The Stabilising Effect of Tax-Benefit Systems on Gender Earnings Inequality in Europe

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**6th European User Conference for EU-Microdata**
*Mannheim, March 2019*

Introduction

- Wages of men and women converging
  - Still an unexplained gender wage gap (Blau & Kahn, 2017; Redmond & McGuinness, 2017)
- Gender differences in labour force participation and hours of work sizable (Olivetti & Petrongolo, 2008).
- The combined effect of the gender wage gap and gender work gap is a gender gap in labour income which varies across countries.
  - implications for equality and poverty both during working life and into retirement.

Employment rate

Hours of work

"Men EU-28"

Women EU-28

Men EU-15

Women EU-15
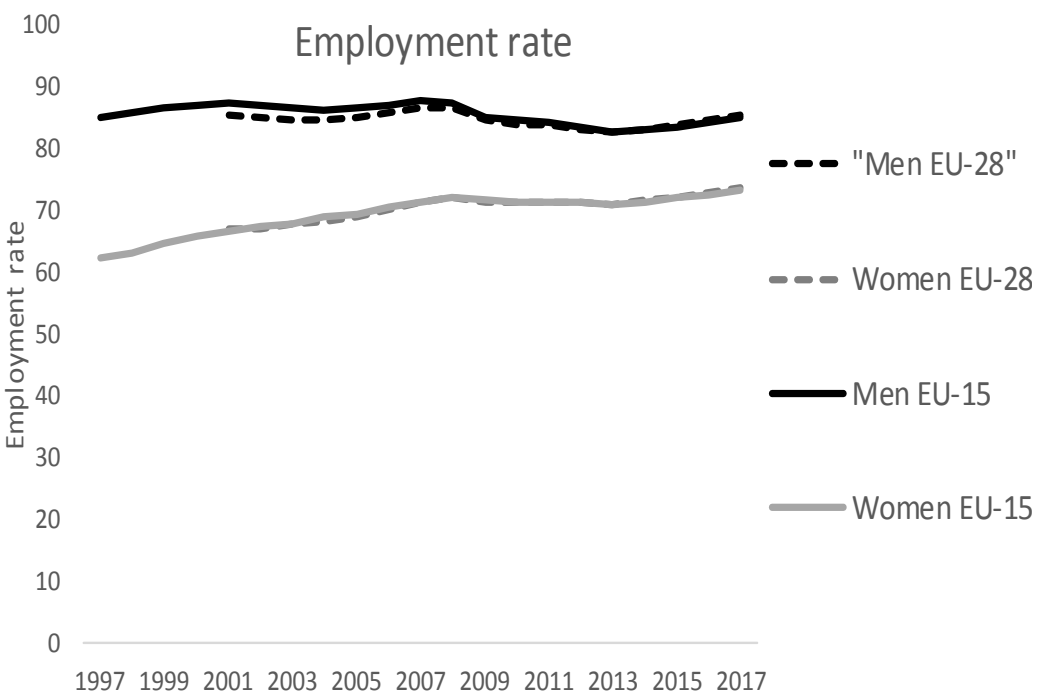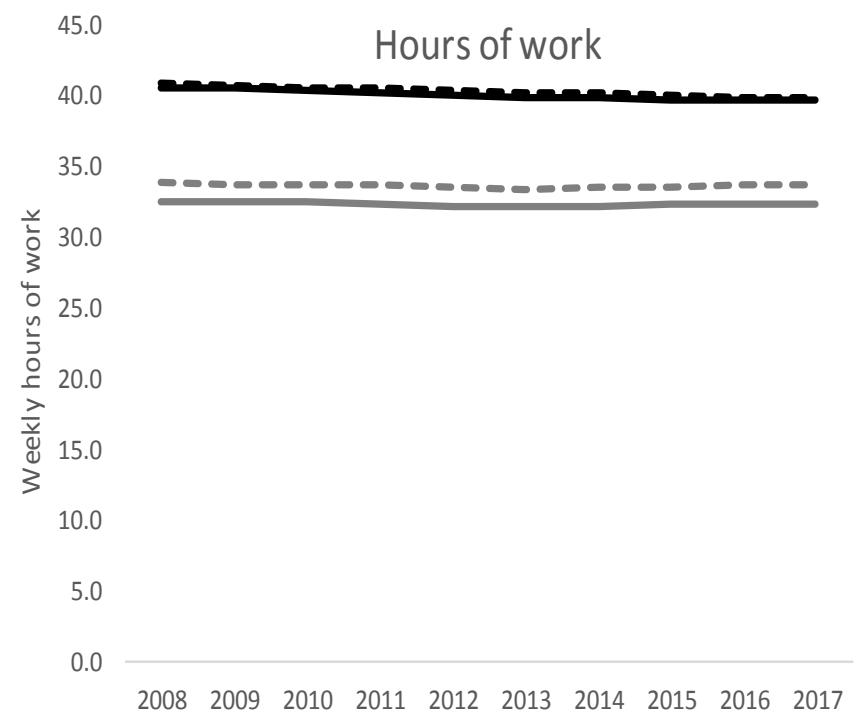
Introduction

- Policy interventions have been shown to help close the gender pay gap
  - equal pay legislation, collective bargaining and minimum wages (Blau and Kahn, 2003; Polachek & Xiang, 2015; Bargain et al, 2018)
- Equally, policy can tackle the gender work gap
  - individual taxation of spouses, childcare subsidies (Bick & Fuchs-Schündeln, 2017; Brewer et al, 2016)
- But, given the gender gap in labour income, tax-benefit policy can also re-distribute between men and women
  - tax-benefit polices are not typically targeted by gender but are usually progressive so that women pay less tax and benefit more from the welfare system

Related literature

- Figari et al (2011) show that the tax-benefit systems of a selection of European countries decrease income inequality between members of a couple

- Avram et al (2016) show how policy changes in a number of European countries affected income and poverty rates by gender.

- Closer to our contribution, Gallego-Granados & Geyer (2015) go a little further and map how the gross gender pay gap is transformed into the net gender pay gap,
  - the design of the German tax-benefit system reduces gender income inequality.

This paper

- Evaluate the capacity for tax-benefit systems in a number of European countries to cushion the gender earnings gap

- 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

- Develop a decomposition method to separate the cushioning effect of the tax-benefit system into its cushioning effect
  1. on the gender wage gap
  2. on the gender work gap

Method

Decomposition method

Market income of individual i is the product of wages (w) and hours (h), plus non-labour income (y):

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

Wages are a function of human capital characteristics (X) and returns to those characteristics (p) where j represents males (m) or females (f)

Market income is transformed into disposable income by a tax-benefit function, d:

$$D_{ij} = d\left(w_i\left(X_i, p^j\right), h_i, y_i, X_i\right)$$

Decomposition method

We define one counterfactual market income and disposable income distribution if both men and women were paid according to the price structure of men (i.e. no unexplained gender wage gap)

$$M_i^* = w_i(X_i, p^m) * h_i + y_i$$

$$D_i^* = d(w_i(X_i, p^m), h_i, y_i, X_i)$$

Decomposition method

The "cushioning" effect of the tax-benefit system on the gender gap in market income is:

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

This can be decomposed into the cushioning effect on the gender wage gap and the cushioning effect on other gender gaps (work and non-labour income)

$$C = \underbrace{\left[\left(M_f^* - M_f\right) - \left(D_f^* - D_f\right)\right]}_{wage} + \underbrace{\left[\left(M_m - M_f^*\right) - \left(D_m - D_f^*\right)\right]}_{work+non-labour\ income}$$

EUROMOD

- To recover disposable income distributions, we use EUROMOD, a harmonised microsimulation model for the EU-28.

- EUROMOD is linked to EU-SILC data and numerically simulates tax-benefit rules, allowing the computation of all social contributions, direct taxes and transfers to yield household disposable income

- Market income and disposable income distributions are estimated for 2016 (latest available policies) using 2012/2013 data.

EUROMOD

- EUROMOD is also used to simulate counterfactual distributions needed for the decomposition
  1. Predict counterfactual wage for women, if they were paid as men
  2. Assume labour supply and non-labour income are invariant to this wage change (to be relaxed in future work)
  3. Apply 2016 policies to new market income distribution

Results

Preliminary country selection

	Ireland	Netherlands	Denmark	Romania	Greece
Tax					
Income tax system	Partly individual	Mainly individual	Individual	Individual	Individual
Top rate (all in)	52%	53%	56%	16% (flat tax)	55%
Threshold (multiples of average wage)	1.9	1.4	1.3	0.53	3.9
Average income tax rate at average wage	19%	30%	36%	25%	26%
Kakwani index (progressivity)	0.32	0.11	0.08	0.15	0.16

Preliminary country selection

	Ireland	Netherlands	Denmark	Romania	Greece
In work benefits	Means tested and phased out**	Means tested, phased in and out	Universal but capped**	None but extra benefits when in work	Means tested and phased out
Childcare	Means tested subsidies; 15 hours free pre-school per week for 3/4 year olds	Means-tested subsidies, covering up to 90%	Means-tested subsidies, covering up to 100%	Means tested subsidies	Means-tested subsidies
Monthly child benefit	€140	€240*	€161*	€ 50	€ 40
Parental leave	4 months - unpaid*. 2 weeks paid paternity leave	4 months, 100% of earnings up to cap. 2 days paid paternity leave	16 months, paid for 8 months, shared between parents.	4 months, unpaid*	4-5 months, unpaid*
Stay at home parent	Home carer's tax credit	Non-working spouse tax credit	N/A	Child-raising leave and allowance	N/A
Carer's benefit/allowance	Time limited benefit and means tested allowance	Time limited benefit based on salary foregone	Municipalities employ family member as carer	Time limited benefit based on salary foregone	N/A

Summary statistics: 20-64 years old

	IE		DK		NL		RO		EL	
	male	female	male	female	male	female	male	female	male	female
A. Employment and wage										
Employed	72%	59%	77%	69%	79%	65%	79%	57%	64%	45%
Full-time	*86%*	*62%*	*94%*	*88%*	*92%*	*49%*	*97%*	*95%*	*92%*	*82%*
Part-time	*14%*	*38%*	*6%*	*12%*	*8%*	*51%*	*3%*	*5%*	*8%*	*18%*
Hours of work (incl. 0)	29.3	19.0	33.1	27.1	34.0	21.6	32.6	22.6	30.3	18.7
Hourly wage (actual)	20.1	19.9	27.3	25.8	21.9	20.0	1.8	1.7	6.9	6.4
Hourly wage (predicted)	20.1	20.1	27.5	25.9	21.9	19.9	1.8	1.7	6.9	6.3
Hourly wage (adjusted)	20.1	22.4	27.5	28.0	21.9	23.1	1.8	1.9	6.9	7.1
Gender wage gap *(M-F)/M*		0%		6%		9%		6%		9%
Unexplained		*12%*		*8%*		*15%*		*13%*		*11%*
Explained		*-11%*		*-2%*		*-6%*		*-7%*		*-3%*
Observations	*3286*	*3608*	*3706*	*3998*	*6801*	*7276*	*5181*	*5432*	*12384*	*12909*

Own calculations using Euromod 2016 policies with SILC data for 2012 (DK, IE, NL) or 2014 (RO, EL). Sample is aged 20-64. 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.

# Summary statistics – components of income distributions

	IE		DK		NL		RO		EL	
	male	female	male	female	male	female	male	female	male	female
B. Earnings and disposable income										
Baseline										
Earnings	3,110	1,726	4,259	2,945	3,352	1,800	302	184	1,254	598
Market income	3,141	1,768	4,294	3,009	3,517	1,923	303	184	1,283	628
Benefits	392	346	430	546	307	277	30	54	176	135
Tax + social security	951	489	1,886	1,279	1,339	558	86	52	432	179
Disposable income	2,582	1,624	2,839	2,275	2,485	1,642	248	186	1,026	583
After closing the unexplained gender wage gap										
Earnings	3,110	1,920	4,259	3,185	3,352	2,011	302	204	1,254	651
Market income	3,141	1,961	4,294	3,249	3,517	2,133	303	205	1,283	681
Benefits	386	346	427	543	304	277	30	53	175	134
Tax + social security	963	569	1,886	1,390	1,335	648	85	59	432	195
Disposable income	2,564	1,738	2,836	2,401	2,486	1,762	248	200	1,026	620
Observations	3286	3608	3706	3998	6801	7276	5181	5432	12384	12909

Own calculations using Euromod 2016 policies with SILC data for 2012 (DK, IE, NL) or 2014 (RO, EL). Sample is aged 20-64. Hourly wages in the baseline are predicted using an OLS model for men and women separately. Earnings, taxes and transfers in the baseline 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.
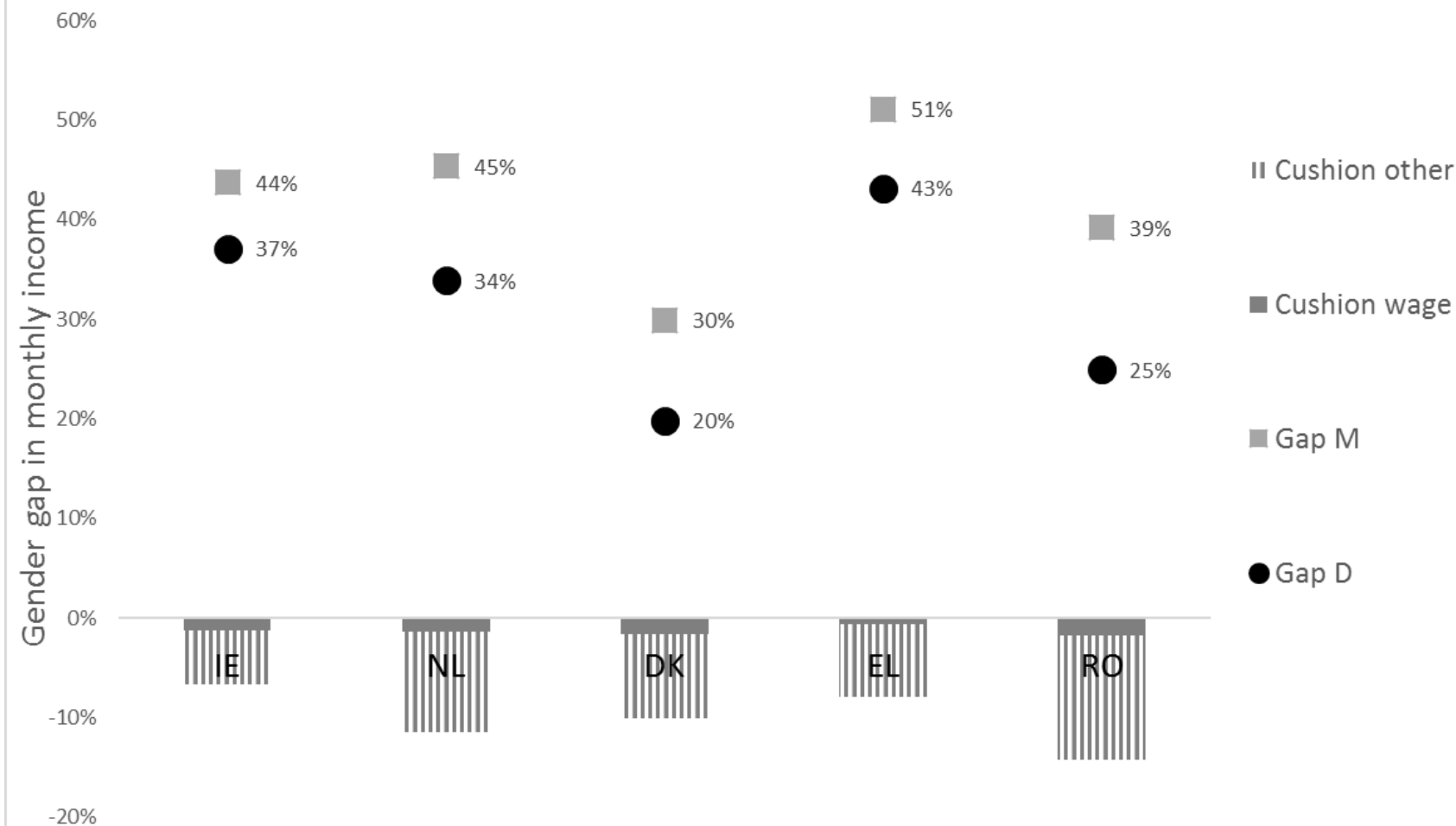
Decomposition results

The components of the gender gap in market income
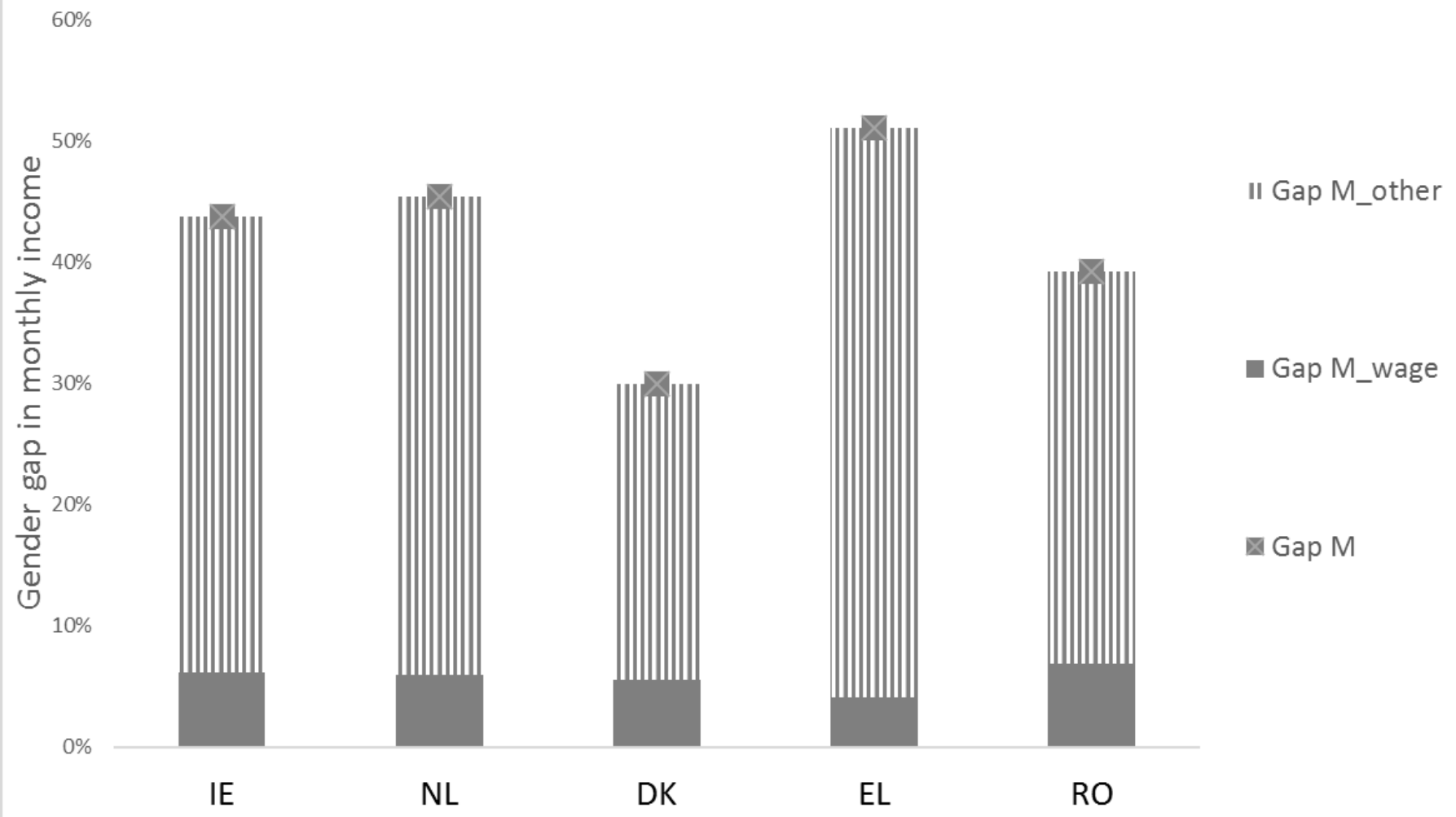
Decomposition results

The components of the gender gap in disposable income

Preliminary Conclusion and Future Steps

Conclusions

- The size and source of the gender income gap varies across countries
  - In all 5 countries, mainly stems from factors other than the gender pay gap e.g. working patterns.
  - Smallest in Denmark (30% of male income); largest in Greece at over 50% of male income
- Tax-benefit systems cushion gender income gaps with variation across countries
  - Romania and Denmark cushions around 1/3 of the gap
  - Ireland and Greece cushion 16% of the gap
  - Gender work gap cushioned rather than gender wage gap – benefits system rather than tax?

Conclusions

- Closing either the gender wage or gender work gap further means less "work" for the tax-benefit system to do – reduced exchequer costs.

- Conversely, systems that over-cushion may reduce incentive for firms/individuals to close these gaps.

Future work

- Extend decomposition to isolate the effect of taxes/benefits separately.

- Extend to EU-28.

- Separate effect of work from non-labour income.

- Allow labour supply to respond to wage changes.

Questions?
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Additional Slides

Wage Prediction Model

- 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.

- OLS model of hourly wages.

- Controls include demographic (age, marital/migrant status); education; work tenure; job characteristics (public/private, self emp., part-time); occupation; industry.

	IE female	IE male	DK female	DK male	NL female	NL male	RO female	RO male	EL female	EL male
Demographic										
Age	0.49 ***	0.56 **	0.60 *	0.00	0.59 ***	0.00 ***	-0.01	0.00 *	0.03	0.00
Age^2	0.00 **	0.00	0.00	0.00	-0.01 ***	0.00 ***	0.00	0.00 **	0.00	0.00
Married	1.30 *	2.22 *	-0.10	0.00	1.44 ***	0.00 ***	0.03	0.00 ***	-0.14	0.00
Single	0.41	-0.35	-0.02	0.00 ***	1.64 ***	0.00	0.01	0.00	-0.68 ***	0.00
Native	1.67 **	2.67 ***	0.14	0.00	2.76 ***	0.00	0.00 ***	0.00	0.41	0.00
Education & tenure										
Educ. years	-1.25 ***	-0.27	-0.65	0.00	-0.64 ***	0.00 ***	-0.14 ***	0.00 ***	0.01	0.00
Educ. years^2	0.06 ***	0.04 ***	0.03 **	0.00 **	0.04 ***	0.00 ***	0.01 ***	0.00 ***	0.01	0.00 **
Exper. Years	0.18 **	0.00	0.08	0.00 ***	0.21 ***	0.00 **	0.03 ***	0.00 ***	0.15 ***	0.00 ***
Exper. years^2	0.00 *	0.00	-0.01 ***	0.00 ***	0.00 *	0.00 **	0.00 **	0.00 ***	0.00 ***	0.00 ***
Job characteristics										
Civil servant	3.03 ***	3.04 ***	-3.23 ***	0.00 ***	-1.31 ***	0.00	-0.01	0.00 ***	0.74 ***	0.00 ***
Firm size	0.06 ***	0.10 ***	0.05 ***	0.00 ***	0.01 *	0.00 ***	0.01 ***	0.00 ***	0.02 ***	0.00 ***
Self-employed	-0.78	-1.02	-4.76 ***	0.00 ***	-3.63 ***	0.00 ***	-0.32 ***	0.00 ***	-0.47 **	0.00
Part-time	2.40 ***	2.97 ***	3.15 ***	0.00 ***	0.62 ***	0.00 ***	-0.01	0.00	1.57 ***	0.00 ***
Occupation										
Armed forces	0.00 ***	0.00 ***	26.30 ***	0.00 ***	7.03	0.00 ***	1.79 **	0.00 ***	2.11 ***	0.00 **
Senior officials and managers	3.55 **	4.66 ***	10.62 ***	0.00 ***	11.13 ***	0.00 ***	1.46 ***	0.00 ***	2.19 ***	0.00 ***
Professionals	8.28 ***	7.90 ***	9.59 ***	0.00 ***	10.47 ***	0.00 ***	1.08 ***	0.00 ***	3.04 ***	0.00 ***
Technicians	3.76 ***	5.38 ***	7.14 ***	0.00 ***	6.65 ***	0.00 ***	0.88 ***	0.00 ***	1.78 ***	0.00 ***
Clerks	-0.26	-1.78	5.76 ***	0.00 ***	3.92 ***	0.00 ***	0.76 ***	0.00 ***	0.95 ***	0.00 ***
Sevice and sales workers	-1.75	-0.58	2.95 ***	0.00	2.67 ***	0.00 ***	0.19 ***	0.00 ***	0.78 ***	0.00 *
Skilled agricultural	-0.54	-6.15 ***	4.17 *	0.00	2.32 *	0.00	-0.11	0.00	0.17	0.00
Craft and trades workers	0.04	-0.61	0.24	0.00 ***	5.67 ***	0.00 ***	0.28 ***	0.00 ***	-0.46	0.00 ***
Plant/machinery operators	0.12	-1.91 **	3.74 ***	0.00 **	4.17 ***	0.00	0.13 *	0.00 ***	2.04 **	0.00 ***
Industry										
Mining, manufacturing, utilities	4.31	1.34	1.17	0.00	0.93	0.00	0.55 ***	0.00 ***	2.48 ***	0.00 ***
Construction	4.04	1.62	2.87 **	0.00	-2.33	0.00	0.73 ***	0.00 ***	2.51 ***	0.00 ***
Wholesale & retail	1.42	-1.18	1.44	0.00	-0.26	0.00	0.67 ***	0.00 ***	1.75 **	0.00 ***
Hotels and restaurant	0.37	-6.14 ***	2.77 *	0.00	-3.27	0.00 ***	0.98 ***	0.00 **	1.22 *	0.00 *
Transport & communication	5.88 *	1.03	0.61	0.00	-1.38	0.00	1.08 ***	0.00 ***	2.40 ***	0.00 ***
Financial intermediation	8.47 **	7.85 ***	4.41 ***	0.00	1.84	0.00 ***	0.86 ***	0.00 ***	3.83 ***	0.00 ***
Real estate & business	5.19	-0.36	1.60	0.00	0.95	0.00	0.87 ***	0.00 ***	0.87	0.00 **
Public administration & defense	7.78 **	3.72 **	1.90	0.00	2.11	0.00	0.48 ***	0.00 ***	1.70 **	0.00 ***
Education	7.62 **	3.33 *	2.01	0.00 ***	-1.49	0.00 *	0.44 ***	0.00 ***	1.53 **	0.00 **
Health & social work	4.74	4.64 ***	0.74	0.00	0.59	0.00	0.51 ***	0.00	1.19 *	0.00 **
Other	3.23	-0.33	2.46 *	0.00	-2.29	0.00 ***	1.02 ***	0.00 ***	1.37 *	0.00
Constant	-1.56	-6.65	1.11	0.00 **	-6.94 **	0.00 **	1.24 ***	0.00 ***	-0.91	0.00 **
N=	1,739	1,739	2,759	2,823	5,118	5,571	2,700	3,670	2,265	3,263
R^2	0.38	0.42	0.28	0.33	0.32	0.38	0.66	0.62	0.43	0.38

Note: OLS model of hourly wages for men and women aged between 20-64 using SILC data for year 2012 (DK, IE, NL) or 2014 (RO, EL). Ommited occupational category is elementary occupations and ommited industry category is agriculture. Estimates significant at the 1%,5% or 10% levels are indicated using ***, ** and * respectively.