost 40 percentage points. However, in some Eastern European countries, like Romania, Croatia, Slovenia and Poland, where the salaries are lower, the salary difference between men and women is around 7 percentage points. A similar situation is to be found in Belgium and Luxembourg.

Finally, the characteristics of personal income tax may have an influence on the gender income. The accumulation of income in the case of joint taxation, especially when the marginal tax rate is high, can generate a higher tax payment for the secondary earner of the household, usually the woman. Nowadays, the only countries that maintain certain types of joint taxation are France, Germany, Ireland, Luxembourg, Malta, Poland, Portugal and Spain. All these countries, however, have introduced some mechanism to correct the problem of accumulation and the taxpayer is given the opportunity to choose between individual or joint filing (except France and Luxembourg).

These data show that there are elements such as participation in the labour market, the regulation of a minimum wage or the design of personal income tax that influence the gender income gap. However, the data also show that European countries have very different profiles when it comes to the labour market situation.

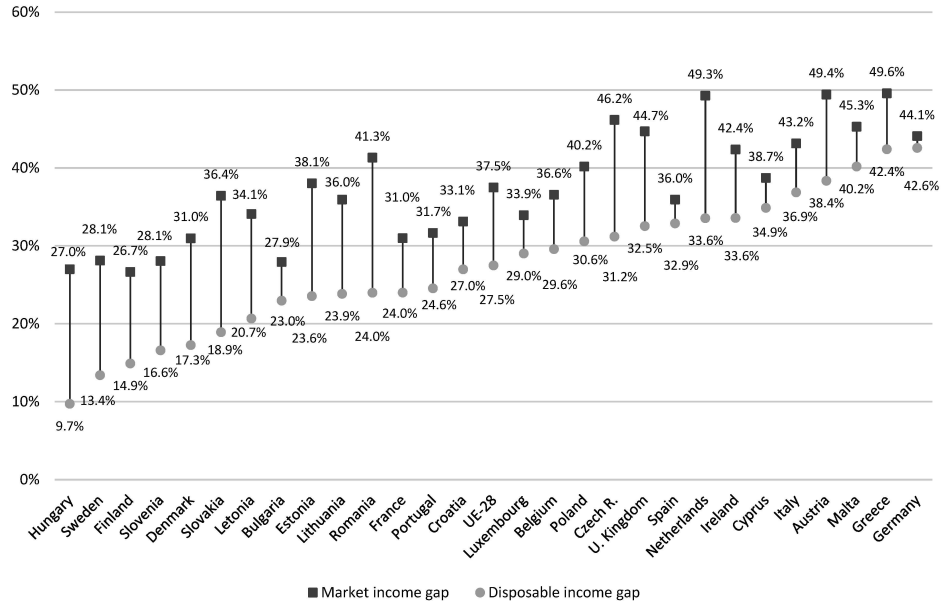
3. Gender income gap and its reduction

3.1. Analysis by country

The results of the total effect that the tax-benefit system has on the gender income gap for all European countries are presented in Figure 2.

As explained in the methodological section, we start by calculating the gender market income gap, and then move on to measure the gender disposable income gap. In Figure 2, the countries are ordered depending on the value of the latter. The difference between market income and disposable income depends on different monetary benefits and taxes. Next, we calculate the change in the gender income gap. This change can be seen as a measure of how policies contribute to improving or worsening the situation for women. We consider the overall gap change resulting from all these policies as a whole as well as from the effect of each policy of the tax-benefit system.

Figure 2
GENDER INCOME GAP ON MARKET AND DISPOSABLE INCOME



Source: Compiled by the authors based in EUROMOD.

The gender market income gap in Europe varies from just under 30% in Finland, Hungary, Bulgaria, Slovenia and Sweden to nearly 50% in the Netherlands, Austria and Greece. This indicates that the starting point is very different, depending on the country analysed. Our focus is on the change, in particular the reduction in the gender income gap due to the tax-benefit system that is put in place in each country.

Countries whose public policies have the greatest effect on the gender income gap are Slovakia, Romania and Hungary, where the gap is reduced by more than 17 percentage points (p. p.). Almost all countries from eastern Europe come in above the average as well as the Nordic countries (Finland, Denmark and Sweden). In contrast, countries from southern and central Europe are below the average. The poorest results for reducing the gender income gap correspond to Germany and Spain, where the gap is reduced by a mere 1.5 p. p. and 3.1 p. p., respectively.

It is worth noting that, as a result of their public policies, several countries manage to change their position in relation to gender market income gap levels. For example, Sweden initially has the fifth lowest position for its gender market income gap, but after applying policies it moves to second position with its gender disposable income gap. In contrast, Germany starts at the 22nd position for its initial gender market income gap but, as its policies have hardly any effect on reducing the gap, it subsequently shows the worst result in gender disposable income gap.

This information can be separated in four main components: contributory and non-contributory benefits, personal income tax and worker's social contributions. Table 2 shows how each type of policy affects the gender income gap in each country.

Table 2
GENDER INCOME GAP CHANGES BY KIND OF POLICY

	Contributory benefits	Non contributory benefits	Personal income tax	Social contributions	Total
Austria	5.7%	-0.2%	4.2%	1.3%	11.0%
Belgium	3.5%	-0.3%	2.0%	1.8%	7.0%
Bulgaria	4.4%	-0.2%	0.1%	0.7%	5.0%
Croatia	4.2%	0.3%	0.4%	1.3%	6.2%
Cyprus	-0.1%	2.2%	1.7%	0.1%	3.8%
Czech R.	9.4%	2.0%	1.3%	2.3%	15.0%
Denmark	7.3%	1.7%	4.8%	-0.2%	13.7%
Estonia	11.6%	-0.4%	2.7%	0.6%	14.5%
Finland	5.6%	1.0%	4.0%	0.5%	11.1%
France	1.4%	1.7%	2.1%	1.8%	7.0%
Germany	1.0%	0.2%	0.7%	-0.3%	1.6%
Greece	6.2%	0.0%	0.5%	0.2%	6.9%
Hungary	11.7%	-1.0%	1.5%	3.0%	15.2%

(*Continued*)

	Contributory benefits	Non contributory benefits	Personal income tax	Social contributions	Total
Ireland	3.0%	2.4%	3.0%	0.4%	8.8%
Italy	3.1%	0.0%	2.0%	1.2%	6.3%
Latvia	8.0%	1.8%	2.0%	1.6%	13.4%
Lithuania	9.3%	0.1%	1.2%	1.5%	12.1%
Luxembourg	0.8%	0.2%	3.7%	0.2%	4.9%
Malta	0.1%	2.4%	2.3%	0.4%	5.1%
Netherlands	5.4%	1.6%	6.1%	1.5%	14.6%
Poland	8.9%	-0.1%	-0.1%	0.9%	9.6%
Portugal	2.0%	0.3%	3.9%	0.9%	7.1%
Romania	8.0%	4.1%	0.6%	4.6%	17.3%
Slovakia	10.3%	1.4%	1.4%	4.4%	17.5%
Slovenia	8.7%	-0.5%	0.7%	2.2%	11.2%
Spain	-0.5%	2.1%	1.3%	0.2%	3.1%
Sweden	5.4%	3.2%	5.2%	0.9%	14.7%
U. Kingdom	3.7%	3.2%	4.5%	0.8%	12.2%
EU-28	5.3%	1.0%	2.3%	1.2%	9.8%

Source: Compiled by the authors based on EUROMOD.

Contributory and non-contributory benefits

As stated in the literature, contributory benefits are much more effective in terms of gender income gap reduction. On average, contributory benefits reduce the gap by 5.3 p. p., while non-contributory benefits reduce it by only 1.0 p. p.

Nevertheless, patterns among countries are quite different. Contributory benefits can reduce the gender income gap by more than 11 p. p., in the case of Estonia and Hungary, or increase it slightly, as in Spain (-0.5 p. p.) and Cyprus (-0.1 p. p.). Non-contributory benefits also have a varied effect on the gender income gap across countries, with a reduction seen in countries such as Romania (4.1 p. p.) and UK (3.2 p. p.) and an increase in Hungary (-1.0 p. p.) and Slovenia (-0.5 p. p.).

Personal income tax

Personal income tax produces, on average, the second greatest reduction in gender income gap (2.3 p. p.), just behind contributory benefits. Differences between countries are also very remarkable: from a 6.1 p. p. reduction in the case of the Netherlands to a 0.1 p. p. widening of the gender income gap in Poland.

As it is well known, personal income tax is usually progressive. This means that we can expect income tax to reduce the gender income gap, where it exists. If market income shows a

gender gap, income tax will work as an automatic stabilizer because it increases tax rates proportionally more for people earning more (men) compared to people earning less (women). Progressivity is probably the main explanation for these diverse differences among countries. In the Netherlands, tax rates range from 8.9% to 51.95%; in Poland personal income tax is much less disparate, with rates from 18% to 32%. Where income tax is less progressive, its effect on gender income gap is weaker.

Income tax is also a personal tax, meaning that it takes into account personal and family circumstances. Family circumstances probably reduce the gender income gap. There are also some countries where income tax includes specific measures to support women. For example, in Spain, there are some specific tax credits aimed at working women with children. This measure, independent of the tax structure, clearly contributes to reducing the gender income gap.

Social security contributions

Social security contributions are, in general, a proportional tax and therefore would not be expected to significantly affect the gender income gap. On average, its effect is low at just a 1.2 p. p. reduction. But differences between European countries are quite substantial. Romanian or Slovakian social contribution systems reduce the gender income gap by more than 4 p. p. whereas in Germany and Denmark their systems widen the gap slightly.

In social contribution systems, there are some elements that imply a certain degree of progressivity. For example, in Belgium there is a reduction in contribution for low-paid workers. As a result, the system changes into a progressive one. In other countries, such as Spain, the social security contributions have some minimum thresholds (the payments cannot be lower than a certain amount) and also the system is capped so social contributions cannot exceed a certain amount. These elements change a theoretically proportional system to a regressive one. For this reason, Belgium is ranked 7th in Europe whereas Spain is ranked 25th.

3.2. Analysis by benefit policy

Table 3 presents detailed information on the reduction in the gender income gap by country as a result of each benefit policy. It offers a vast amount of information worth further scrutiny. In this section, we analyse the effect of these different policies on the gender income gap.

Unemployment benefits

In the case of unemployment benefits, *a priori* we do not expect a remarkable effect on the gender income gap. The most important type, the contributory benefit, is closely related to wages and so we expect the benefit to replicate the distribution of salaries among men and women. In fact, the range of gender income gap change is very narrow: from a 0.6 p. p. increase (Ireland) to a 1.1 p. p. reduction (Denmark).

Retirement pensions

In general terms, we can assume that retirement pension benefits (particularly the contributory type) are a reflection of the history of the labour market over previous decades. Contributory pension depends on wage history so we would expect a widening of the gender income gap: firstly, because the gender wage gap in the past was wider than nowadays; and, secondly, because one can expect a more precarious contribution history for women. Furthermore, in many countries part-time work is carried out by more women than men. For these reasons, we can expect a retirement pension distribution worse than the corresponding one for current wages.

Table 3 shows some countries, especially Eastern European countries, where the retirement pension system clearly reduces the gender income gap. In these countries, the labour market was, historically, more equitable between men and women (Drakulic, 2000; UNICEF, 1999), therefore the corresponding current contributory pension system should also be seen to be more equitable. In contrast, there are some countries where the retirement pension system clearly widens the gender income gap. This is the case in central and southern European countries. These countries (Spain, Italy, Luxembourg and Germany) are characterized by dual labour markets where precarious conditions are more common for women (Spain); or where part-time work is spread among women (German mini-jobs) (European Commission, 2018; Eurofound, 2016; Lorente, 1990).

Survivor benefits

These benefits are closely related to retirement pension as they are also linked to the labour history of the country. Spain presents the best result (a reduction in the gender income gap of 5.9 p. p.) while being the worst in retirement pension systems. This pattern is shared among those countries that performed badly in retirement pension benefits. The opposite is also true: countries producing very strong reductions in retirement pensions are now at the bottom of the list. In Spain, the labour history of women has been very poor, so the right to a survivor's pension is very important. In Estonia, the retirement pension system considerably reduces the gender income gap, therefore the difference between men and women receiving survivor benefits is minor (Maruani, 2004).

Another factor to consider is the difference in life expectancy between men and women in different countries. In countries where this difference is higher in favour of women, we can expect a higher presence of survivor benefits for them (European Commission, 2018; EUROSTAT[10]).

Disability and sickness benefits

These policies do not produce relevant changes in the reduction of the gender income gap. The main impact related to these policies is produced as benefits in kind, information that is not collected by the EUROMOD data. Furthermore, the monetary benefits considered are assigned according to variables not directly related to gender.

Family benefits

Application of this policy shows quite significant differences across countries. In Romania, the gender income gap is reduced by 4.8 p. p. as a result of family benefits. Similar results are presented by Latvia and Sweden. In contrast, the family policy slightly worsens the gender income gap in Hungary, Belgium, Austria, Italy, Greece, Germany and Poland. An initial explanation could be simply the amount of public expenditure: Latvia or Sweden are countries where the percentage of public spending over GDP is higher. From this point of view, a higher spending could mean a greater gender income gap reduction. But this relationship is not always true: Austria and Belgium are also among the most generous countries in family benefits as a fraction of GDP.

There is another explanation for these differences. In Latvia and Sweden, the average amount of family benefits received by women is much higher than the average amount received by men (145% and 220%, respectively). In contrast, in Austria and Belgium the average amount received by women is lower than the corresponding amount for men (88% and 78%). Since there is no specific difference by gender in the implementation of policies, these differences must be related to household composition: the frequency of one-parent families headed by women compared to men, unemployment by gender, and similar variables. These differences can result in policy implementation having a different response in each country.

Social exclusion benefits

The effect of social exclusion benefits on the reduction of the gender income gap is very limited. It ranges from a reduction of 0.6 p. p. (United Kingdom) to a widening of the gap by 0.4 p. p. (Slovakia). The main reason for this is that public spending is minimal compared to other policies. The average spend in EU-28 on social exclusion benefits is only 0.47% of GDP.

But a curious pattern emerges among countries. Some countries that were in top positions for family policy are situated at the bottom for social exclusion benefits, as in the case of Romania. It holds the first position for family benefits (a reduction in the gender income gap of 4.8 p. p.) and the 26th position if ranked depending on social exclusion policies (widening the gender income gap by 0.2 p. p.). On the contrary, Austria is in the 26th position for family policies (0.4 p. p. widening of the gender income gap) but in third position concerning social exclusion benefits. This evidence suggests that these two policies must be related, as poverty and family are issues which are very closely linked. If family policy adequately covers problems related to poverty among households, then a social exclusion policy is not needed. And the opposite is also true: if family policy fails, social exclusion policy acts as a safety net.

Education and housing benefits

These two types of benefits have very little effect on the gender income gap. On average, each of them reduces the gap by only 0.1 p. p.. But this situation is not so straightforward, as these two policies are not usually implemented through monetary benefits.

Table 3
GENDER INCOME GAP REDUCTION BY COUNTRY AND POLICY

Unemployment		Retirement pensions		Survivor benefits		Sickness benefits		Disability benefits		Family benefits		Social exclusion		Education		Housing benefits	
Denmark	1.1%	Hungary	12.7%	Spain	5.9%	Sweden	1.1%	Denmark	1.4%	Romania	4.8%	UK	0.6%	Denmark	0.7%	UK	0.9%
Germany	0.7%	Estonia	8.2%	Italy	5.7%	Slovenia	0.6%	Ireland	1.2%	Latvia	3.5%	Netherl.	0.6%	Sweden	0.5%	Sweden	0.6%
Finland	0.7%	Slovakia	7.9%	Greece	4.9%	Bulgaria	0.5%	UK	1.0%	Sweden	2.9%	Cyprus	0.5%	UK	0.4%	Denmark	0.5%
Austria	0.4%	Czech R.	7.6%	Croatia	4.9%	Denmark	0.5%	Sweden	0.9%	Cyprus	2.4%	Austria	0.4%	Netherl.	0.3%	Finland	0.4%
Spain	0.4%	Lithuania	7.1%	Luxemb.	4.3%	Netherl.	0.4%	Czech R.	0.5%	Estonia	2.3%	Malta	0.4%	Ireland	0.1%	Ireland	0.4%
Greece	0.3%	Poland	6.7%	Cyprus	3.4%	Germany	0.2%	Luxemb.	0.5%	Ireland	2.0%	Denmark	0.4%	Luxemb.	0.1%	Netherl.	0.4%
Estonia	0.3%	Romania	6.1%	Portugal	2.8%	Estonia	0.2%	Belgium	0.5%	Slovakia	1.8%	Luxemb.	0.3%	Malta	0.1%	France	0.3%
Bulgaria	0.3%	Latvia	6.0%	Slovenia	2.6%	Czech R.	0.2%	Italy	0.5%	Czech R.	1.6%	Greece	0.3%	Slovenia	0.1%	Czech R.	0.2%
Lithuania	0.2%	Slovenia	4.3%	Austria	2.6%	UE-28	0.2%	Austria	0.5%	Malta	1.4%	Spain	0.2%	UE-28	0.1%	UE-28	0.1%
Netherl.	0.2%	Netherl.	4.3%	Poland	2.5%	Lithuania	0.2%	Netherl.	0.4%	Lithuania	1.3%	Belgium	0.1%	Italy	0.1%	Malta	0.1%
Latvia	0.1%	Denmark	4.2%	Slovakia	2.1%	Latvia	0.1%	Germany	0.3%	Croatia	1.3%	UE-28	0.1%	Germany	0.1%	Austria	0.1%
EU-28	0.1%	UK	2.8%	Finland	2.0%	Hungary	0.1%	Estonia	0.3%	Finland	1.3%	Czech R.	0.1%	Hungary	0.1%	Slovenia	0.0%
Slovenia	0.1%	EU-28	2.7%	Germany	2.0%	Slovakia	0.1%	UE-28	0.1%	France	1.2%	Portugal	0.1%	Finland	0.1%	Hungary	0.0%
Croatia	0.1%	Finland	2.5%	UE-28	1.9%	Belgium	0.1%	Slovakia	0.1%	Bulgaria	1.1%	Germany	0.1%	Spain	0.1%	Germany	0.0%
France	0.1%	Sweden	2.4%	Romania	1.4%	Croatia	0.1%	Greece	0.1%	UK	1.1%	Lithuania	0.1%	Croatia	0.1%	Spain	0.0%
Sweden	0.1%	Belgium	2.4%	Czech R.	1.2%	Luxemb.	0.1%	France	0.0%	UE-28	1.0%	France	0.1%	Belgium	0.0%	Portugal	0.0%
Poland	0.1%	Bulgaria	2.3%	Lithuania	0.7%	Portugal	0.0%	Hungary	0.0%	Slovenia	0.7%	Ireland	0.1%	Portugal	0.0%	Latvia	0.0%
Hungary	0.0%	Austria	1.9%	Malta	0.6%	UK	0.0%	Slovenia	0.0%	Spain	0.5%	Finland	0.1%	Lithuania	0.0%	Lithuania	0.0%
Slovakia	0.0%	Ireland	1.8%	Belgium	0.6%	Austria	0.0%	Romania	0.0%	Luxemb.	0.2%	Latvia	0.0%	Estonia	0.0%	Luxemb.	0.0%
Czech R.	0.0%	France	1.4%	Hungary	0.4%	Spain	0.0%	Malta	-0.1%	Portugal	0.1%	Sweden	0.0%	Czech R.	0.0%	Poland	0.0%
Belgium	0.0%	Greece	0.9%	Ireland	0.4%	Malta	0.0%	Portugal	-0.1%	Netherl.	0.1%	Croatia	0.0%	France	0.0%	Belgium	0.0%
UK	0.0%	Croatia	0.3%	Bulgaria	0.3%	Poland	0.0%	Bulgaria	-0.2%	Denmark	0.1%	Estonia	0.0%	Austria	0.0%	Romania	0.0%
Romania	0.0%	Malta	0.0%	France	0.2%	Romania	0.0%	Latvia	-0.2%	Poland	-0.1%	Italy	0.0%	Latvia	0.0%	Bulgaria	0.0%
Malta	0.0%	Portugal	-0.6%	Denmark	0.2%	Italy	0.0%	Lithuania	-0.2%	Germany	-0.2%	Hungary	0.0%	Greece	0.0%	Greece	0.0%
Portugal	-0.1%	Germany	-1.9%	Sweden	0.1%	Greece	0.0%	Finland	-0.3%	Greece	-0.2%	Poland	0.0%	Slovakia	0.0%	Slovakia	0.0%
Italy	-0.2%	Italy	-2.6%	Latvia	0.1%	Finland	0.0%	Cyprus	-0.3%	Italy	-0.3%	Bulgaria	-0.1%	Poland	0.0%	Italy	0.0%
Luxemb.	-0.4%	Cyprus	-3.3%	Netherl.	0.1%	Cyprus	0.0%	Poland	-0.4%	Austria	-0.4%	Romania	-0.2%	Bulgaria	0.0%	Croatia	0.0%
Cyprus	-0.5%	Luxemb.	-4.1%	Estonia	0.0%	Ireland	0.0%	Spain	-0.6%	Belgium	-0.6%	Slovenia	-0.3%	Romania	0.0%	Cyprus	0.0%
Ireland	-0.6%	Spain	-4.9%	UK	0.0%	France	-0.1%	Croatia	-2.2%	Hungary	-1.2%	Slovakia	-0.4%	Cyprus	-0.1%	Estonia	-0.1%

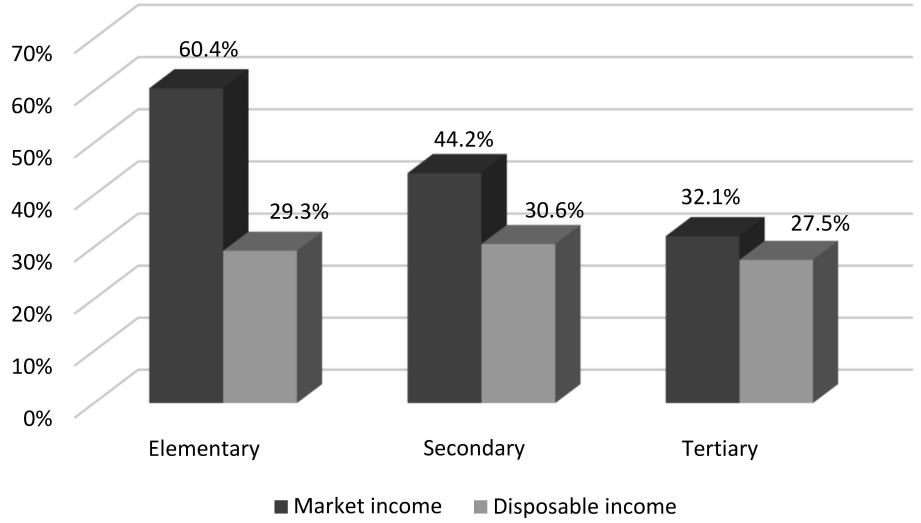
Source: Compiled by the authors based on EUROMOD.

3.3. Sociodemographic analysis

In the third analysis, we compare the situation of different sociodemographic groups. The effect of the tax-benefit system for each group is analysed, with the gender income gap being calculated before and after policies are introduced. We present the results for three sociodemographic characteristics (educational level, labour market situation and marital status), averaged for the EU-28 countries. Data for each individual country are detailed in the Annexes.

Figure 3 shows the gender income gap by educational level (elementary, secondary and tertiary) averaged for the EU.

Figure 3
GENDER INCOME GAP BY EDUCATIONAL LEVEL



Source: Compiled by the authors based on EUROMOD.

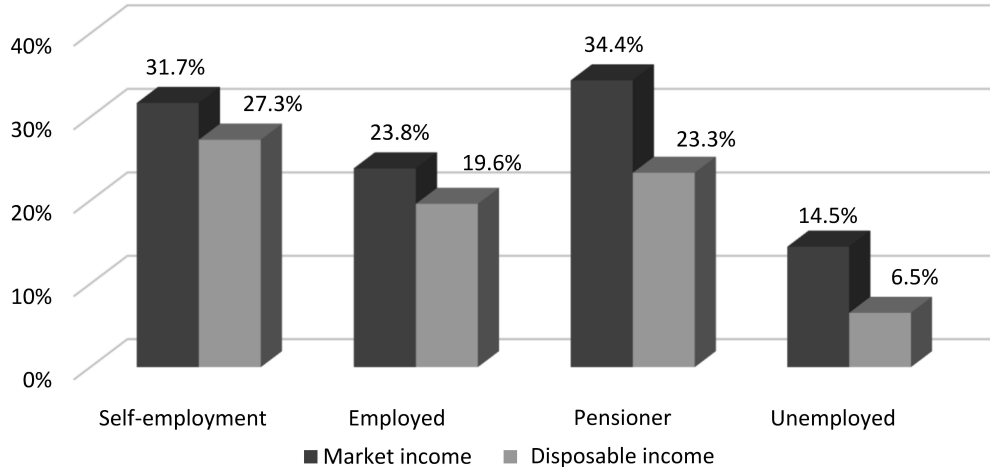
The most obvious trend in Figure 3 is that the gender market income gap decreases as the educational level increases. While the market income gap between men and women with primary education is more than 60%, this difference decreases by half in the tertiary group. This trend is maintained in all European countries. Therefore, a higher level of education is linked to greater gender equality.

Another trend clearly evident is that when the tax-benefit system is applied to calculate the disposable income, there is a significant reduction in gender inequalities in the group with primary studies. The income gap reduction within this group is more than 30 p. p. while in the tertiary education group it is only 4.5 p. p.. This leads us to conclude that the measures that most reduce gender inequality tend to reach social groups with lower educational levels.

Overall, all three educational levels show a similar gender disposable income gap of 30% once the tax benefit-system is applied.

Figure 4 shows the gender income gap by labour market situation (self-employment, employed, pensioner and unemployed) as an average for the EU.

Figure 4
GENDER INCOME GAP BY LABOUR MARKET SITUATION



Source: Compiled by the authors based on EUROMOD.

In Figure 4, the groups with the highest gender market income gap are pensioners and self-employed, with 34.4% and 31.7% respectively, followed by employees with 23.9% and unemployed with 14.5%. The analysis by country highlights some differences: France, Hungary and Ireland, for example, show a negative gender market income gap for pensioners, while Malta and Denmark show a negative gender market income gap for the unemployed group.

When applying the tax-benefit system, the effect is more noticeable in the pensioners group, reducing the gap by 12 p. p. The opposite is true in the case of the employed group in which, after applying the policies, the gap narrows by 4 p. p.

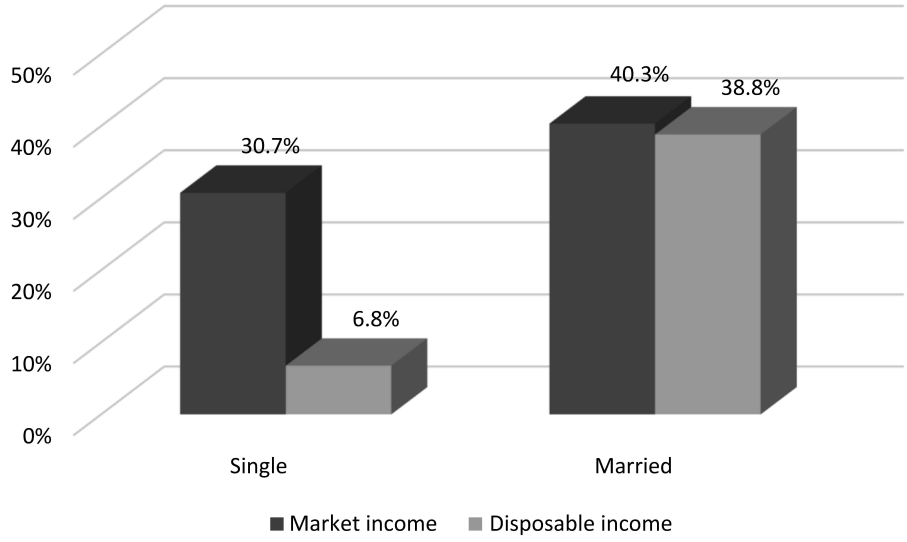
The final situation is better for all groups. Unemployed group continues to be the group with the least gender income gap (6.5%). In seven countries this group shows a negative gap (Denmark, Estonia, Latvia, Malta, Romania, Sweden and United Kingdom).

Finally, Figure 5 shows the EU average for gender income gap by marital status (single and married).

The information in Figure 5 shows that there are differences according to marital status in both market income and disposable income. Initially, the market income gap between men

and women is higher in the married group, at 40.3%, while in the singles group, this gap is 10 percentage points lower, at 30.7%. This pattern is repeated in almost all the European countries analysed; there are only seven countries in which the situation is reversed (Bulgaria, Croatia, Hungary, Romania, Slovakia, Slovenia and Sweden).

Figure 5
GENDER INCOME GAP BY MARITAL STATUS



Source: Compiled by the authors based on EUROMOD.

Application of the tax-benefit system has a much greater effect in reducing the gender income gap within the collective of singles than that of married people. In the singles group the gap is reduced by almost 24 p. p., while in the married group it is only reduced by 1.5 p. p.

In fact, after applying the policies, the outcome is very unbalanced between the two groups. The European average for the married group shows the gap is practically unchanged, at almost 39%, with only half of the countries showing an increase in the income gap after applying the tax-benefit system. In the singles group, the opposite occurs, the gender disposable income gap is reduced to a 6.8% in the EU average. This important reduction is seen in all countries, some of them reaching negative disposable income gap levels (Cyprus, Greece, Portugal and Spain).

Overall, this sociodemographic analysis from the perspective of education, labour market situation and marital status shows that the tax benefit system reduces the gender income gap, in every case and circumstance. The reduction is greater in the case of pensioners, singles and the lower education level group. It seems that policies effective in reducing the gender gap benefit these groups more.

4. Inequality

Another way to measure the effect of the tax-benefit system in reducing differences between men and women is through inequality indices, as explained in the methodological section. To measure these differences, we use the Reynolds-Smolensky (R-S) decomposed index to calculate the redistributive effect among men and women. This index allows us to study not only the differences *between* men and women as a group (as we aim to do by measuring the gender income gap) but also to analyse the inequality *within* men and *within* women as a group.

Another aspect that merits analysis is whether the reduction of the gender income gap has a direct relationship with the reduction of inequality overall and with the reduction of inequality within the group of men and women. Thus, we use two ways to measure the differences between men and women and to identify any possible implication.

4.1. Redistributive effect among men and women

Our first objective is to decompose the redistributive effect among men and women. By completing this analysis, we can identify whether the reduction seen in inequality after policy implementation is due to a reduction *between* the two groups or a reduction *within* each group.

Table 4 shows the results obtained from the analysis of the redistributive effect among the group of men and women after implementing the tax-benefit system in European countries.

The first column includes the total redistributive effect (Reynolds-Smolensky index) after the tax-benefit system has been implemented. In the other columns, the components on which this effect depends: *between* effect, men's *within* effect and women's *within* effect.

Table 4
REDISTRIBUTIVE EFFECT OF POLICY, BY EUROPEAN COUNTRY

Country	Total effect Π_{RS}	Between effect Π_{RS}^{B}	Men's within effect $pS_Y\Pi_{RS}^{m}$	Women's within effect $(1-p)(1-S_Y)\Pi_{RS}^{w}$
Austria	0.254	0.129	0.079	0.047
Belgium	0.272	0.137	0.080	0.057
Bulgaria	0.175	0.088	0.043	0.045
Croatia	0.227	0.115	0.060	0.053
Cyprus	0.168	0.077	0.053	0.038
Czech R.	0.245	0.128	0.057	0.060
Denmark	0.245	0.124	0.061	0.058
Estonia	0.194	0.101	0.036	0.057
Finland	0.291	0.147	0.074	0.070
France	0.232	0.117	0.065	0.051
Germany	0.218	0.106	0.068	0.045

(*Continued*)

Country	Total effect Π_{RS}	Between effect Π^{B}_{RS}	Men's within effect $pS_Y\Pi^{m}_{RS}$	Women's within effect $(1-p)(1-S_Y)\Pi^{w}_{RS}$
Greece	0.231	0.115	0.078	0.040
Hungary	0.222	0.116	0.047	0.060
Ireland	0.234	0.118	0.071	0.046
Italy	0.215	0.108	0.067	0.042
Latvia	0.171	0.089	0.029	0.054
Lithuania	0.198	0.102	0.039	0.058
Luxembourg	0.242	0.120	0.078	0.045
Malta	0.183	0.090	0.064	0.030
Netherlands	0.211	0.111	0.060	0.042
Poland	0.193	0.100	0.045	0.049
Portugal	0.217	0.110	0.058	0.050
Romania	0.250	0.132	0.062	0.059
Slovakia	0.235	0.123	0.051	0.061
Slovenia	0.254	0.129	0.063	0.063
Spain	0.189	0.093	0.059	0.037
Sweden	0.252	0.128	0.065	0.058
U. Kingdom	0.190	0.099	0.053	0.039
EU-28	0.222	0.113	0.059	0.051

Source: Compiled by the authors based on EUROMOD.

In Table 4 we can see that Finland, Belgium, Slovenia and Austria show the most redistributive tax-benefit systems, with an R-S index of more than 0.25 points. They are also the countries where the between effect among men and women is greater. In contrast, Cyprus, Latvia, Bulgaria, Malta and Spain have the least redistributive tax-benefit systems (R-S index less than 0.19 points) and the between effect is the weakest. Overall, countries with more redistributive systems, with a higher total effect, have a greater between effect.

If we consider which component contributes the most to inequality reduction, we see that, on average, the between effect is the most important, at 51%, while the within effect for men and for women represent 26% and 23% respectively. This trend is similar in the majority of countries, as the between effect represents approximately 50% of the total.

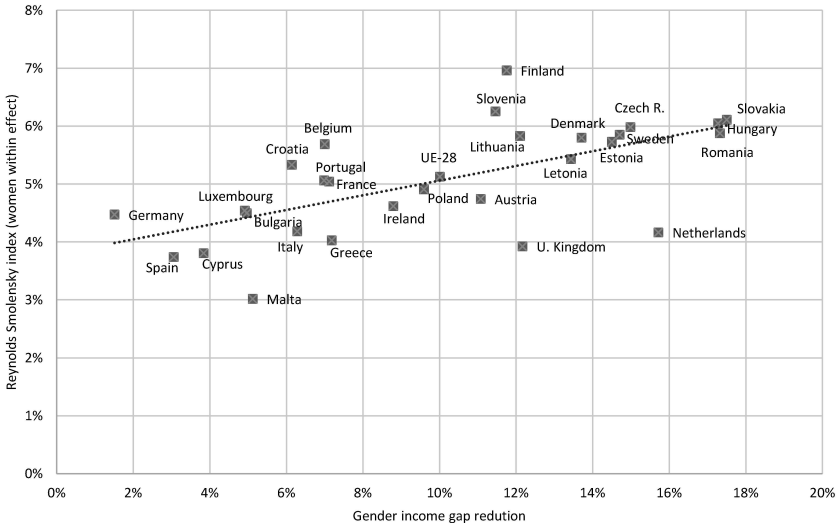
The other two components, men's within effect and women's within effect, do not have the same weight in all countries analysed. While in countries like Latvia, Estonia, Lithuania, Hungary or Slovakia, the women's within effect is greater than men's, in Malta, Greece, Luxembourg, Austria or Spain, the opposite occurs. The conclusion is that a reduction in inequality between men and women explains 50% of the reduction in total inequality, while the reduction in inequality within men and within women has a different effect, depending on the country analysed.

4.2. Gender income gap vs redistributive effect (R-S index)

In this section we analyse the relationship between the two ways of quantifying differences between men and women; the income gap and the redistributive effect.

Figure 6 shows the relationship between reduction in the gender income gap and reduction in inequality within women. It is clear that in those countries where public policy manages to achieve a greater reduction in the gender income gap, the reduction in inequality among women is greater. Therefore, fighting against the gender income gap also reduces inequality among women.

Figure 6
GENDER INCOME GAP REDUCTION VS WOMEN'S WITHIN EFFECT



Source: Compiled by the authors based on EUROMOD.

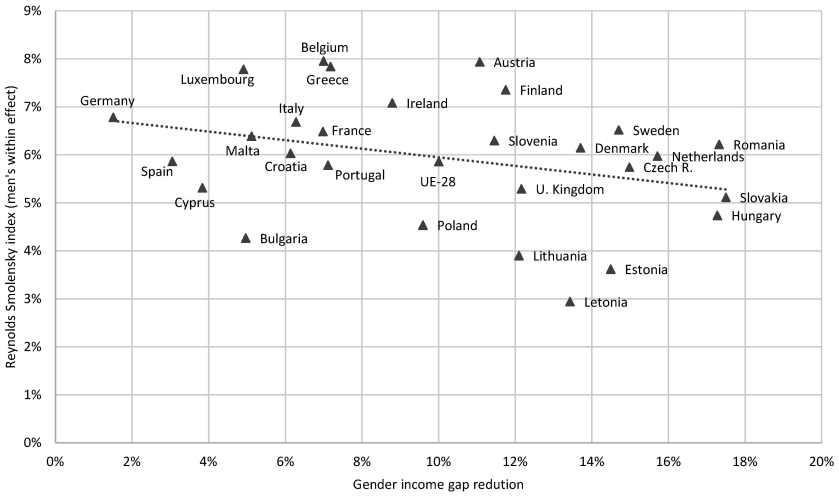
Interestingly, this pattern changes when we analyse men (Figure 7). Countries where public policy achieves a greater reduction in the gender income gap show less reduction of inequality among men. In any case, any reduction in the gender income gap that reduces inequality is welcomed, especially among groups that suffer inequality the most (women).

Lastly, in Figure 8, we represent the relationship between gender income gap reduction and the total redistributive effect after implementing public policies.

Analysis of the results shows that, on the one hand, Mediterranean countries (Spain, Malta, Cyprus, Italy, Portugal and Greece) are characterized by a very low gender income gap reduction and a lower Reynolds Smolensky index than the trend. On the other hand, Nordic countries like Finland, Sweden and Denmark stand out as being effective in terms of significantly reducing inequality, managing to reduce the Gini index above the trend. A further group of countries with a similar pattern are the eastern European countries: Romania, Slovakia and Hungary. They are characterized by a very high gender income gap reduction

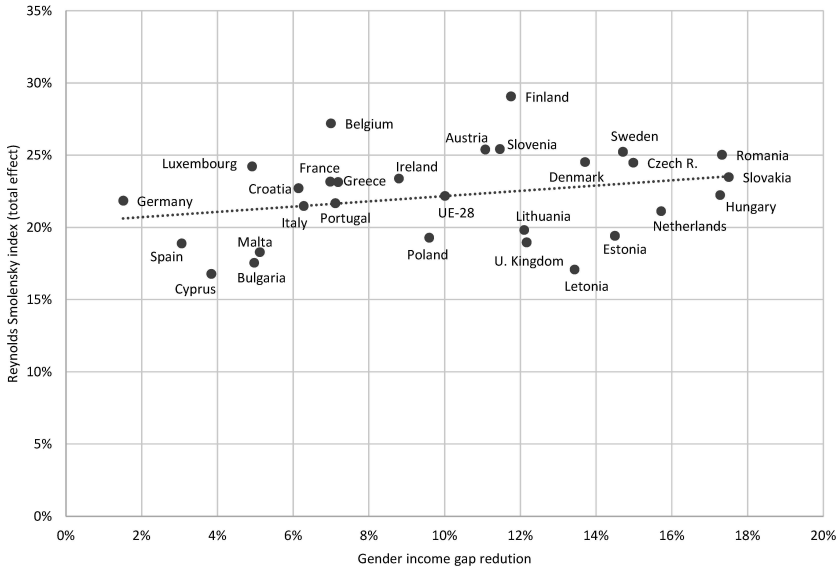
but their redistributive effect is close to the European average. This may be due to the greater effect that public pensions have on gender redistribution, and the effect of the presence of a socialist economy in these countries thirty years ago.

Figure 7
GENDER INCOME GAP REDUCTION VS MEN'S WITHIN EFFECT



Source: Compiled by the authors based on EUROMOD.

Figure 8
GENDER INCOME GAP REDUCTION VS REYNOLS SMOLENSKY (total effect)



Source: Compiled by the authors based on EUROMOD.

5. Conclusion

This paper aims to broaden the perspective from which the gender pay gap is analysed, introducing the idea that public intervention through tax-benefit policies can contribute to a reduction in the gender income gap. In addition, our study aims to provide empirical evidence that a decrease in the gender income gap positively influences reduction of social inequality.

The first significant result is that in countries of the European Union, implementation of a tax-benefit system leads to a decrease in the gender income gap, demonstrating that public intervention can improve the situation of women in terms of financial independence. This decrease varies greatly among countries, given that the social characteristics, economic development and public policies implemented are different in each country. While countries like Slovakia, Romania or Hungary reduce the gap by as much as 17 percentage points, other countries such as Germany, Spain or Cyprus achieve less than a 4 percentage points reduction.

In order to find an answer that explains these differences, we calculate the effect that each policy of the tax-benefit system has on the gender income gap in each country. The results show that the policy of retirement pensions is, on average, the one that most reduces the gender income gap. It is in the eastern European countries where the effect is greater, since the pension system reflects the pattern of the labour market which, historically, has been very balanced between men and women. The two policies of survivor benefits and personal income tax are also seen to have a generalized positive impact on the reduction of the gender income gap. Distinguishing between contributory and non-contributory benefits provides useful insight into their influence on the gender income gap. On average, contributory benefits are much more effective in reducing the gender income gap than non-contributory benefits. However, there is wide disparity between countries in the degree of effect that both types of benefits have.

The third set of results is related to a number of sociodemographic characteristics: education level, labour situation, and marital status. It can be seen that the lower the education level, the higher the gender income gap, although public policy often corrects these differences. With regards to the labour situation, the gender market income gap is higher for pensioners and for the self-employed although, again, public policy partially corrects this gap. Finally, the gender gap is seen to be wider for married people, but this imbalance is not corrected by public policy.

Once shown that public intervention through the tax-benefit system helps to reduce the gender income gap, the relationship between it and the reduction of inequality is analysed. The first analysis, the intra-group analysis (within the group of women) shows that there is a direct relationship: those countries that manage to reduce the gender income gap to a greater extent also achieve a greater reduction in inequality within the group of women.

Intergroup analysis of inequality, which measures the inequality between the group of women and that of men, reinforces the idea that a greater reduction in the gender income gap implies a greater reduction in inequality. The main conclusion is that fighting inequality

also means fighting the gender income gap. If a gender income gap exists, any general policy reducing inequality will also have a positive effect in the gender income gap reduction.

In this paper, a comprehensive study has been carried out at European level to understand the global situation and corroborate the main implications. On the basis of these results, future analyses would be ideally focused on specific countries. In this way, for example, studies of the policies with the greatest impact on the reduction of the gender income gap in certain countries can then be simulated to other countries.

Annex 1. Gender market income gap by sociodemographic characteristics

	Elementary	Secondary	Tertiary	Self-employed	Employed	Pensioner	Unemployed	Single	Married	Total
Austria		55.5%	36.8%	52.2%	35.6%	31.0%	28.1%	42.7%	54.4%	49.4%
Belgium	57.4%	49.4%	25.1%	16.0%	26.1%	27.5%	22.2%	34.0%	38.5%	36.6%
Bulgaria	53.5%	36.2%	26.3%	26.3%	12.9%	31.6%	16.2%	36.0%	20.7%	27.9%
Croatia	64.4%	41.1%	16.3%	1.8%	17.2%	18.9%	24.3%	33.7%	30.8%	33.1%
Cyprus	69.4%	45.2%	36.5%	35.2%	29.3%	56.3%	6.3%	12.4%	45.1%	38.7%
Czech R.		48.8%	41.2%	29.9%	29.0%	41.4%	31.9%	45.3%	45.9%	46.2%
Denmark	59.1%	28.5%	34.7%	23.0%	23.2%	33.6%	-33.1%	21.4%	35.9%	31.0%
Estonia	81.5%	52.1%	38.7%	34.6%	27.8%	50.9%	14.2%	35.2%	39.0%	38.1%
Finland		37.3%	33.9%	38.3%	25.2%	61.2%	9.5%	25.6%	33.3%	30.6%
France	35.8%	32.7%	30.1%	41.5%	25.8%	-14.8%	6.7%	19.9%	39.3%	31.0%
Germany	55.6%	46.4%	38.2%	47.1%	39.0%	42.4%	17.0%	23.5%	56.2%	44.1%
Greece	66.5%	53.6%	39.6%	38.7%	22.0%	26.2%	14.9%	39.1%	52.4%	49.6%
Hungary		42.0%	28.0%	13.7%	17.2%	-1.6%	4.5%	37.2%	31.7%	35.6%
Ireland	55.9%	54.4%	44.6%	44.6%	30.4%	-13.0%	24.0%	22.0%	48.9%	42.4%
Italy	63.6%	41.7%	33.2%	29.4%	20.8%	27.7%	5.8%	33.8%	47.8%	43.2%
Latvia	80.1%	49.2%	35.2%	19.8%	21.2%	29.8%	14.0%	29.8%	34.2%	34.1%
Lithuania	72.5%	52.0%	34.9%	34.6%	19.0%	42.6%	41.3%	27.7%	36.4%	36.0%
Luxembourg	50.5%	27.0%	28.8%	38.0%	22.1%	29.9%	19.4%	25.0%	38.2%	33.9%
Malta	75.5%	48.9%	30.7%	31.1%	20.0%	24.2%	-54.8%	25.6%	54.3%	45.2%
Netherlands	65.7%	51.7%	41.3%	44.2%	36.9%	55.8%	18.9%	29.6%	59.1%	49.3%
Poland	56.8%	51.9%	36.4%	60.2%	19.7%	46.5%	18.1%	36.7%	40.0%	40.2%
Portugal	51.1%	33.7%	26.6%	23.7%	22.2%	53.3%	10.4%	23.6%	34.1%	31.7%
Romania	63.2%	51.3%	14.7%	44.8%	12.1%	63.1%	12.8%	44.0%	38.5%	41.3%
Slovakia		41.5%	31.7%	7.7%	22.7%	41.2%	25.6%	39.7%	33.2%	36.4%
Slovenia		41.2%	22.5%	24.9%	13.0%	46.2%	18.6%	35.7%	20.0%	28.1%
Spain	49.3%	43.4%	27.3%	24.6%	22.7%	16.9%	15.9%	20.7%	42.7%	36.0%
Sweden	41.7%	35.1%	25.8%	22.5%	21.2%	36.1%	29.7%	29.5%	26.4%	28.1%
U. Kingdom	60.2%	45.4%	39.1%	38.3%	33.3%	57.5%	42.2%	31.0%	52.1%	44.7%
EU-28	60.4%	44.2%	32.1%	31.7%	23.8%	34.4%	14.5%	30.7%	40.3%	37.9%

Source: Compiled by the authors based on EUROMOD.

Annex 2. Gender disposable income gap by sociodemographic characteristics

	Elementary	Secondary	Tertiary	Self-employed	Employed	Pensioner	Unemployed	Single	Married	Total
Austria		38.6%	34.9%	44.3%	32.3%	29.4%	19.7%	15.7%	53.7%	38.5%
Belgium	35.5%	35.3%	22.9%	18.6%	22.2%	26.8%	10.7%	11.5%	42.8%	29.6%
Bulgaria	22.2%	27.8%	25.2%	24.7%	13.0%	29.0%	13.8%	18.9%	24.4%	23.0%
Croatia	34.2%	31.6%	15.7%	4.2%	14.6%	24.8%	12.1%	6.2%	34.8%	26.9%
Cyprus	41.0%	38.6%	36.1%	31.4%	24.3%	44.4%	18.3%	-8.4%	46.8%	34.9%
Czech R.		29.7%	36.0%	29.8%	27.1%	13.1%	25.2%	19.4%	37.8%	31.2%
Denmark	16.7%	13.8%	24.7%	15.5%	16.8%	13.0%	-8.8%	5.6%	26.0%	17.3%
Estonia	5.0%	30.2%	29.3%	30.5%	23.0%	5.5%	-6.4%	15.7%	29.7%	23.6%
Finland		18.1%	27.4%	36.5%	18.5%	23.8%	2.1%	7.4%	28.2%	19.4%
France	24.5%	23.6%	26.0%	39.9%	19.7%	19.7%	8.3%	4.3%	38.7%	24.0%
Germany	35.4%	37.6%	42.5%	49.1%	38.2%	44.8%	6.1%	7.9%	60.9%	42.5%
Greece	41.8%	48.5%	37.6%	42.4%	20.1%	26.0%	14.4%	-1.3%	56.3%	42.7%
Hungary		19.3%	24.4%	22.6%	18.1%	13.6%	8.0%	2.5%	33.0%	20.4%
Ireland	35.6%	39.2%	35.9%	38.2%	25.1%	23.4%	9.6%	2.9%	46.5%	33.6%
Italy	34.1%	39.1%	32.1%	26.8%	18.9%	26.0%	18.1%	6.9%	51.9%	36.9%
Latvia	11.0%	28.8%	27.6%	13.6%	15.8%	13.1%	-11.8%	8.6%	27.4%	20.7%
Lithuania	23.9%	30.6%	27.6%	30.4%	15.2%	18.6%	22.5%	4.0%	32.9%	23.9%
Luxembourg	32.1%	25.0%	28.4%	28.4%	17.3%	22.8%	23.6%	3.4%	42.8%	29.0%
Malta	53.3%	42.6%	27.8%	28.9%	17.3%	23.8%	-51.1%	5.5%	56.3%	40.0%
Netherlands	38.9%	34.5%	31.4%	35.9%	26.9%	29.2%	19.6%	10.0%	48.7%	34.7%
Poland	28.6%	39.2%	33.2%	43.5%	20.5%	27.4%	4.3%	3.7%	40.3%	30.6%
Portugal	34.9%	29.6%	16.8%	22.0%	15.6%	25.9%	10.8%	-4.4%	36.0%	24.6%
Romania	5.7%	27.9%	12.9%	18.6%	5.6%	27.3%	-39.1%	7.3%	30.4%	24.0%
Slovakia		19.2%	23.5%	-1.1%	19.5%	6.5%	30.2%	7.5%	25.8%	19.0%
Slovenia		21.2%	19.2%	19.7%	9.7%	16.0%	21.5%	10.9%	21.2%	16.9%
Spain	39.9%	38.6%	25.6%	24.6%	19.3%	20.7%	17.5%	-2.5%	48.7%	32.9%
Sweden	15.8%	16.3%	13.5%	14.2%	8.8%	22.8%	-4.7%	8.8%	18.4%	13.4%
U. Kingdom	33.9%	31.7%	32.6%	30.7%	25.5%	35.9%	-11.5%	10.9%	46.8%	32.5%
EU-28	29.3%	30.6%	27.5%	27.3%	19.6%	23.3%	6.5%	6.8%	38.8%	28.1%

Source: Compiled by the authors based on EUROMOD.

Annex 3. Overall reduction in gender income gap by sociodemographic characteristics

	Elementary	Secondary	Tertiary	Self-employed	Employed	Pensioner	Unemployed	Single	Married	Total
Austria		16.9%	1.9%	7.9%	3.3%	1.6%	8.3%	27.0%	0.7%	11.0%
Belgium	21.9%	14.1%	2.2%	-2.6%	3.9%	0.8%	11.5%	22.4%	-4.3%	7.0%
Bulgaria	31.3%	8.4%	1.1%	1.7%	-0.1%	2.5%	2.4%	17.1%	-3.7%	5.0%
Croatia	30.2%	9.4%	0.5%	-2.4%	2.6%	-5.9%	12.2%	27.5%	-3.9%	6.2%
Cyprus	28.4%	6.6%	0.4%	3.8%	5.0%	11.9%	-12.0%	20.8%	-1.7%	3.8%
Czech R.		19.1%	5.1%	0.1%	1.9%	28.2%	6.7%	25.9%	8.1%	15.0%
Denmark	42.5%	14.7%	10.1%	7.5%	6.5%	20.6%	-24.3%	15.8%	9.9%	13.7%
Estonia	76.5%	21.9%	9.3%	4.1%	4.9%	45.4%	20.6%	19.5%	9.3%	14.5%
Finland		19.2%	6.5%	1.8%	6.7%	37.4%	7.4%	18.2%	5.1%	11.1%
France	11.4%	9.2%	4.1%	1.6%	6.1%	-34.4%	-1.5%	15.6%	0.7%	7.0%
Germany	20.2%	8.8%	-4.3%	-2.0%	0.7%	-2.3%	10.9%	15.5%	-4.7%	1.6%
Greece	24.7%	5.1%	2.0%	-3.7%	1.9%	0.2%	0.4%	40.4%	-3.9%	6.9%
Hungary		22.7%	3.6%	-8.8%	-0.9%	-15.2%	-3.5%	34.7%	-1.3%	15.2%
Ireland	20.3%	15.1%	8.7%	6.4%	5.3%	-36.5%	14.5%	19.1%	2.5%	8.8%
Italy	29.4%	2.6%	1.1%	2.6%	1.9%	1.7%	-12.4%	26.9%	-4.1%	6.3%
Latvia	69.1%	20.4%	7.7%	6.2%	5.4%	16.8%	25.9%	21.2%	6.9%	13.4%
Lithuania	48.6%	21.4%	7.3%	4.2%	3.8%	24.1%	18.9%	23.7%	3.5%	12.1%
Luxembourg	18.4%	2.0%	0.4%	9.6%	4.8%	7.1%	-4.2%	21.7%	-4.6%	4.9%
Malta	22.2%	6.2%	2.9%	2.3%	2.7%	0.4%	-3.6%	20.1%	-2.1%	5.1%
Netherlands	26.9%	17.2%	10.0%	8.3%	10.1%	26.5%	-0.7%	19.6%	10.4%	14.6%
Poland	28.2%	12.6%	3.2%	16.6%	-0.8%	19.1%	13.8%	33.0%	-0.3%	9.6%
Portugal	16.2%	4.1%	9.8%	1.7%	6.6%	27.5%	-0.4%	28.0%	-1.9%	7.1%
Romania	57.6%	23.4%	1.9%	26.2%	6.5%	35.9%	51.9%	36.7%	8.1%	17.3%
Slovakia		22.3%	8.3%	8.8%	3.1%	34.7%	-4.6%	32.2%	7.5%	17.5%
Slovenia		20.0%	3.3%	5.2%	3.4%	30.2%	-2.9%	24.7%	-1.2%	11.2%
Spain	9.4%	4.8%	1.6%	0.0%	3.5%	-3.8%	-1.6%	23.1%	-6.0%	3.1%
Sweden	25.9%	18.8%	12.3%	8.3%	12.4%	13.2%	34.4%	20.7%	8.0%	14.7%
U. Kingdom	26.2%	13.7%	6.6%	7.6%	7.7%	21.6%	53.8%	20.1%	5.3%	12.2%
EU-28	31.2%	13.6%	4.6%	4.4%	4.2%	11.0%	7.9%	24.0%	1.5%	9.8%

Source: Compiled by the authors based on EUROMOD.

Notes

1. An analysis of market income can also be found in Atkinson *et al*. (2018) and in Boschini *et al*. (2020). However, they focus on gender differences among top income earners.
2. In Equation (1) the numerator would remain constant but the denominator would increase as a result of these in-kind policies.
3. See Euromod Modelling Conventions. EUROMOD (2018).
4. Figari *et al*. (2011) and Avram *et al*. (2016) have proposed alternative methods for allocating the benefits within a household. They do it to show results are sensitive to previous assumptions. In order not to bias the results, we have adopted EUROMOD conventions.
5. Our analysis is able to assess the average effect of taxes and benefits but not how this effect is distributed along the distribution of income (for this, a dominance analysis would be necessary).
6. Country results are available in the Annexes.
7. The information about EUROMOD can be found on this web page: https://www.euromod.ac.uk/. Institute for Social and Economic Research, University of Essex, EUROMOD: Version H1.0+ [software], December 2017.
8. In general terms, EUROMOD (2018) imputes labour and self-employment income to the person who earns it and splits the remaining source of income between partners: "capital and property income must be shared equally between the oldest household member and his/her partner".
9. Although income and other socioeconomic characteristics are available for the population older than 16, we have preferred to take into account the legal age in the majority of the EU countries, in line with previous studies about this topic, such as the work carried out by Avram *et al*. (2016) or Figari *et al*. (2011).
10. https://ec.europa.eu/eurostat/tgm/refreshTableAction.do?tab=table&plugin=1&pcode=sdg_03_10&language=en.

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Resumen

Importantes instituciones internacionales como la ONU o la Comisión Europea tienen en el centro de sus agendas el objetivo de lograr la igualdad de género para garantizar un desarrollo social justo y, en última instancia, un crecimiento económico estable.

El principal objetivo de este trabajo es ampliar la perspectiva desde la cual se analiza la brecha de género, considerando las diferencias de género no solo en los salarios, sino en la renta final disponible.

Introducimos la idea de que la intervención pública, a través de impuestos y transferencias, puede contribuir a la reducción de la brecha de género. Además, aportamos evidencia empírica de que la disminución de esta brecha fomenta la reducción de la desigualdad social en general.

En el trabajo cuantificamos el efecto que tiene cada política de impuestos y transferencias sobre la brecha de género en todos los países de la Unión Europea. La base de datos utilizada es EUROMOD, un modelo de microsimulación de impuestos-transferencias para la Unión Europea. Analizamos cómo cambia la brecha de género en cada país, según el tipo de prestación (contributiva versus no contributiva) y considerando las principales características sociodemográficas. Además, analizamos si la reducción de la brecha de género está relacionada con una disminución de los niveles de desigualdad en los países europeos.

Los resultados aportan evidencia empírica de que la intervención pública a través de impuestos y transferencias contribuye a reducir la brecha de género y apoyan la idea de que una reducción en esta brecha tiene efectos positivos sobre la igualdad social.

Palabras clave: brecha de ingresos de género, sistema de impuestos y transferencias, brecha salarial, políticas públicas.

Clasificación JEL: H50, H53, I38.