I Z A Institute
of Labor Economics
Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 13786

Tax-Benefit Systems and the Gender Gap in Income

Karina Doorley
Claire Keane

OCTOBER 2020

I Z A Institute
of Labor Economics

Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 13786

Tax-Benefit Systems and the Gender Gap in Income

Karina Doorley
ESRI, IZA and Trinity College Dublin

Claire Keane
ESRI and Trinity College Dublin

OCTOBER 2020

ISSN: 2365-9793

IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

Tax-Benefit Systems and the Gender Gap in Income*

The gender wage gap and the gender work gap are sizable, persistent and well documented for many countries. The result of the gender wage and gender work gap combined is an income gap between men and women. A small literature has begun to examine how the tax-benefit system contributes to closing gender income gaps by redistributing between men and women. In this paper, we study the effect of tax-benefit policy on gender differences in income. We use microsimulation models linked to survey data to estimate gender gaps in market income (before taxes and transfers) and disposable income (after taxes and transfers) for each country. We develop a method to isolate the relative contributions of the gender wage gap and the gender work gap to the overall gap in income between men and women. We then decompose the difference between the gender gap in market income and the gender gap in disposable income into (i) the relative contribution of taxes and benefits in each country and (ii) the relative cushioning of the gender wage gap and gender work gap. Policy conclusions are drawn about redistribution between men and women.

JEL Classification: J16, J31

Keywords: gender inequality, decomposition, tax-benefit system

Corresponding author:
Karina Doorley
The Economic and Social Research Institute
Whitaker Square
Sir John Rogerson's Quay
Dublin 2
Ireland

E-mail: karina.doorley@esri.ie

* The results presented here are based on EUROMOD version I2.0+, UKMOD version A1.5+ and SWITCH version 1.3. 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. We are indebted to the many people who have contributed to the development of EUROMOD. The process of extending and updating EUROMOD is financially supported by the European Union Programme for Employment and Social Innovation 'Easi' (2014-2020). UKMOD is maintained, developed and managed by the Institute for Social and Economic Research (ISER) at the University of Essex. The process of extending and updating UKMOD is financially supported by the Nuffield Foundation, based on the annual update of the UK component of EUROMOD funded by the European Union Programme for Employment and Social Innovation "EaSI" (2014-2020). SWITCH is maintained, developed and managed by the Economic and Social Research Institute. Funding from the ESRI's Tax, Welfare and Pensions Research Programme (supported by the Departments of Public Expenditure and Reform, Employment Affairs and Social Protection, Health, Children and Youth Affairs and Finance) is gratefully acknowledged. We are grateful to the CSO for facilitating access to the Survey of Income and Living Conditions (SILC) Research Microdata File used to construct the database for the SWITCH tax-benefit model. The results and their interpretation are the authors' responsibility. We are grateful to research assistance from Míde Griffin and Alyvia McTague.

1. Introduction

Recent research suggests that the wages of men and women are converging in many countries. This is largely due to the fact that women are catching up with men in terms of education and skills. However, a sizable gap in wages remains which can be attributed, among other factors, to occupational segregation, work-force interruptions and discrimination (Blau & Kahn, 2017; Redmond & McGuinness, 2019). Gender differences in participation in the labour market are also large and the extent of these differences varies across countries (Olivetti & Petrongolo, 2008). Women are less likely to work and working women tend to work fewer hours, on average, than working men. The result of the gender wage and gender work gap combined is an earnings gap between men and women that is unlikely to close in the immediate future. This gap has knock-on effects on the career trajectories of men and women with implications for equality and poverty both during working life and into retirement.

Factors such as equal pay legislation, collective bargaining and minimum wages have all been shown to close the gender wage gap. Additionally, policies such as the individual taxation of spouses, parental leave for both parents and childcare subsidies have contributed to increasing the labour force participation of women in many countries and, consequently, to closing the gender work gap. A small literature has also begun to examine how the tax-benefit system can contribute to closing gender income gaps, not by tackling the gender wage or gender work gap, but by redistributing between men and women so that the gender gap in disposable income is relatively smaller than the gender gap in gross income. Although tax-benefit polices are not typically targeted at either gender, because women typically earn less than men, the fact that tax-benefit systems are usually progressive means that women pay less tax, on average, than men and benefit relatively more from the welfare system. The degree to which the gender earnings gap is affected by the tax-benefit system depends on the size and source of the gender earnings gap and the nature of the tax-benefit system. For example, in countries with low female labour force participation, the gender income gap will be cushioned if there is a strong welfare component to the tax-benefit system. In countries with large gender wage gaps, the gender income gap will be cushioned more if the taxation system is progressive.

Figari, Immervoll, Levy, & Sutherland (2011) show that the tax-benefit systems of a selection of European countries decrease income inequality between members of a couple. Gallego-Granados & Geyer (2015) go a little further and map how the gross gender pay gap is transformed into the net gender wage gap in Germany, showing that the design of the German tax-benefit system reduces gender income inequality. In a cross-country contribution, Avram & Popova (2020) show how the tax-benefit systems in a number of European countries contribute to closing the gender income gap.

In this paper, we build on this literature and study the effect of policy on gender differences in income by evaluating how tax-benefit systems in a selection of European countries (Ireland, UK, Netherlands, Denmark, Romania and Greece) cushion the gender income gap. Similar to Avram & Popova (2020), we look at the population as a whole rather than focusing on redistribution within couples. We build on their work by formally setting out a method of

decomposing the difference between the gender gap in market income and the gender gap in disposable income, distinguishing between the cushioning work performed by the tax and benefit system separately. This method has parallels with the wider inequality literature and is easily applicable. A novel feature of our analysis is that we also decompose the gender income gap into the relative contributions of the unexplained gender wage gap and the gender work gap for two of the countries in our sample. We show how our decomposition method can be used to assess how much of each type of gender income gap is cushioned by the tax-benefit system.

We make a number of contributions to the literature on gender income inequality. Firstly, we develop a framework to estimate the cushioning effect of the tax-benefit system on gender income inequality. Secondly, by applying this framework to the a selection of European countries, we build on the work of Figari, Immervoll, Levy, & Sutherland (2011) and Avram & Popova (2020) to provide cross-country evidence of how tax-benefit systems cushion gender earnings inequality in the population as a whole and the first cross-country evidence of how the components of the gender income gap are cushioned. We then discuss the trade-off between cushioning the gender earnings gap and incentivising a decrease in the gender earnings gap at source, through increased female labour supply and decreased gender pay gaps. Our results have particular implications for policymakers who engage in gender or equality budgeting.

2. Related literature

2.1 Gender differences in earnings

The gender gap in disposable income is made up of a number of components:, the gender gap in hours of work, the gender gap in wages, the gender gap in non-labour income and the transformation of market income into disposable income via the tax-benefit system.

Considering the gender gap in hours of work, female employment has increased in recent decades in most countries, from 49% on average in the 1980s to 60% in the 2010s. Figure 1 shows the gender gap in employment rates for the last two decades and weekly hours of work for the last decade in Europe. Despite some increase in female employment, a sizable gender gap in employment remains in the EU.

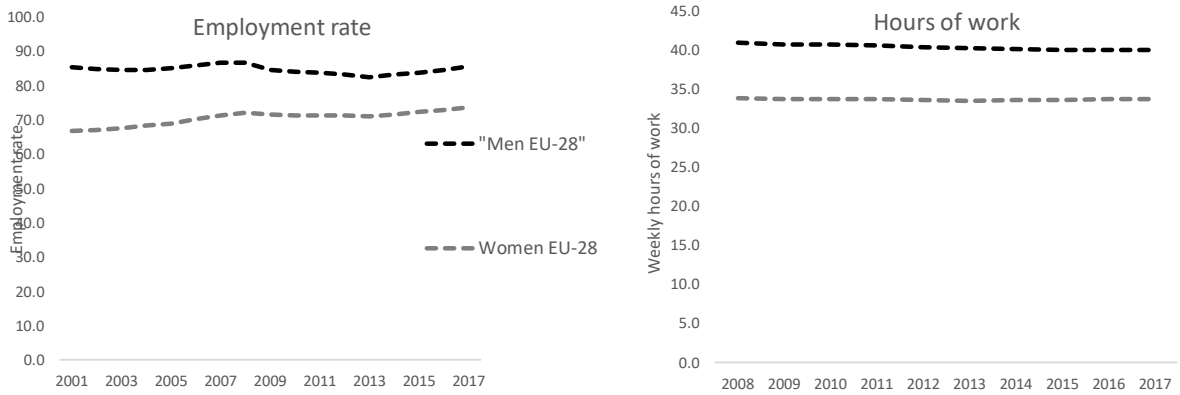


Figure 1 Gender gap in employment rate and hours of work in Europe

Source: Eurostat

Economic literature advances several reasons for the existence of a gender pay gap: differences in human capital (Mincer and Polachek, 1974), differences in employment types (Bergmann, 1989) and discrimination (Becker 1971). There has been a narrowing of the gender difference in human capital and employment types over the last number of decades accompanied by a convergence in earnings between men and women (Goldin, 2014; Keller, 2019). However, there is still a well-documented gender pay gap which differs substantially across countries (Olivetti & Petrongolo, 2008). The gender pay gap has been found to be small at the start of employment but to greatly increase with age (Goldin, 2014) and at the point of becoming a parent (Albrecht, Bronson, Skogman Thoursie, & Vroman, 2018; Kleven, Landais, & Søgaard, 2018)

Data from the Structure of Earnings Survey (Figure 2) shows that monthly earnings have increased over the last decade for both men and women in the EU but this increase has been steeper for men. The raw gender wage gap, which is simply the average wage difference between men and women, has decreased over the last number of years but remains around 16%. Controlling for worker characteristics, Redmond & McGuinness (2019) estimate that the adjusted gender wage gap, i.e. the portion that is unexplained by different labour market characteristics between men and women, is slightly lower than this at between 11-12% in the EU-28.

Figure 2 Gender gap in monthly earnings and raw gender wage gap.

Source: Eurostat

The gender wage gap and the gender gap in employment are inter-related and it is likely that the direction of causality goes in both directions. On the one hand, the fact that women are paid less than men for the same work leads to them substituting away from market work to work in the home. Olivetti & Petrongolo (2008) found that selection into employment explains nearly half of the observed negative correlation between wage and employment gaps. In other words, females with higher earnings potential are much more likely to join the labour market. Keller (2019) finds that declining gender pay gaps have contributed to decreasing occupational segregation.

On the other hand, the fact that women work fewer hours than men leads to a wage differential between men and women due to the resulting work experience and training gaps. This is particularly the case because hours of work in many occupations are worth more when given at particular moments and when the hours are more continuous. Because of this nonlinear relationship between earnings and hours of work, the relatively uninterrupted patterns of labour force participation by men compared to women results in a gender wage differential (Goldin, 2014).

2.2 Policy Interventions

Institutions such as trade unions; the minimum wage and generous policies concerning the reconciliation of work and family life have been found to reduce the gender wage gap, the gender gaps in hours of work and, thus, gender earnings gaps (Bargain, Doorley, & Van Kerm, 2018; Christofides, Polycarpou, & Vrachimis, 2013; Olivetti & Petrongolo, 2017). However, few studies have examined the potential of tax-benefit policy, not to alter behaviour of individuals or firms, but to cushion these existing gender gaps as market income is transformed into disposable income. The question of whether or not this is desirable must be balanced with other considerations around incentives to work among secondary earners and shifting the responsibility for closing the unexplained gender wage gap to employers. This will be discussed in more detail in the concluding section.

A useful tool in this respect is gender responsive budgeting or gender budgeting, which is defined by the OECD as "integrating a clear gender perspective within the overall context of

the budgetary process through special processes and analytical tools, with a view to promoting gender-responsive policies" (OECD, 2016). Its scope includes, but is not limited to, expenditure policies, budgetary allocation, tax policy and equal opportunities legislation (Stotsky, 2016). Many governments participate in gender budgeting exercises and some have even legislated for gender budgeting (e.g., Austria in 2004, Belgium in 2009). These exercises tend to estimate, in either an ex ante or an ex post framework, the relative impact of changes to tax-benefit policy on men and women with a view to avoiding policy changes which are unfairly skewed towards one gender or identifying policy areas which need to be "gender-proofed".

A small literature has also begun to examine how the tax-benefit system as a whole contributes to closing gender income gaps by redistributing between men and women. Figari, Immervoll, Levy, & Sutherland (2011) show that the tax-benefit systems of a selection of European countries decrease income inequality between members of a couple. They found that partners' incomes were equalised the most in Finland, the UK and Austria, and the least in Greece and Italy, detailing the role of a range of policy instruments. Gallego-Granados and Geyer (2015) combined decomposition methods, tax-benefit simulation and structural labour supply estimation to map relationships between the gross gender wage gap, the tax-benefit system and the net gender wage gap in Germany, showing that the design of the German tax-benefit system reduces gender income inequality. Avram and Popova (2020) examine the extent to which the tax-benefit system closes the gender gap in earnings with a focus on which policy instruments contribute most to reducing the gap. They find that the equalising effect of benefits is higher than that of taxes but find large variability across countries and groups within the population. In a different context, structural models have been developed to analyse the impact of tax-benefit policy on labour supply and welfare within couples (Bargain, 2008; Immervoll, Kleven, Kreiner, & Verdelin, 2011; Bastani, 2013).

In this paper, we show how tax-benefit systems in a cross-section of EU countries cushion the gender income gap in the population as a whole (rather than simply redistributing between spouses). We contribute to the literature in two ways – firstly, we formalise a decomposition method which allows us to separately identify the effect of taxes and benefits on the gender income gap. Secondly, in an extension of this method, we simulate the distribution of female wages if they were compensated for their observable labour market attributes as men are, i.e. if there were no unexplained gender wage gap. We also simulate the distribution of female hours of work if they worked the same hours as similar men, i.e., if there were no gender work gap. We then estimate how the tax-benefit system cushions the gender wage gap and the gender work gap separately.

3. Data and Method

3.1 Decomposition Method

In this section, we develop a method to be used to measure the cushioning effect of the tax-benefit system on the gender earnings gap and to decompose this effect into the relative contributions of taxes and benefits. We will also decompose the cushioning effect into a wage

and a work component, showing how the tax-benefit system cushions the gender income gap by source. We define the gender gap in market income as follows:

Market income, M_j, for men $(j = m)$ and for women, $(j = f)$, is calculated at the individual level as the sum of labour income and non-labour income:

$$M_{ij} = w_i * h_i + y_i$$

Labour income is the product of hourly wages, w, and monthly hours of work, h. Non-wage income, such as investment income, is denoted y. The market income gap between men and women is simply the difference between average market income of men and women:

$$Gap_M = (\bar{M}_m - \bar{M}_f)$$

This can be expressed in monetary terms (€) or as a percentage, with male income providing the reference group. Disposable income for men, D_m and for women D_f is calculated at the individual level as follows:

$$D_{ij} = d(w_i * h_i, y_i, X_i)$$

d denotes the tax-benefit function which calculates individual disposable income on the basis of wages, w, hours of work, h, non-wage income, y and household characteristics, X. The disposable income gap between men and women is calculated as the difference between the average disposable income of men and women:

$$Gap_D = \bar{D}_m - \bar{D}_f$$

The "cushioning" effect of the tax-benefit system on the gender gap in market income can be quantified as the gender gap in market income minus the gender gap in disposable income.[2]

$$C = Gap_M - Gap_D$$

3.1.1 Taxes vs. Benefits

We can isolate the contribution of benefit policy from the contribution of tax policy to the overall cushioning effect by introducing a benefit function, $b(.)$, which transforms market income into post-transfer, pre-tax income, giving us:

$$D_{ij}^b = b(w_i * h_i, y_i, X_i)$$

and by introducing a tax function, $t(.)$, which transforms market income into post-tax pre-benefit income (D_{ij}^t) in a similar fashion. We then have:

[2] This "cushioning" index is similar in nature to the Reynolds-Smolensky index which measures the effect of the tax benefit system on income inequality as measured by the Gini index.

$$Gap_{D^b} = (\overline{D}_m^b - \overline{D}_f^b)$$

$$Gap_{D^t} = (\overline{D}_m^t - \overline{D}_f^t)$$

$$C = \underbrace{(Gap_M - Gap_{D^b})}_{benefits} + \underbrace{(Gap_M - Gap_{D^t})}_{tax}$$

3.1.2 Wage gaps vs. work gaps

We can also examine the targeting of the tax benefit system by isolating the cushioning effect of the tax-benefit system on the gender wage gap and the gender work gap separately. To do this, we must first estimate a wage function. Market income is calculated as:

$$M_{ij} = \hat{w}_i\left(X_i, \hat{p}^j\right) * h_i + y_i$$

Wages, w, are predicted for all workers and are a function of individual characteristics, X, and a price structure, p^j. This price structure is estimated separately for men and women.

We define a further set of market income and disposable income distributions for women if they were paid according to the price structure of men, i.e., if there were no unexplained gender wage gap. In this scenario, the remaining wage gap between men and women is due to observable characteristics such as education, experience and so forth. We assume that women do not change their labour market behavior in response to this closing of the unexplained gender wage gap. This is a reasonably restrictive assumption which could be relaxed in future work. However, it provides us with a useful snapshot of how the tax-benefit system cushions current gender wage and gender work gaps. The adjusted market income and disposable income distributions for women are estimated as follows:

$$M_i^{\text{wage}} = \hat{w}_i(X_i, p^m) * h_i + y_i$$

$$D_i^{\text{wage}} = d(\hat{w}_i(X_i, p^m), h_i, y_i, X_i)$$

We next introduce a market income distribution for women, based on the male work hours distribution. To do this, we randomly draw an hours choice for women from the male distribution, matching along age categories, education, marital status and the number of children in the family. This hours choice is converted into employment income using the individual's predicted wage or, for those who do not work in the baseline, the average hourly wage for women within the same (age, education, marital status, number of children) cell.

$$M_i^{\text{work}} = \hat{w}_i(X_i, p^f) * h_i^m + y_i$$

$$D_i^{\text{work}} = d(\hat{w}_i(X_i, p^m), h_i^m, y_i, X_i)$$

Figures A.1 and A.2 in Appendix 4 show how this matching of hours of work from men to women modifies the distribution of female hours of work.

We can now decompose C into the effect of the tax-benefit system on the unexplained gender wage gap, its effect on the gender work gap and its effect on gender income gaps from other sources (demographic characteristics, occupational segregation, investment income, etc).

$$C = \underbrace{\left[\left(M_f^{\text{wage}} - M_f\right) - \left(D_f^{\text{wage}} - D_f\right)\right]}_{wage} + \underbrace{\left[\left(M_f^{\text{work}} - M_f\right) - \left(D_f^{\text{work}} - D_f\right)\right]}_{work}$$

$$+ \underbrace{\left[\mathrm{C} - \left[\left(M_f^{\text{wage}} - M_f\right) - \left(D_f^{\text{wage}} - D_f\right)\right] - \left[\left(M_f^{\text{work}} - M_f\right) - \left(D_f^{\text{work}} - D_f\right)\right]\right]}_{other}$$

3.2 Microsimulation and Data

We use three tax-benefit microsimulation models in this work: SWITCH for Ireland, UKMOD for the UK and EUROMOD for Denmark, Greece, the Netherlands and Romania. SWITCH and UKMOD are based on the EUROMOD platform and, so, are harmonised in terms of simulation structure. The models numerically simulate tax-benefit rules, allowing the computation of all social contributions, direct taxes and transfers to yield household disposable income.[3] EUROMOD is linked to EU-SILC data.[4] UKMOD is linked to the Family Resources Survey and SWITCH is linked to the SILC Research Microdata File for Ireland. SWITCH is used for Ireland rather than the Irish component of EUROMOD as SWITCH is linked to more detailed administrative data which allows for more accurate simulation of taxes and benefits.[5] We estimate market income and disposable income distributions for 2017 for all countries, which represents the latest available data.

The income reference period for the data underlying the EUROMOD model is the previous year. However, the income reference period for the data underlying both SWITCH and UKMOD is the current year. This allows us to estimate gender wage gaps for Ireland and the UK and counterfactual income distributions if these gender wage gaps were closed.[6] The extension of the decomposition to gender wage gaps and gender work gaps is therefore confined to these two countries.

The estimated income distributions are then decomposed using the technique described above to estimate the "cushioning" effect of tax-benefit policy on the gender income gap and to decompose it into (i) the cushioning effect of tax and benefit policy separately and (ii) the

[3] For a comprehensive overview of EUROMOD, see Sutherland and Figari (2013)

[4] Started in 2003 for 6 member states (Belgium, Denmark, Greece, Ireland, Luxemburg and Austria), as well as Norway, EU-SILC was extended to other EU countries from 2004. It gathers annual cross-sectional information on European individuals and households (incomes, socio-demographics, social exclusion, life condition). It was originally created to provide the material for structural indices of social cohesion in Europe (Laeken indices). EU-SILC (statistics on income and life conditions) constitute the most recent and important source of microdata for comparative studies on income distribution in Europe.

[5] SWITCH is linked to the SILC Research Microdata File which is only accessible through strict access conditions via the Irish Central Statistics Office while the Irish component of EUROMOD is linked to the less detailed User Database provided by EUROSTAT.

[6] Estimating the gender wage gap when the income reference period is not the same as the period in which hours of work and demographics is reported is difficult as the measure of hourly wage is subject to much measurement error.

cushioning effect of policy on the gender wage gap and the gender work gap separately for the UK and Ireland.

In order to execute this analysis, we must make an assumption about how couples share their resources. Standard analyses of income distribution are generally carried out at the household level, assuming that income is fully shared or 'pooled' so that all household members enjoy the same standard of living. This unitary model of family behaviour is often an appropriate way to characterise household income sharing. Non-unitary models of family behaviour, which posit some form of bargaining or negotiation within the family, challenge this approach and have been shown to have some validity (Lundberg, Pollak, & Wales, 1997; Cantillon & Nolan, 2001; Browning, Chiappori, & Lechene, 2010). For example, it has been found that the distribution of cash income across household members can have a strong influence on the distribution of consumption (Browning, Bourguignon, Chiappori, & Lechene, 1994; Lundberg, Pollak, & Wales, 1997). This has implications for the economic independence of each individual as well as for bargaining power within the household.

We therefore consider two alternative scenarios. In the individual scenario, which constitutes our central scenario, we consider each member of a couple as an individual in terms of their market income, tax liability and benefit entitlement. One exception is family benefits, such as child benefit, and household level benefits, such as housing benefits, which we assume to be shared equally among members of a couple.[7] In the income-sharing scenario, we assume that members of a couple fully pool their income. The individual approach can be considered to represent an upper bound of the gender gap in income. It is a useful measure in that it represents potential income (consumption, bargaining, etc) inequality. However, it should not be considered as a concrete measure of economic welfare as most households do share income to some extent (Watson, Maître, & Cantillon, 2013). The income-sharing scenario therefore puts a lower bound on our estimates (results available in Appendix 5).

4. Results

We choose one EU country from each of the common European groupings of Continental, Eastern, Southern and Nordic and both Anglo-Saxon countries. This cross-section of countries, Ireland, UK, Netherlands, Denmark, Romania and Greece represents some of the diversity of tax-benefit systems found in the EU. These particular countries were chosen because they have largely individualised income taxation systems, which facilitates the splitting of taxes and benefits between spouses in the individual scenario. The advantage of analysing both the UK and Ireland is that the underlying data allows us to extend the decomposition for these countries into the relative contributions of wages and work. The same exercise could be performed for countries with joint taxation systems. However, it would be more difficult to perform a pure individualised decomposition in these countries as some assumptions about how taxes should be split between members of a couple would be required.

[7] Appendix 3 details, for each country, the benefits which are split between members of a couple in this scenario.

Expenditure on social protection, which reflects the government's ability and willingness to redistribute income and wealth ranged from a low of 14% of GDP in Ireland to a high of 31% of GDP in Denmark. Figures for Romania, the Netherlands, Greece and the UK were 14%, 28%, 25% and 26% respectively. These figures can be compared to the EU-28 average of 27% of GDP.

Perhaps more interesting is the breakdown of social protection by function. Figure 3 shows the split of each country's social protection expenditure between sickness and disability, old age and survivor's benefits, unemployment and social exclusion and family and children. While most benefits (with the exception of maternity and paternity benefit) are not targeted at a particular gender, the division of paid work and caring duties mean that their impact is typically not gender-neutral. For example, women benefit more from family and child benefits as they are more likely to be lone parents and more likely to be engaged in caring for children in the home. On the other hand, men typically benefit more from unemployment benefits as they are more likely to be in the labour market.

We note from Figure 3 that expenditure on sickness, disability and old-age benefits makes up the vast majority of social protection expenditure (75-90%) in each country. Unemployment and social exclusion expenditure is particularly low in Greece, Romania and the UK but of similar magnitude in Denmark, Ireland and the Netherlands (9-10% of overall social protection). Expenditure on family and child benefits is higher than the EU average in Denmark, similar to the EU average in Ireland, the UK and Romania and lower than the EU average in Greece and the Netherlands.

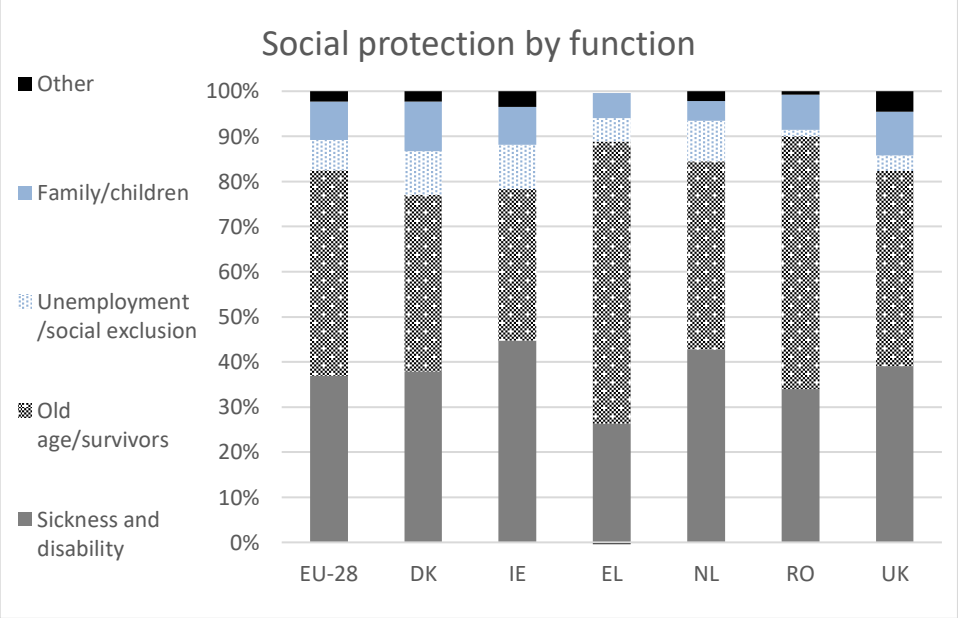


Figure 3 Social protection expenditure by function as a percentage of total social protection expenditure

Source: Eurostat

With the exception of Romania, income tax systems in the six countries examined are progressive. Romania has a flat income tax system where the rate is 10% on all personal income except for gambling income, income from real estate transfers, and dividend income. Social security contributions are also charged at a flat rate of 35% in Romania. Top marginal tax and social security rates vary little among the other countries, from a low of 52% in Ireland to a high of 56% in Denmark. However, average tax and social security rates (ATR) by income level does vary across countries.

Figure 4 displays the average tax and social security rates by percentage of average wages (ATRs) in our cross-section of countries. Figures for Romania are unavailable but, due to the flat nature of the tax system and social security system (45% contribution rate), there is little variation in ATRs by income levels in Romania.[8] The ATR at 67% of the average wage is highest in Denmark at around 34% and is much lower, ranging between 16% and 23% in the other three countries. The gap between Denmark and the other countries closes a good deal as income levels rise but, at 167% of average income, a single person in Denmark has an ATR of 42% compared to 38%, 35%, 33% and 30% in the Netherlands, Ireland, Greece and the UK respectively.

Figure 4 Average income tax and social security contribution rate for childless singles in 2017, by percentage of average wage

Source: OECD

4.1 Summary statistics

Summary statistics for the predicted and counterfactual income distributions for the cross-section of countries are displayed in Tables 1 and 2.

[8] Income tax allowances are available based on the level of monthly salary and number of dependent persons and social security contributions are capped so that they are not charged on income exceeding five times the average gross earnings.

Table 1 shows employment and wage statistics for men and women in each country. The employment rate of men is systematically higher than that of women with the largest gap of 22 percentage points observed in Romania. The smallest employment gap, of 5 percentage points, is observed in Denmark. Among the employed, men usually work full-time (88 % in Ireland to 97% in Romania) while a sizeable proportion of women work-part-time in Ireland, the Netherlands and Greece. Consequently, hours of work are significantly higher for men than for women in each country.

As discussed in Section 3, we calculate the gender wage gap only for Ireland and the UK. In both these countries the average hourly wage for women is lower than for men – by 6% in Ireland and 11% in the UK. Splitting these gender wage gaps into the portion that can be explained by labour market attributes and the part that is unexplained (and often interpreted as discrimination), we find that the gender wage gap in each country is largely unexplained.[9] In fact, as demonstrated by the negative 'explained' component in Ireland and the fact that the adjusted hourly wage for women is higher than the average male hourly wage, given their labour market characteristics, women in Ireland would be paid more than men if they were compensated under the male wage structure. Note that the gender pay gap estimation is based on a model controlling for occupation and industry (see Appendix 1). Occupational segregation has been shown to contribute to the gender pay gap with horizontal segregation resulting in women being concentrated in lower paid occupations and vertical segregation resulting in women being concentrated at lower (paying) levels within an occupational group. McGuinnes, Kelly, Callan, & O'Connell (2009) found that industrial and occupational segregation accounted for around 13% of the gender pay gap in Ireland while the corresponding figure in the UK is over 25% (Office for National Statistics, 2018). Omitting occupation and industry controls would, therefore, result in a larger gender wage gap. Our estimate of the gender wage gap, treating occupation and industry as exogenous, can therefore be seen as a lower bound.

Table 1 also shows by how much hours worked by women would increase if they were to adopt male working patterns – female hours worked would jump from an average of 20.1 per week in Ireland to 30.2 while in the UK they would increase from 20.6 to 33.

[9] Appendix 1 shows the models used to estimate the explained and unexplained portion of the gender wage gap

Table 1 Employment and wage statistics for men and women

	IE		UK		DK	
	male	female	male	female	male	female
Employment and wage						
Employed	76%	64%	83%	70%	77%	72%
Full-time	*88%*	*66%*	*93%*	*66%*	*94%*	*88%*
Part-time	*12%*	*34%*	*7%*	*34%*	*6%*	*12%*
Hours of work (incl. 0)	30.6	20.1	31.8	20.6	33.2	27.8
Hours of work (incl. 0, adjusted)		30.2		33.0		
Hourly wage (actual)	20.7	19.5	16.7	14.9	31.4	29.2
Hourly wage (predicted)	20.7	19.5	16.8	14.9		
Hourly wage (adjusted)	20.7	21.1	16.8	16.3		
Raw gender wage gap *(M-F)/M*		6%		11%		
Unexplained		*7%*		*8%*		
Explained		*-2%*		*3%*		
Observations	*2988*	*3281*	*10751*	*12013*	*3209*	*3431*

	NL		RO		EL	
	male	female	male	female	male	female
Employment and wage						
Employed	82%	72%	81%	59%	68%	48%
Full-time	*92%*	*50%*	*97%*	*95%*	*92%*	*82%*
Part-time	*8%*	*50%*	*3%*	*5%*	*8%*	*18%*
Hours of work (incl. 0)	34.4	22.9	33.8	23.8	31.6	19.3
Hours of work (incl. 0, adjusted)						
Hourly wage (actual)	23.2	20.3	2.8	2.6	7.0	6.6
Observations	*7838*	*8579*	*4988*	*5158*	*14452*	*15066*

Own calculations using SWITCH (IE), UKMOD (UK) and EUROMOD (DK, NL, RO, EL) with SILC data for 2017 (IE), FRS data for 2017 (UK) and EU-SILC data for 2017 (DK, NL, RO, EL) and 2017 policies. Sample is aged 22-64. Hourly wages are calculated as monthly employee income divided by monthly hours of work. Hourly wages in the baseline are predicted using an OLS model for men and women separately for the UK and Ireland. Hourly wages in the adjusted scenario are predicted using coefficients from the male model for both men and women. Adjusted hours of work for women are drawn from the male distribution as described in Section 3.1.2.

Panel A in Table 2 shows income statistics for men and women in each country assuming no income sharing takes place. Market income (the vast majority of which is from labour market earnings) in each country, is systematically higher for men than for women with the smallest gap in Denmark and the largest in Ireland. Regarding the gender difference in benefit levels men receive less in benefits in all countries except Greece. Men pay between one and a half and two and a half times more tax and social security, on average, than women. The result of

this is that gender differences in disposable income are not as large as gender differences in market income.[10] For example, in Ireland, women earn 49% less market income than men, on average. However, their disposable income is 39% less than that of men, on average.

Panel B in Table 2 shows how income changes if the unexplained gender wage gap is closed i.e. if women were rewarded as men for their labour market attributes, assuming no income sharing between members of a couple. The gap in market income between men and women narrows in this scenario, as does the gap in disposable income.

Panel C in Table 2 shows how income changes once women's work hours are matched to those of similar males. This results in a more substantial closing of the gender gap in market income (falling to 12% in the UK and 27% in Ireland) with the tax-benefit system further reducing these gaps to 6% in the UK and 18% in Ireland.

Table 2 Composition of disposable income for males and females before and after eliminating the unexplained gender wage gap

	IE		UK		DK	
	male	female	male	female	male	female
A. Baseline						
Market income	3,719	1,912	2,895	1,716	4,242	3,122
(male-female)/male	*0.49*		*0.41*		*0.26*	
Earnings	3,612	1,848	2,772	1,604	4,142	2,976
Benefits	303	327	173	272	511	673
Tax + social security	1,187	507	757	374	1,923	1,397
Disposable income	2,835	1,731	2,311	1,614	2,829	2,398
(male-female)/male	*0.39*		*0.30*		*0.15*	
B. After closing the unexplained gender wage gap						
Market income	3,719	2,030	2,895	1,880		
(male-female)/male	*0.45*		*0.35*			
Earnings	3,612	1,966	2,772	1,768		
Benefits	302	325	172	270		
Tax + social security	1,194	554	757	434		
Disposable income	2,827	1,800	2,310	1,716		
(male-female)/male	*0.36*		*0.26*			
Observations	*2988*	*3281*	*10751*	*12013*		
C. After matching women with a male hours choice						
Market income	3,719	2,707	2,895	2,560		
(male-female)/male	*0.27*		*0.12*			
Earnings	3,612	2,643	2,772	2,448		
Benefits	265	278	147	203		
Tax + social security	1,224	720	759	609		
Disposable income	2,761	2,265	2,283	2,154		
(male-female)/male	*0.18*		*0.06*			
Observations	*2988*	*3281*	*10751*	*12013*		

[10] This is also true if we compare gender earnings gaps (i.e. without non-labour income) to gender disposable income gaps.

	NL		RO		EL	
	male	female	male	female	male	female
A. Baseline						
Market income	3,542	1,933	349	233	983	527
(male-female)/male	*0.45*		*0.33*		*0.46*	
Earnings	3,369	1,801	348	232	838	449
Benefits	292	318	43	46	147	125
Tax + social security	1,257	493	96	66	288	157
Disposable income	2,577	1,759	296	212	842	495
(male-female)/male	*0.32*		*0.28*		*0.41*	

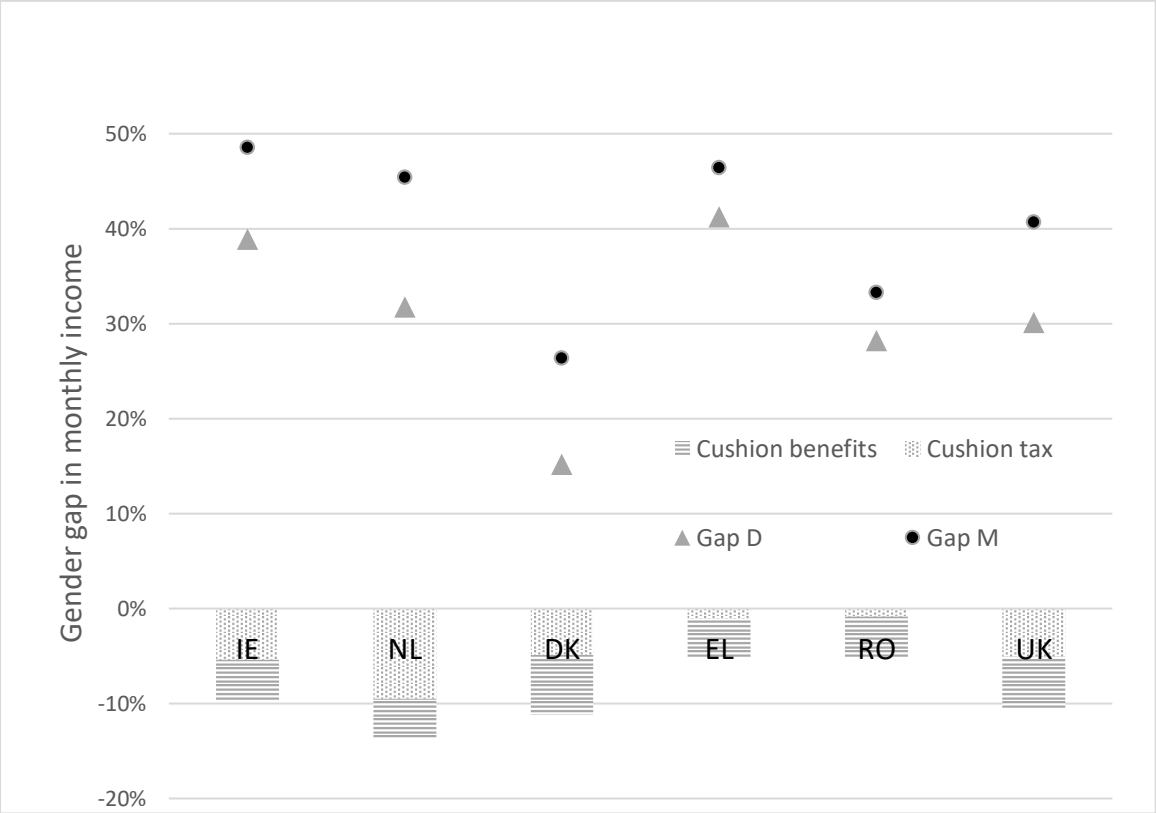
Own calculations using 2017 SWITCH (IE), UKMOD (UK) and EUROMOD (DK, NL, RO, EL) policies with SILC data for 2017 (IE), FRS data for 2017 (UK) and EU-SILC data for 2017 (DK, NL, RO, EL). Sample is aged 22-64. Earnings, taxes and transfers in the baseline for the UK and Ireland are based on hourly wages predicted using an OLS model for men and women separately. In the wage adjusted scenario, they are based on hourly wages predicted using coefficients from the male model for both men and women. In the hours-adjusted scenario, they are based on an hours choice for women drawn from the male distribution as described in Section 3.1.2.

4.2 Decomposition results: Taxes vs. Benefits

The main results of our decomposition are displayed in Figure 5. Figure 5 shows the gender gap in market income and the gender gap in disposable income in each country. It also shows how the difference between the two, the cushioning effect of the tax-benefit system, is divided between the tax and the benefit system. Results are expressed in percentage terms with male income providing the reference group and are presented under the assumption of no income sharing. Results for the assumption of full income sharing are shown in Appendix 5.

The gender gap in market income (grey square) varies substantially across countries and is smallest in Denmark (26%) and largest in Ireland (49%). The tax-benefit system, through which market income is transformed into disposable income, narrows this gap. The black dots indicate that the gender disposable income gap varies from a low of 15% in Denmark to a high of 41% in Greece. The cushioning effect of the tax and benefit system i.e. the difference between the gender gap in market income and the gender gap in disposable income, is represented by the grey bars and is broken down into the cushioning effect of the tax system and benefit system separately. The tax system is responsible for much of the cushioning effect observed in the Netherlands, which has relatively high female labour force participation and very progressive taxation. The benefit system is responsible for much of the cushioning effect observed in Greece and Romania, which have lower female labour force participation. In Romania, in particular, as the tax system is mostly flat, it contributes very little to closing the gender gap in income. The cushioning effect is spread more evenly between the tax and benefit system in the remaining countries.

Figure 5 The gender gap in market income, the gender gap in disposable income and the contribution of the tax and benefit system to the difference between the two.



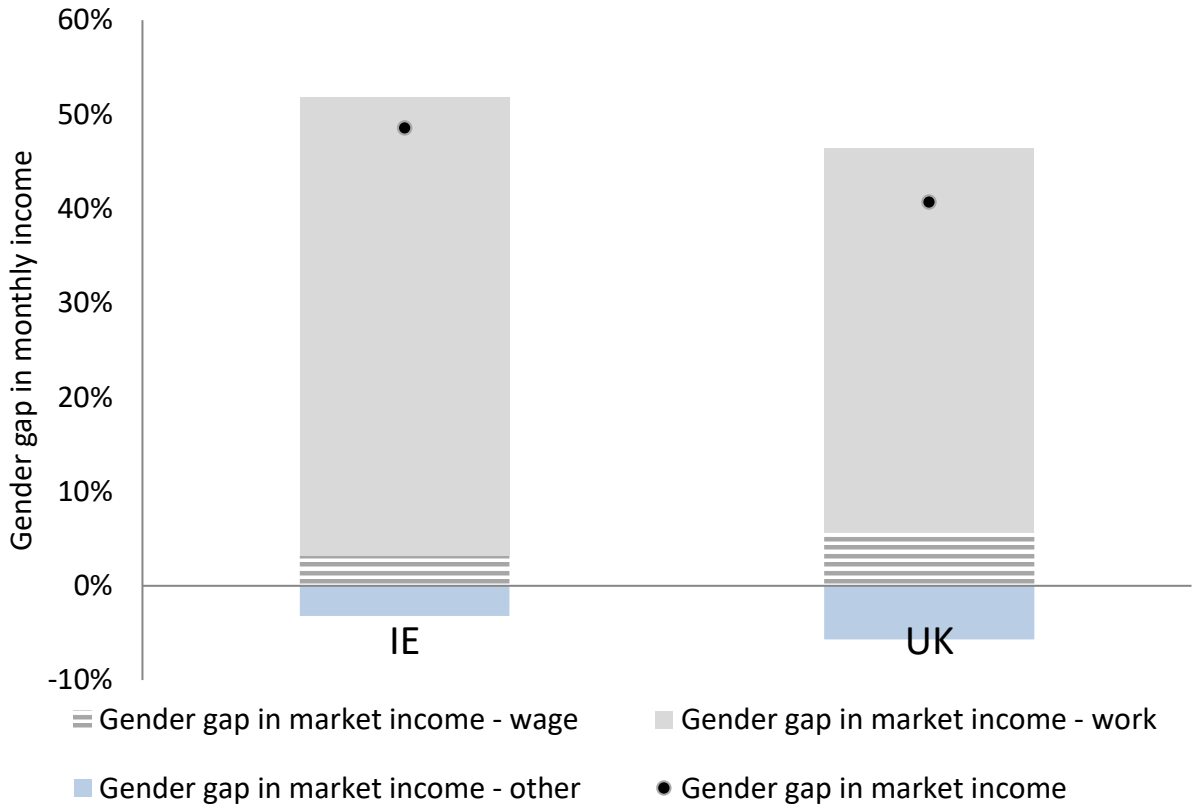
Source: Own calculations using 2017 SWITCH (IE), UKMOD (UK) and EUROMOD (DK, NL, RO, EL) policies with SILC data for 2017 (IE), FRS data for 2017 (UK) and EU-SILC data for 2017 (DK, NL, RO, EL). Sample is aged 22-64.

4.3 Decomposition results: Wage gaps vs. work gaps

Figure 6 shows how the gender gap in market income is decomposed into the three components described in Section 3.1.2 Wage gaps vs. work gaps- the wage gap, the work gap and other factors - for the UK and Ireland.[11] The contribution of the gender wage gap is relatively small, resulting in a gender gap in market income of 3 percentage points in Ireland (6% of the total) and 6 percentage points in the UK (15% of the total). Likewise, the contribution of other factors to the gap in the market incomes of men and women is of a similar, small magnitude but in the countervailing direction. The largest contributor to the gender gap in market incomes is the work gap – which accounts for nearly 90% of the market income gap in Ireland and 80% in the UK.

[11] Recall that, for this decomposition, the income reference period must match the labour market information. In this sample of countries, this is only true for the UK and Ireland.

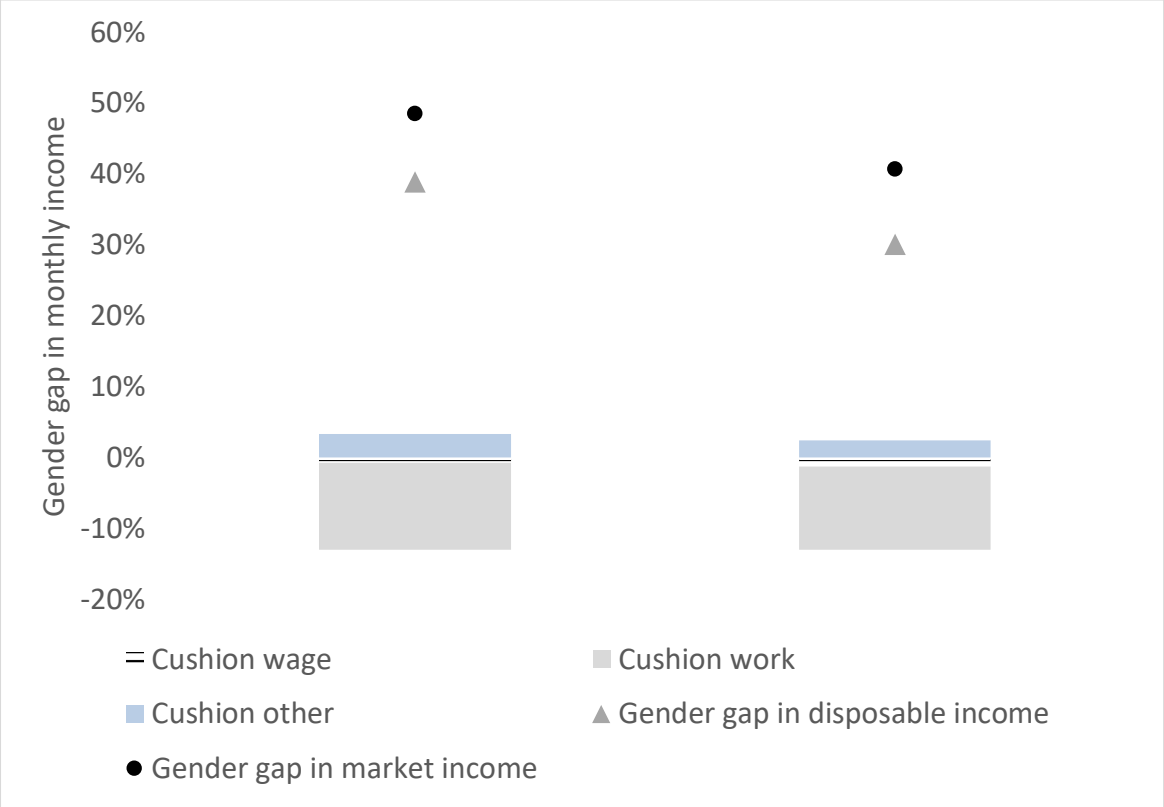
Figure 6 The contribution of the gender wage gap and the gender work gap to the gender gap in market income



Source: Own calculations using 2017 SWITCH and UKMOD policies linked to 2017 SILC and FRS data, respectively. Sample is aged 22-64. Hourly wages in the baseline are predicted using an OLS model for men and women separately. Hourly wages in the adjusted scenario are predicted using coefficients from the male model for both men and women. Adjusted hours of work for women are drawn from the male distribution as described in Section 3.1.2.

Figure 7 shows how the tax benefit system as a whole cushions these three components separately in transforming market income into disposable income. The gender gap in market income is again represented by a black circle. The gender gap in disposable income is represented by a grey triangle. The tax-benefit system provides very little cushioning for the part of the gender income gap caused by unexplained wage differences between men and women in either the UK or Ireland. By contrast, gender income inequality caused by work patterns is substantially cushioned by the tax-benefit policy in both countries.

Figure 7 The cushioning effect of the tax-benefit system on the gender wage gap and the gender work gap.



Source: Own calculations using 2017 SWITCH and UKMOD policies linked to 2017 SILC and FRS data, respectively. Sample is aged 22-64. Hourly wages in the baseline are predicted using an OLS model for men and women separately. Hourly wages in the adjusted scenario are predicted using coefficients from the male model for both men and women. Adjusted hours of work for women are drawn from the male distribution as described in Section 3.1.2.

5. Discussion

Using microsimulation together with a new decomposition method, we evaluate how the tax-benefit system affects gender income gaps. Results from this analysis indicate that the tax-benefit system reduces gender income gaps in a cross-section of European countries and that it does this both through gender differences in benefit entitlement and gender differences in tax liabilities. Focusing on the UK and Ireland, we find that the gender income gap is primarily caused by the gender work gap. The gender wage gap and other factors (demographics, occupational segregation, etc) also play a smaller role.

Should tax-benefit systems cushion gender income gaps? In a population where women work less than men and earn less than men, a progressive tax-benefit system will always cushion the gender income gap. The question of how much it should do this is an open one. On the one-hand, cushioning the gender income gap reduces income inequality and reduces the risk of women being over-represented among the poor. This is an argument often put forward in favour of gender budgeting. It can also compensate for poor childcare options by facilitating the choice

of one parent (usually the mother) to stay home, or work part-time hours, to care for children. Facilitating a parent who wants to care for their child at home is usually considered a good policy option. However, the kind of progressivity needed in the tax-benefit system to accomplish this can often dis-incentivise those who would rather engage in market work from doing so as excessive progressivity in the tax-benefit system reduces incentives to work (Bick & Fuchs-Schuendeln, 2017). This may exacerbate the gender income gap at source i.e. the gender gap in market income. Striking a balance between these objectives is tricky and the policy mix implemented is ultimately a political choice based on competing demands on resources.

Empirically, it appears that, within Europe, countries have taken different stances regarding how much the tax-benefit system should cushion the gender income gap. In Greece and Romania less cushioning takes place compared (around 5 percentage points), compared to the Netherlands (14 percentage points). However, a country's starting point also matters. Denmark has the lowest gender gap in market income but its tax benefit system still provides significant cushioning, reducing the gap from 26% to 15%.

The source of cushioning also differs across countries. The benefits system performs most of the cushioning in the Netherlands while the tax system performs most of the cushioning in Romania and Greece. The tax and benefit systems play equally important roles in the UK, Ireland and Denmark.

Analysis carried out for the UK and Ireland shows that a significant difference in income would continue to exist if the unexplained gender wage gap were to fully close – this accounts for only 6% of the gender gap in market income in Ireland and 15% in the UK. Relatively little of this unexplained gender wage gap is cushioned by the tax benefit system, suggesting that the tax-benefit system is not providing a disincentive to firms to pay equal wages for equal work.

On the other hand, tackling the gender work gap would do much to equalise the incomes of men and women and this is an important finding for policymakers. We find that the tax-benefit system mainly works to alleviate the part of the gender income gap which is due to this gender work gap. This supports the prevalent view in the literature that the tax-benefit system can disincentivise secondary work (Bick & Fuchs-Schuendeln, 2017). These findings merit further discussion and investigation in the gender budgeting literature.

Works Cited

Albrecht, J., Bronson, M. A., Skogman Thoursie, P., & Vroman, S. (2018). The career dynamics of high-skilled women and men: Evidence from Sweden. *Working Paper Series 2018:9, IFAU - Institute for Evaluation of Labour Market and Education Policy.*

Avram, S., & Popova, D. (2020). *Do welfare state taxes and transfers reduce gender inequality? Evidence from eight European countries.* EUROMOD Working Paper Series.

Bargain, O. (2008). Normative Evaluation of Tax Policies: From Households to Individuals. *Journal of Population Economics, 21*, 339-371.

Bargain, O., Doorley, K., & Van Kerm, P. (2018). Minimum Wages and the Gender Gap in Pay. New Evidence from the UK and Ireland. *Review of Income and Wealth*, forthcoming.

Bastani, S. (2013). Gender-Based and Couple-Based Taxation. *International Tax and Public Finance, 20*, 653-686.

Bick, A., & Fuchs-Schuendeln, N. (2017). Quantifying the Disincentive Effects of Joint Taxation on Married Women's Labor Supply. *American Economic Review, 107*(5), 100-104.

Blau, F. D., & Kahn, L. M. (2017, September). The Gender Wage Gap: Extent, Trends, and Explanations,. *Journal of Economic Literature,, 55*(3), 789-865.

Browning, M., Bourguignon, F., Chiappori, P.-A., & Lechene, V. (1994). Incomes and Outcomes: a Structural Model of Intrahousehold Allocation. *Journal of Political Economy, 102*, 1067-1096.

Browning, M., Chiappori, P.-A., & Lechene, V. (2010, June). Distributional Effects in Household Models: Separate Spheres and Income Pooling. *The Economic Journal, 120*, 786-799.

Cantillon, S., & Nolan, B. (2001). Poverty Within Households: Measuring Gender Differences Using Nonmonetary Indicators. *Feminist Economics, 7*(1), 5-23.

Christofides, L. N., Polycarpou, A., & Vrachimis, K. (2013). Gender wage gaps, 'sticky floors' and 'glass ceilings' in Europe. *Labour Economics, 21*(C), 86-102.

Figari, F., Immervoll, H., Levy, H., & Sutherland, H. (2011). Inequalities Within Couples in Europe: Market Incomes and the Role of Taxes and Benefits. *Eastern Economic Journal, 37*, 344-366.

Fortin, N. M., Bell, B., & Böhm, M. (2017). Top earnings inequality and the gender pay gap: Canada, Sweden, and the United Kingdom. *Labour Economics, 47*(C), 107-123.

Gallego-Granados, P., & Geyer, J. (2015). Distributional and Behavioural Effects of the Gender Wage Gap. *Discussion Papers*. Berlin: Deutsches Institut für Wirtschaftsforschung.

Goldin, C. (2014). A Grand Gender Convergence: Its Last Chapter. *American Economic Review, 104*(4), 1091-1119.

Immervoll, H., Kleven, H. J., Kreiner, C. T., & Verdelin, N. (2011). Optimal Tax and Transfer Programs for Couples With Extensive Labor Supply Responses. *Journal of Public Economics, 95*, 1485-1500.

Keller, E. (2019, June). Labor supply and gender differences in occupational choice. *European Economic Review, 115*, 221-241.

Kleven, H., Landais, C., & Søgaard, J. E. (2018). Children and Gender Inequality: Evidence from Denmark. *CEPR Discussion Papers*.

Lundberg, S. J., Pollak, R. A., & Wales, T. J. (1997). Do Husbands and Wives Pool Their Resources? Evidence from the United Kingdom Child Benefit. *The Journal of Human Resources, 32*(3), 463-480.

McGuinnes, S., Kelly, E., Callan, T., & O'Connell, P. (2009). The Gender Wage Gap in Ireland: Evidence from the National Employment Survey. *The Equality Authority*.

OECD. (2016). Gender Budgeting in OECD Countries.

Office for National Statistics. (2018). *Understanding the gender pay gap in the UK*.

Office for National Statistics. (2018). Understanding the gender pay gap in the UK.

Olivetti, C., & Petrongolo, B. (2008, October). Unequal Pay or Unequal Employment? A Cross-Country Analysis of Gender Gaps. *Journal of Labor Economics, 26*(4), 621-654.

Olivetti, C., & Petrongolo, B. (2017). The Economic Consequences of Family Policies: Lessons from a Century of Legislation in High-Income Countries. *Journal of Economic Perspectives, 31*(1), 205-230.

Redmond, P., & McGuinness, S. (2017). The Gender Wage Gap in Europe: Job Preferences, Gender Convergence and Distributional Effects. *IZA Discussion Papers 10933*.

Redmond, P., & McGuinness, S. (2019). The Gender Wage Gap in Europe: Job Preferences, Gender Convergence and Distributional Effects. *Oxford Bulletin of Economics and Statistics*, 564-587.

Stotsky, J. (2016). Gender Budgeting: Fiscal Context and Current Outcomes. *IMF Working Paper 16/149*.

Watson, D., Maître, B., & Cantillon, S. (2013). *Implications of Income Pooling and Household Decision-making for Poverty and Deprivation: An Analysis of the SILC 2010 Special Module for Ireland.* Dublin: Department of Social Protection.

Appendix 1: Wage model

Table A1 OLS models of hourly wages for men and women

	IE				UK			
	female		male		female		male	
Demographic								
Age	0.08		0.49	*	0.33	***	0.56	***
Age^2	0.00		-0.01		0.00	***	-0.01	***
Married	0.07		-1.06		0.64	**	1.68	***
Single	0.15		-2.24	*	0.02		0.07	
Native	0.91		2.20	***	0.00	***	0.00	***
Education & tenure								
Educ. years	-0.61	***	-0.94	***	1.27	***	1.11	***
Educ. years^2	0.04	***	0.06	***	-0.02	***	-0.02	***
Exper. Years	0.52	***	0.25	*	0.22	***	0.24	***
Exper. years^2	-0.01	***	0.00		0.00	***	0.00	***
Job characteristics								
Civil servant	2.66	***	0.31		0.48		-1.06	
Firm size	0.07	***	0.07	***	0.01	***	14.38	***
Part-time	1.28	***	2.38	***	-0.39	**	-3.57	***
Constant	3.29		-2.17		-14.33	***	-15.99	***
Occupation dummies	*Yes*		*Yes*		*Yes*		*Yes*	
Industry dummies	*Yes*		*Yes*		*Yes*		*Yes*	
N=	*1,799*		*1,634*		*7,113*		*6,853*	
R^2	*0.48*		*0.43*		*0.35*		*0.36*	

*Note: OLS model of hourly wages for men and women aged between 22-64 using SILC data for year 2017. Estimates significant at the 1%,5% or 10% levels are indicated using ***, ** and * respectively.*

Appendix 2: Limitations of microsimulation

It is worth noting the standard limitations that accompany the use of microsimulation models. Firstly, the models are static and assume no behavioural response to policy changes. Second, survey data tends to have problems accurately capturing the higher end of the income distribution. However it is these data which are the subject of extensive analysis in the debate about income inequality.

Other important considerations when using a microsimulation model include the systematic underreporting of income for the purposes of tax evasion. Take-up of means-tested benefits is generally not 100% although basic microsimulation of benefits attributes them to all eligible households. We deal with this by introducing random non-take-up, where possible, to certain means-tested benefits which have low reported take-up rates. In addition to this there may be some policies that are not captured by a tax-benefit model due to a lack of information in the underlying data that prevents simulation of a tax or benefit. In the context of this research, the inability of microsimulation models to simulate non-cash benefits such as childcare subsidies may lead us to underestimate the effect of the benefits system on the gender income gap. Lastly, indirect taxes are generally not captured in microsimulation models as expenditure information is often not present in the income surveys used to build a database for the tax-benefit model.[12]

[12] Kaplanoglou and Rapanos (2016) examined how the distribution of consumption in Greece changed between 2008 and 2013. They found evidence of a significant increase in consumption inequality, with indirect tax changes contributing to this outcome. See also Pestel and Sommer (2016), Decoster et al. (2014), and Savage (2017) for analyses based on imputation of expenditure data into a tax-benefit microsimulation database.

Appendix 3: Family benefits assumed to be split between members of a couple in the "no income sharing" scenario

UK	Child Benefit, Heating Allowance, Working Tax Credit, Child Tax Credit, Social Assistance, Income-related Employment Support Allowance, Housing Benefit and Local Housing Allowance, Universal Credit, Council Tax Credit
Ireland	Child Benefit, Working Families Payment, Fuel Allowance, Rent Supplement, Residual Family Allowances, Supplementary Welfare Allowance, Minor Social Assistance Benefits
Denmark	Social assistance, Child family Grant, Ordinary Child Benefit, Child Benefit for Student Parents, Housing Benefit, Housing Grant, Green Check, Other Family Related Benefits
Greece	Child benefit, Large Family benefit, Guaranteed Minimum Income, Social Dividend, Minor Family Benefits, Civil Servant's Family Benefit
Netherlands	Child Allowance, Child Benefit, Social Assistance Benefit, Care Allowance, Housing Benefit
Romania	Universal Child Benefit, Child Raising Incentive, Child Raising Allowance, Means-tested Family Benefits, Means-tested Heating Benefit, Means-tested Education Allowance

Appendix 4: Adjusting female hours of work

Figure A.1 Actual and adjusted weekly hours of work - UK

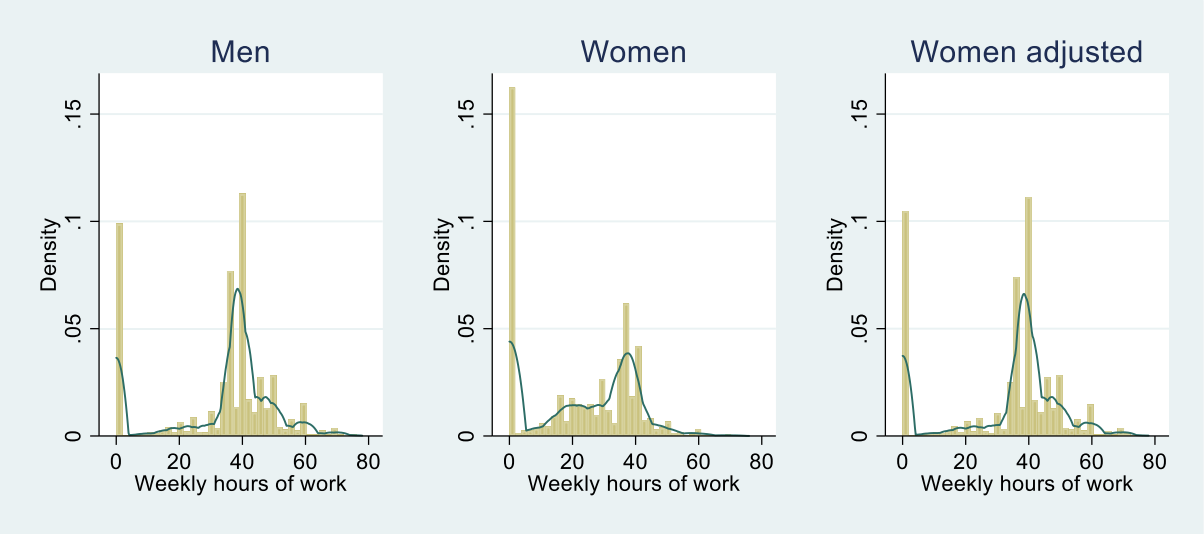


Figure A.2 Actual and adjusted weekly hours of work - Ireland

Source: Own calculations using 2017 SWITCH and UKMOD policies linked to 2017 SILC and FRS data, respectively. Sample is aged 22-64. Adjusted hours of work for women are drawn from the male distribution as described in Section 3.1.2.

Appendix 5: Full income sharing

Table A2 Composition of disposable income for males and females before and after eliminating the unexplained gender wage gap: full income sharing

	IE		UK		DK	
	male	female	male	female	male	female
A. Baseline						
Market income	2,978	2,652	2,367	2,227	3,724	3,655
(male-female)/male	*0.11*		*0.06*		*0.02*	
Earnings	2,894	2,553	2,265	2,082	3,616	3,484
Benefits	283	372	185	281	552	638
Tax + social security	927	766	587	538	1,673	1,644
Disposable income	2,333	2,257	1,965	1,970	2,603	2,649
(male-female)/male	*0.03*		*0.00*		*-0.02*	
B. After closing the unexplained gender wage gap						
Market income	3,024	2,725	2,431	2,326		
(male-female)/male	*0.10*		*0.04*			
Earnings	2,940	2,626	2,329	2,181		
Benefits	282	369	185	279		
Tax + social security	948	799	611	575		
Disposable income	2,358	2,295	2,006	2,030		
(male-female)/male	*0.03*		*-0.01*			
Observations	*2988*	*3281*	*10751*	*12013*		
C. After closing the unexplained gender wage gap						
Market income	3,318	3,119	2,679	2,747		
(male-female)/male	*0.06*		*-0.03*			
Earnings	3,234	3,020	2,577	2,602		
Benefits	259	310	159	212		
Tax + social security	1,041	904	676	684		
Disposable income	2,536	2,524	2,163	2,275		
(male-female)/male	*0.00*		*-0.05*			
Observations	*2988*	*3281*	*10751*	*12013*		

	NL		RO		EL	
	male	female	male	female	male	female
A. Baseline: full income sharing						
Market income	2,811	2,683	296	266	785	710
(male-female)/male	*0.05*		*0.10*		*0.09*	
Earnings	2,677	2,476	295	265	674	601
Benefits	291	344	37	55	118	180
Tax + social security	909	846	82	75	229	211
Disposable income	2,071	2,058	250	246	669	671
(male-female)/male	*0.01*		*0.02*		*0.00*	

Own calculations using 2017 SWITCH (IE), UKMOD (UK) and EUROMOD (DK, NL, RO, EL) policies with SILC data for 2017 (IE), FRS data for 2017 (UK) and EU-SILC data for 2017 (DK, NL, RO, EL). Sample is aged 22-64. Earnings, taxes and transfers in the baseline for the UK and Ireland are based on hourly wages predicted using an OLS model for men and women separately. Earnings, taxes and transfers in the adjusted scenario are based on hourly wages predicted using coefficients from the male model for both men and women. Adjusted hours of work for women are drawn from the male distribution as described in Section 3.1.2.

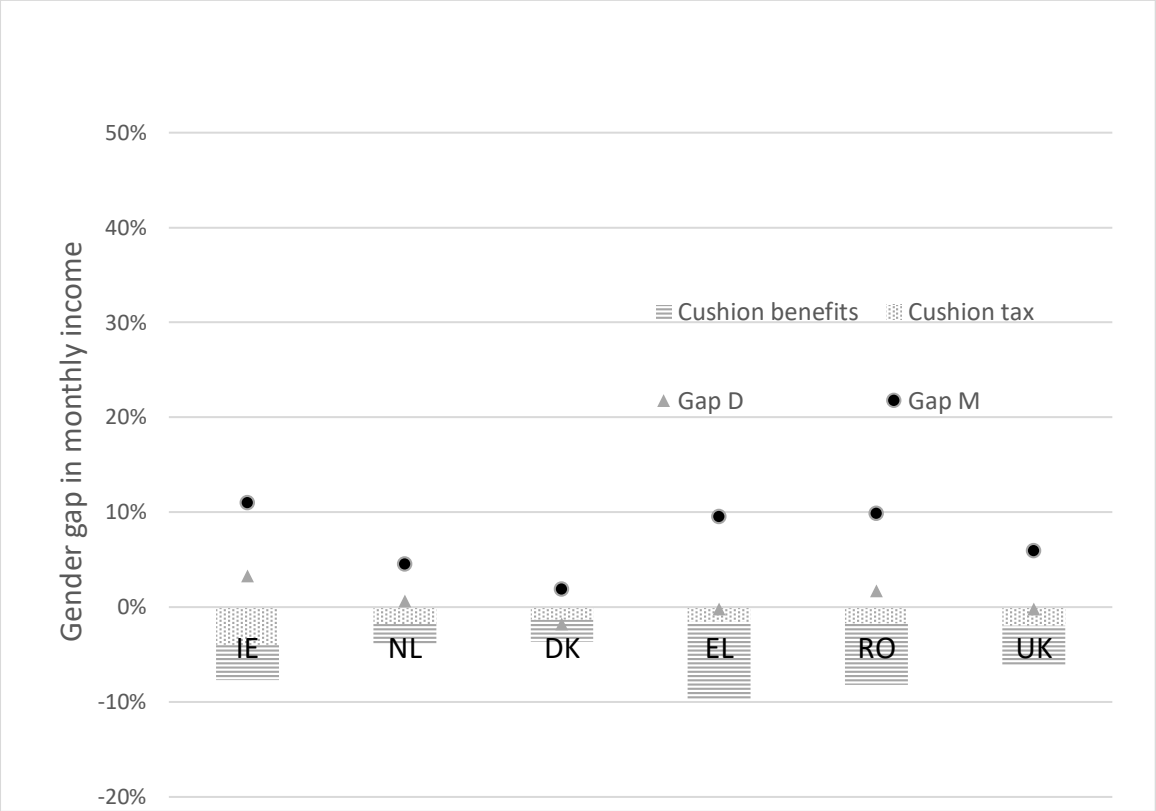
Panels A and B in Table A2 repeat the statistics shown in Table 2 but under the assumption that income is shared fully between members of a couple. As expected, the gender gaps in market and disposable income are dramatically reduced – gaps in disposable income range from 2% in Denmark to 11% in Ireland, compared to a range of 26%-49% under the assumption of no income sharing. The role of the tax-benefit system in equalising incomes across genders is striking – the income gaps are reduced substantially in Ireland, the Netherlands and Romania, removed entirely in the UK and Greece while in Denmark the tax-benefit system flips the gap in market income so that the gap in disposable income is now 2% in women's favour.

Panel B in Table A2 shows how income changes if the unexplained gender wage gap is closed i.e. if women were rewarded as men for their labour market attributes, assuming full income sharing. As was the case under the assumption of no income sharing, the gap in market income between men and women narrows in this scenario, as does the gap in disposable income.

Panel C in Table A2 shows how income changes (again assuming full income sharing) once women's work hours are matched to those of similar males. This results in a reversal of the gender income gap in the UK (a 3% difference in women's favour based in market income and a 5% difference in women's favour in disposable income). In Ireland, a 3% gap in market income is converted to no gender difference once the tax-benefit system has been applied.

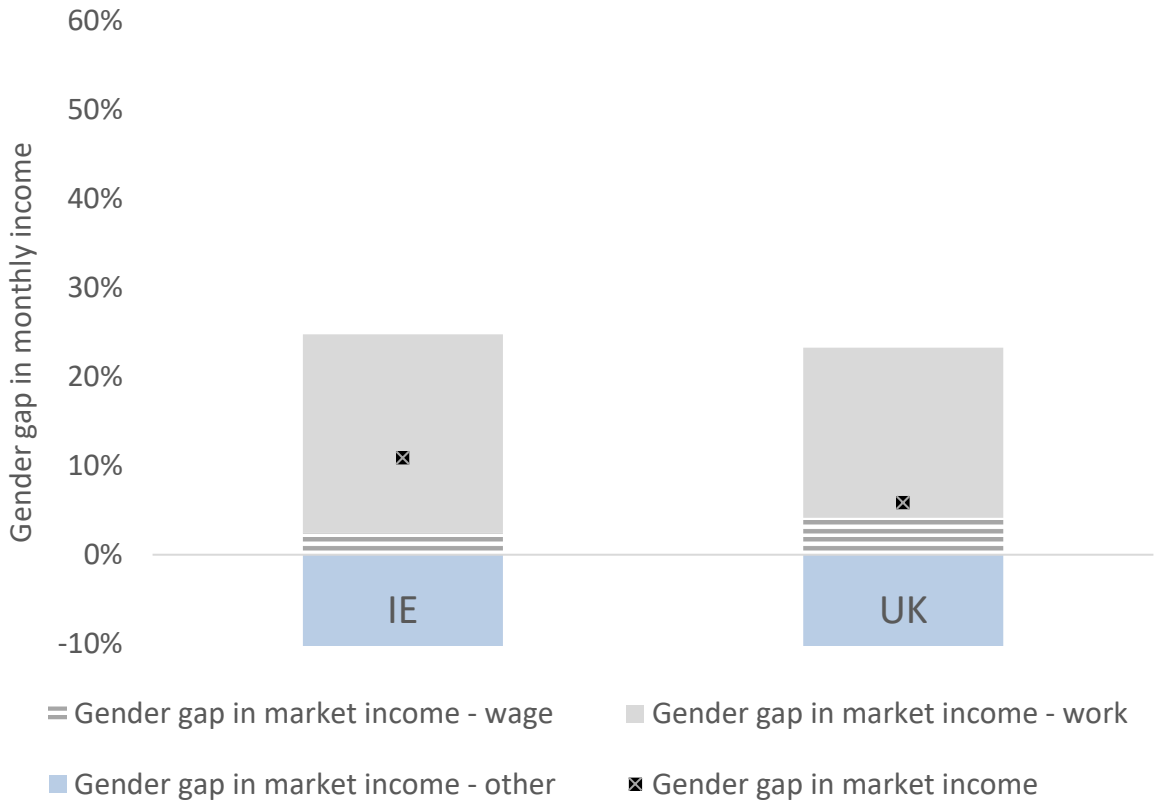
Under the assumption of full income sharing, the gap in market income is much more muted ranging from 2% in Denmark to 11% in Ireland (see Figure A.3 below). The tax-benefit system closes most, or in some countries all, of this gap. In Denmark, Greece, Romania and the UK, the benefit system is the main driver closing this gap while, in the Netherlands and Ireland, the cushioning effect is more evenly spread between the tax and benefit system.

Figure A.3 The gender gap in market income, the gender gap in disposable income and the contribution of the tax and benefit system to the difference between the two – full income sharing



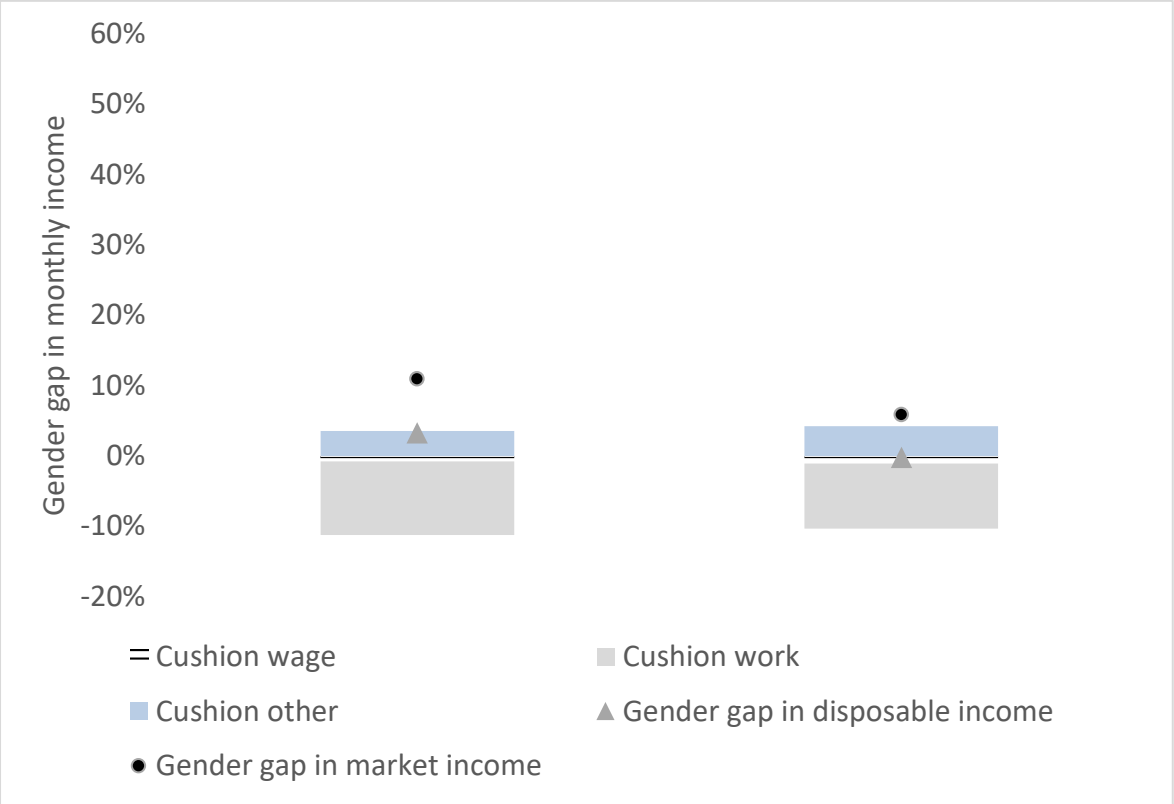
Compared to the results for full income sharing (see Figure 6), the overall gender gap in market income is substantially lower if we assume couples fully share their income, as shown in Figure A.4. The gap falls from 49% in Ireland to 11% and from 41% in the UK to 6%. The pattern of results holds, with the gender work gap accounting for the majority of the gender income difference and a smaller role played by the gender wage gap. In line with these findings, and the results under an assumption of full income sharing (see Figure 6), the tax-benefit system mainly cushions the gender income gap caused by work patterns and provides very little cushioning for the part of the gender income gap caused by unexplained wage differences between men and women in either the UK or Ireland (see Figure A.5 below).

Figure A.4 The contribution of the gender wage gap and the gender work gap to the gender gap in market income – full income sharing



Source: Own calculations using 2017 SWITCH and UKMOD policies linked to 2017 SILC and FRS data, respectively. Sample is aged 22-64. Hourly wages in the baseline are predicted using an OLS model for men and women separately. Hourly wages in the adjusted scenario are predicted using coefficients from the male model for both men and women. Adjusted hours of work for women are drawn from the male distribution as described in Section 3.1.2.

Figure A.5 The cushioning effect of the tax-benefit system on the gender wage gap and the gender work gap – full income sharing



Source: Own calculations using 2017 SWITCH and UKMOD policies linked to 2017 SILC and FRS data, respectively. Sample is aged 22-64. Hourly wages in the baseline are predicted using an OLS model for men and women separately. Hourly wages in the adjusted scenario are predicted using coefficients from the male model for both men and women. Adjusted hours of work for women are drawn from the male distribution as described in Section 3.1.2.