

Changes in the Wage Structure in EU countries: The impact of institutions and macroeconomic trends

Preliminary

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Abstract

This paper documents changes in the wage structures in eight EU countries over the period 1995-2002. Using comparable cross-country microeconomic data we compute, at each decile of the wage distribution, the part of the observed wage changes that is due to changes in the composition of workers' and jobs characteristics and the part of wage changes that is due to changes in the returns to these characteristics, i.e. the composition and price component of wage changes. We find that the "price components" explain a large part of the wage changes in most of the countries in our sample. We investigate to what extent international comparisons of these two components of wage adjustments can shed light on the main patterns of medium-run trends in wage adjustments.

Keywords: *Wage Structure, Quantile Regressions.*

JEL Codes: J31

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1. Introduction

One of the most recurrent themes in Labour Economics is about the determinants of relative wages, wage inequality and, in general, the wage structure. Over the last two decades, studies on these topics have proliferated taking advantages of the wealth of microeconomic data sets that are becoming available, including those that contain matched employer-employee characteristics. This literature has provided relevant insights on the reasons for wage differentials among workers of different skills (i.e. returns to education, etc.), among similar workers performing different jobs (i.e. compensating differentials), theories of wage determination, the impact of labour market institutions on the wage structure, the nature of complementarities among production factors, or, most recently, wage dispersion within firms of some particular characteristics.¹

From a macroeconomic viewpoint, the way wages adjust to aggregate developments has important implications. First, given that the degree of inertia of nominal wages is an important source of price sluggishness² and that relative wage adjustments may affect marginal costs, price setting and inflation persistence are not immune to changes in the wage structure. Secondly, wage rigidities generate unemployment and inflation persistence, with implications for the optimal design of monetary policy.³ Moreover, macroeconomic shocks do not only affect the levels of aggregate labour market variables (labour demand and labour supply) but also their composition (geographical, skills, etc.). Finally, relative wage rigidities may have different sources, although most of them are thought to be derived from labour market institutions generating non-competitive forces in wage determination.

For instance, in a competitive labour market, with perfect labour mobility, relative wages only reflect (among homogenous workers) compensating differentials and (among workers of different skills) productivity differentials. However, the fact that there exist sizeable wage differentials across workers of similar characteristics in different jobs (sectors, regions, etc.) and

¹ This literature is too wide to be adequately quoted here. For a comprehensive survey see Katz and Autor (1999). The seminal reference on the returns to education is Mincer (1974). As for some interpretation of wage differentials as non-competitive features of the labour market, see Krueger and Summers (1988). On the impact of technology on the wages structure and skill-biases, see Machin and van Reenen (1998) and Chennells and van Reenen (1999); on the impact of labour market institutions, Di Nardo et al. (1996). Regarding wage dispersion within firms, see Lazear and Shaw (forthcoming).

² On the sources of inflation persistence in countries of the euro area, see Rumler (2005).

³ See Christoffel and Linzert (2005) and Blanchard and Gali (2007).

that these differentials are relatively stable through time and across countries is typically interpreted as the result of non-competitive features of the labour markets, such as efficiency wages (Krueger and Summers, 1988) or rent-sharing. Thus, changes in these differentials are usually read as changes in the degree of competition of the labour market (see, for instance, Saint-Paul, 2005, Koeniger, Leonardi and Nunziata, 2007).

Despite the growing empirical literature on wage structure, there is no systematic accounting of cross-country differences in changes in the structure of wages in EU countries over the past decade.⁴ In many EU countries over the last decade, there have been substantial labour demand shocks, as derived, for instance, from technological change and globalisation, and significant labour supply shocks, as those coming from demographic trends like immigration, population ageing and changes in female participation and in the composition of the labour force by educational levels. Deregulation in product markets and labour market reforms have also been prevalent, affecting the way labour markets operate. These developments have possibly changed national wage structures. A cross country comparison of these changes can indeed help to identify labour market rigidities. In this context, cross-country comparisons seem very informative on the consequences of recent macroeconomic developments.

International comparisons of changes in the wage structure face one main difficulty: the lack of comparable cross-country microeconomic data that could allow the computation of wage variables controlling for workers and job characteristics. Without a proper accounting of the impact of these characteristics, cross-country comparisons of wages are contaminated by employment compositional effects that blur the observation of the adjustment of wages to macroeconomic shocks and institutional changes.

The contribution of this paper is twofold: i) to provide a measure of changes in wages that is “purged” of employment composition effects and is comparable across countries, ii) to relate this measure of wage adjustment to some features of the national labour markets and the observable shocks that could have produced those changes, in an attempt to shed light on the main patterns of medium-run trends in wage adjustments. We do so using data from the *Structure of Earnings*

⁴ Recent work on wage differentials for European countries includes several papers produced within the Pay Inequality and Economic Performance project (PIEP) which used 1995 data (see Marsden, 2005). Currently, several studies within the Wage Dynamic Network analyse relative wages across industries using 1995 and 2002 data. Du Caju et al (2008) summarise the WDN evidence on industry wage differentials for a sample of 8 EU countries.

Survey, for which two waves are available for most European countries, usually 1995 and 2002. Thus, we are able to compute changes in the wage structure over this period for eight EU countries. For that, we estimate Mincerian (quantile) wage regressions, and, using Machado and Mata (2005) procedure, decompose wage changes at each decile of the wage distribution in two components: i) changes in employment composition and ii) changes in “returns”. Then, we interpret these changes in returns in the light of the most relevant macroeconomic and labour market trends in each country.

We document that, although in most of these countries wage dispersion increased (mostly at the upper part of the distribution), the magnitudes of these changes are very heterogeneous. Our results highlight the importance of the part of the change in wages that is due to changes in returns to workers and job characteristics (conditional on characteristics), in contrast with the changes in composition of the labour force that have been found relevant for the US in recent literature (see Lemieux, 2002, 2006b). The effects of changes in returns are positive for all the countries of our sample, while compositional effects are mostly negative. For example the decrease in real wages observed in Spain in the intermediate quantiles and, to a larger extent in Germany in the lower quantiles, is due to compositional effects, stemming from workers’ characteristics in the case of Spain and from job characteristics in the case of Germany.

The paper has the following structure. Section 2 provides some background information on recent macroeconomic and labour market trends in EU countries. Section 3 describes the data that we use for the analysis and reports some facts. Section 4 presents the methodology and main results regarding the measurement and decomposition of changes in wage structures in EU countries. Section 5 interprets these changes in relationship with institutions and macroeconomic and labour market trends. Finally, Section 6 concludes.

2. Changes in the wage structure, macroeconomic and labour supply trends, and institutional reforms in the EU: A preview

The wage distribution in most OECD countries has been widening since the 1980s. This trend is often associated to the impact of skill-biased technological progress and to complementarities between new technologies and human capital. Part of the empirical debate is about the nature, causes and timing of increasing earnings inequality in the US, with some authors claiming that it

was due to a one-time event associated to changes in labour market institutions (deunionisation, changes in the minimum wages) and compositional effects, while others claiming that it has continued throughout the 1990s and 2000s and was due to skill-biased technological change.⁵ As for Europe, conventional wisdom was that changes in the wage structure have been less acute and that this lack of wage flexibility, originated in labour market institutions prone to wage compression, explained the increase in unemployment among unskilled workers in the 1980s and early 1990s (Krugman, 1994).

In this literature, changes in wage structure are typically assessed by looking at the relationship between wages at several deciles of the earnings distribution. Table 1 compiles some of these statistics for the countries and period of interest in this paper. Data comes from OECD. According to this data, wage structures have widened, as indicated by the increase of the ratio of the 9th to 1st decile, in all countries, with two exceptions: Ireland and Spain. Most often, this increase took place at the upper half of the distribution (the ratio of the 9th to the 5th decile increased in all countries in the sample, while the ratio of the 5th to the 1st decile decreased or remained constant, with the exceptions of Germany and Hungary). This widening of the wage structure took place at the same time that a reduction of the gender wage gap (the ratio of female median wages to male median wages increased) and an increase in the weight of female employment, while average wage growth was rather heterogeneous across countries (see Tables 1 and 2).

Besides the changes in employment composition by gender, labour supply and demand in European countries were subject to some other transformations due to medium term trends (ageing, increasing weight of services in employment, etc.) or new developments (increasing immigration flows). As seen in Table 3, the share of young workers in total employment is falling in most countries, while the share of workers close to retirement is increasing. The fall in both male and female unemployment rates is plausibly a source of significant compositional effects in terms of workers skills and sectoral employment composition.

As for macroeconomic trends, besides technological changes, there have been substantial transformations in European labour markets since the mid 1990s. The most evident is monetary integration, but other forces increasing competition and international mobility of production

⁵ For evidence on the first view see Di Nardo et al. (1996) and Lemieux (2006); for evidence on the second, see Autor, Katz and Kearney (2008).

factors have also been noticeable. Table 4 gives some indication of these changes across countries by reporting the change in a globalisation index, computed from data on goods and capital flows (international trade, FDI, portfolio investments and income payments to foreign nationals) and restrictions (import barriers, tariffs, taxes on international trade and capital account restrictions),⁶ and the proportion of foreigners in the labour force. As seen in Table 3, all countries have experienced an increase in their international exposure, as indicated by the increasing trend in globalization and the rise in the weight of foreigners in the labour force. The largest increase in globalization took place in Austria, Czech Republic, Finland, Germany, Poland and Spain, while the largest increase in migration inflows took place in Greece, Portugal, Spain and the UK.

Facing these changes, European product and labour markets have been under stress, and regulatory reforms have been high in the political agenda. As seen in Table 5, at the mid 1990s there was substantial cross-country heterogeneity in labour and product market institutions in EU countries and, although the process of reform has reduced this heterogeneity to some extent, not all the countries have progressed at the same pace. According to the intensity of reform indicator by Brandt, Burniaux, and Duval (2005), which measures the proportion of a maximum score associated to the situation recommended by the OECD Jobs Strategy and that, conveniently, is close to the ideal of labour market competition, the leaders are Denmark, Finland, the Netherlands, Germany and Belgium, with Italy, Greece, Ireland, France and Spain lagging behind.

⁶ For details see, Dreher (2006).

Table 1. Earnings dispersion^a and gender wage^b gap

	Ratio of 9 th to 1 st earnings deciles		Ratio of 9 th to 5 th earnings deciles		Ratio of 5 th to 1 st earnings deciles		Gender wage gap	
	1995	2005	1995	2005	1995	2005	1995	2005
Austria	--	--	--	--	--	--	0.74	0.79
Czech Republic	2.78	3.01	1.71	1.77	1.63	1.70	0.78	0.82
Denmark	2.47	2.64	1.69	1.73	1.46	1.53	0.86	.088
Finland	2.34	2.42	1.66	1.70	1.41	1.43	0.78	0.80
France	3.08	3.10	1.93	2.01	1.59	1.54	0.90	0.89
Germany	2.79	3.13	1.79	1.84	1.56	1.70	0.77	0.76
Hungary	3.96	5.63	2.09	2.46	1.89	2.33	0.83	0.87
Ireland	4.01	3.57	1.98	2.07	2.02	1.72	0.75	0.82
Netherlands	2.77	2.91	1.71	1.76	1.62	1.65	0.77	0.80
Poland	3.40	4.31	1.97	2.18	1.72	1.98	0.80	0.89
Spain	4.22	3.53	2.10	2.14	2.01	1.65	0.71	0.83
Sweden	2.20	2.33	1.59	1.68	1.39	1.39	0.81	0.85
United Kingdom	3.48	3.51	1.88	1.96	1.85	1.79	0.73	0.79
United States	4.59	4.86	2.17	2.31	2.11	2.10	0.75	0.81
OECD unweighted average	3.12	3.39	1.81	1.93	1.70	1.73	0.77	0.81

Table 2. Average annual wages in the total economy^a

	Level or average wages in 2005 in current USD	Level of average wages in 2005 in USD PPPs	Average annual growth rates of real average wages ^b (%)		
			1995-1995	1995-2000	2000-2005
Austria	39 404	35 981	1.3	0.6	0.9
Belgium	43 579	38 910	1.8	1.3	0.3
Czech Republic	10 034	16 195	6.6	3.0	4.8
Denmark	54 074	36 462	0.7	1.6	1.4
Finland	38 436	29 415	0.2	1.3	2.4
France	38 580	32 981	0.9	1.1	1.4
Germany	38 001	34 310	2.1	0.8	0.2
Greece	25 085	26 877	4.9	2.7	3.8
Hungary	11 962	17 835	5.9	0.8	6.9
Ireland	52 911	40 111	2.5	2.3	2.9
Italy	31 051	27 724	-0.7	0.8	0.2
Luxembourg	56 711	50 634	1.9	1.2	1.2
Netherlands	44 037	39 318	0.4	0.2	0.6
Poland	10 571	16 502	4.7	5.0	2.1
Portugal	18 453	20 038	1.8	2.7	0.6
Spain	26 926	27 388	1.9	-0.5	-0.3
Slovak Republic	7 608	12 623	5.9	5.1	2.8
Sweden	38 244	30 351	-0.2	3.3	1.4
United Kingdom	44 974	40 520	0.9	2.5	1.7
United States	45 563	45 563	1.0	2.9	0.2
OECD Europe^c	36 211	32 346	1.5	1.4	1.1
EU-15^c	37 409	33 357	1.0	1.1	0.8
EU-19^c	35 456	32 125	1.5	1.5	1.1
Total OECD^c	39 303	36 537	1.2	1.8	0.7

a) Average gross annual wages per full-time and full-year equivalent dependent employee in the total economy obtained by dividing the National Accounts based total wage bill by the average number of employees in the total economy, which is then multiplied by the ratio of average usual weekly hours per full-time employee to average usually weekly hours for all employees. For more details, see: www.oecd.org/els/employmentoutlook/2007

b) Average annual wages are deflated by a price deflator for private final consumption expenditures.

c) Aggregates are computed on the basis of 2000 GDP weights expressed in 2000 purchasing power parities and include the countries shown

Source: OECD estimates based on OECD National Accounts database and OECD (2006), OECD Economic Outlook, No. 80, December

a) Earnings dispersion is measured by the ratio of 9th to 1st deciles limits of earnings, 9th to 5th deciles and 5th to 1st deciles.

b) The gender wage gap is calculated as the ratio of median earnings of female workers relative to male workers.

Note: Estimates of earnings used in the calculation refer to gross earnings of full-time wage and salary workers. Further information on the national data sources and earnings concepts used in the calculations can be found at:

www.oecd.org/els/employmentoutlook/2007. Source: OECD database on Earnings Distribution.

Table 3. Demographic trends

	Female lab.market participation rates ^a		Population share of 15- 24 year-olds ^b		Population share of 25- 44 year-olds ^b		Population share of 45- 64 year-olds ^b		Male unemployment rate ^b		Female unemployment rate ^b	
	1995	2002	1995	2002	1995	2002	1995	2002	1995	2002	1995	2002
Austria	0.73	0.76	18.7	17.5	47.2	45.8	33.6	36.1	3.2	4.1	4.3	3.9
Belgium	0.73		18.5	18.3	45.5	43.0	35.5	38.3	7.5	7.4	10.2	9.0
Czech Republic			24.2	20.1	40.6	41.0	34.8	38.4	3.4	5.9	4.8	9.0
Denmark	0.82	0.84	19.9	16.2	43.1	43.8	36.4	39.7	5.6	4.2	8.6	4.3
Finland	0.84	0.85	18.5	18.7	44.6	39.9	36.5	40.9	15.8	9.0	15.1	9.1
France	0.77	0.79	20.6	19.8	45.0	42.8	33.9	36.8	9.7	7.9	13.8	10.1
Germany	0.69	0.74	16.3	16.1	45.1	43.2	38.3	40.1	7.2	7.8	9.4	7.9
Greece			20.3	19.2	41.0	44.5	38.2	35.9	6.2	6.4	13.8	15.2
Hungary			23.1	19.9	41.4	40.8	35.0	38.8	10.7	6.1	8.8	5.4
Ireland	0.55	0.68	26.9	25.1	43.0	43.4	29.6	31.1	12.1	4.6	12.2	3.7
Italy	0.53	0.60	20.5	16.6	42.9	45.8	36.0	37.1	8.8	6.9	16.2	12.2
Luxembourg			17.6	16.8	48.3	47.9	33.6	34.7	2.1	1.9	4.4	3.6
Netherlands	0.66	0.75	19.0	17.4	47.1	45.1	33.3	36.9	5.8	2.8	8.7	3.5
Poland			21.3	22.1	45.7	41.2	32.5	36.3	12.1	19.1	14.7	20.9
Portugal	0.75	0.78	24.2	21.3	41.8	43.4	33.4	34.8	6.4	4.2	8.2	6.1
Spain	0.56	0.64	22.4	18.0	44.4	48.2	32.7	33.3	17.8	8.0	30.8	16.4
Sweden	0.87	0.86	17.8	16.3	43.7	42.8	38.0	40.5	9.8	5.7	8.2	4.7
UK	0.74	0.77	17.7	17.2	45.9	45.0	35.9	37.4	10	5.7	6.8	4.4
US	0.76	0.76	19.2	19.2	49.5	44.6	30.7	35.8	5.6	5.9	5.6	5.6

Source: ^aEuropean LFS ^bOECD.Stat

Notes: Start year is 1996 for Hungary, 1999 for Belgium; End year is 2001 for Germany, 2005 for Belgium.

Table 4. Globalization and immigration

	Index of Globalisation ^a			Proportion of foreign labour force (%) ^b		
	1995	2002	Change	1996	2002	Change
	(1)	(2)	(2)-(1)	(4)	(5)	(5)-(4)
Austria	74.84	87.90	13.06	10.0	10.9	0.9
Belgium	90.71	94.00	3.29	8.4	8.6	0.2
Czech Republic	68.71	83.27	14.56	2.8	1.9	-0.9
Denmark	84.48	89.91	5.43	3.1	3.6	0.5
Finland	80.02	91.03	11.01		1.8	
France	67.85	76.81	8.96	6.3	6.2	-0.1
Germany	63.78	76.56	12.78	8.9	9.2	0.3
Greece	63.66	69.72	6.06	3.7	5.5	1.8
Hungary	75.00	82.29	7.29	0.5	1.0	0.5
Ireland	91.89	95.06	3.17	3.5	5.5	2.0
Italy	66.07	75.04	8.97	2.9	3.8	0.9
Luxembourg	95.01	96.53	1.52	53.8	61.3	7.5
Netherlands	89.36	92.95	3.59	3.9	3.7	-0.2
Poland	51.23	62.41	11.18			
Portugal	73.53	82.33	8.80	1.8	5.3	3.5
Spain	72.90	83.86	10.96	1.0	4.5	3.5
Sweden	86.39	89.89	3.50	5.1	4.9	-0.2
UK	76.18	79.51	3.33	3.3	4.6	1.3
US	63.27	64.49	1.22			

Source: ^aDreher (2006), ^bOECD.

Table 5. Labour market institutions and reforms

	Empl. protection legislation		Unemp. benefits indicator		Minimum wage as % of median		Bargaining coord/tion index	Bargaining centr/tion index	OECD Reform Intensity Indicator	Product Market Regulation indicator		Admin. Regulation indicator		Economic Regulation indicator	
	1995	2002	1995	2002	1995	2000	Constant in 1995-2000	Constant in 1995-2000	1994-2004	1998	2003	1998	2003	1998	2003
Austria	2.6	2.5	7.8	10.3			4	3	17.8	1.8	1.4	1.8	1.9	2.3	1.5
Belgium	2.7		10.2		50	49	4.5	3	21.4	2.1	1.4	2.1	1.9	2.6	1.8
Denmark	1.6	1.6	42.1	40.1			4	2	29.3	1.5	1.1	1.1	1.1	2.1	1.4
Finland	2.3	2.3	20.9	19.2			5	5	25.0	2.1	1.3	2.5	1.3	2.5	1.9
France	3.0	3.0	19.5	19.2	59	61	2	2	14.5	2.5	1.7	3.2	1.6	2.8	2.3
Germany	2.6	2.1	20.0	23.2			4	3	23.9	1.9	1.4	2.5	1.9	2.2	1.8
Ireland	1.3	1.3	19.2	17.5			4	4	17.4	1.5	1.1	1.4	1.1	1.9	1.5
Italy	3.7	3.3	6.1	6.4			4	2	21.7	2.8	1.9	3.1	1.6	3.7	2.6
Netherlands	2.3	2.4	23.5	15.8	49	47	4	3	25.7	1.8	1.4	2.0	1.9	2.4	1.6
Portugal	3.7	3.7	10.4	13.1	41	38	4	4	15.9	2.1	1.6	2.0	1.5	3.0	2.2
Spain	2.4	2.3	16.7	14.6	33	32	3	3	10.5	2.3	1.6	2.8	2.0	2.5	2.1
Sweden	2.9	2.7	15.3	14.4			3	3	17.4	1.8	1.2	2.0	1.1	2.0	1.7
UK	1.3	1.4	10.3	3.8		42	1	1	16.7	1.1	0.9	1.2	0.8	1.5	1.4
US	0.6	0.6	1.1	1.3	36	36	1	1	11.6	1.3	1.0	1.4	1.1	1.4	1.3

Notes: *Employment protection legislation* series is taken from Allard (2005a). This series uses the OECD methodology generating an index increasing on the range {0,5}. The series describing *unemployment benefits* is a new indicator which combines the amount of the subsidy with their tax treatment, their duration and the conditions that must be met in order to collect them, by Allard (2005b). The *bargaining coordination & bargaining centralization* indicators are from OECD (2004), Table 3.5. They range from 1-5 and are increasing in the degree of coordination in the bargaining process on the employers' as well as the unions' side, and in the degree of centralization, respectively. The *Overall Product Market Regulation indicator* is from Conway *et al* (2005), Table 24. The indicator summarises information on 139 economy-wide or industry specific regulatory provisions and has a range {0,4}. The *Administrative Regulation Indicator* as well as the *Economic Regulation indicator* are also from Conway *et al* (2005), Table 24. All the above are available at the CEP – OECD Institutions Data Set (1960-2004). The *OECD reform intensity indicator* is from Brandt, Burniaux and Duval (2005).

In section 5 we relate these developments in labour and products markets to the changes in wage structures; for that we need to compute a measure changes in wage compatible across countries and cleaned of compositional effects.

3. Data and descriptive analysis

The analysis in this paper uses micro data from the Structure of Earnings Survey (*SES* henceforth) of eight countries. This is a survey at the firm level, that involves interviewing a large sample of firms randomly selected from the Social Security General Register records or similar firm registers in the country, and obtaining information on both the firm as such and a random sample (ca. 20%, depending on the size of the firm) of their employees. Information obtained about the workers includes several measures of the pay and hours of work, age, gender, and educational attainment and some characteristics that are job specific as type of contract, sector, and occupation. Information obtained about the firm includes number of employees, whether it is privately owned, the nature of the pay bargaining regime etc. The *SES* is uniquely suitable for our study as (i) is comparable across countries: this survey has been run by the national statistical office of 20 European countries on comparable basis, first occasionally and now every four years. Currently two harmonised waves exist, 1995 and 2002, with some exceptions. (ii) The *SES* is a matched employer employee data and, therefore, will allow us to control for individual, job-specific and firm-specific features when estimating a comparable measure of (residual wages) and “conditioning out” composition effects from both workers and firms. (iii) The data is collected at the firm level, which gives us more accurate information on pay and earnings, variables that are usually very noisy in household surveys.

Not all the data for EU countries and waves are made available for research. So far, we have been able to gain access to data for eight countries (Belgium, Germany, Greece, Hungary, Ireland, Italy, the Netherlands, and Spain).⁷ After excluding outliers, workers with missing/not

⁷ Results for Greece have been borrowed from “Christopoulou & Kosma (2008)”, which is also a WDN research paper, follows the same methodology and uses same data and codes as this paper. Estimations for Italy, Ireland and Spain were done at the Safe Center in Eurostat and the ones for Germany via remote access at Statistics Germany. Philip Du Caju (NBB), Steven Poelhekke (DNB) and Gabor Katay (MNB) were kind enough to run our codes on the Belgian, Dutch and Hungarian *SES* data available at their respective national central banks.

accurate observations for some relevant variables, and those in sectors that were missing for most of the countries and or waves (mainly education, health and recreational activities), we end up with the country-samples sizes shown in Table 6.

Table 6. Sample size per country and wave

	1st wave			2nd wave		
	1995	1996	1999	2001	2002	2005
Belgium			101,302			97,409
Germany	652,676			467,932		
Greece	20,761				23,863	
Hungary		91,578			119,019	
Ireland	36,727				16,359	
Italy	79,501				73,692	
The Netherlands	66,196				37,860	
Spain	170,697				173,487	

The information available in the SES allows us to construct detailed measures of earnings including or excluding several kinds of complements. For the analysis in the present paper we have used 3 different measures of wages: basic hourly wage excluding payment for overtime, hourly wage including regular bonuses and payment for overtime, and hourly wage including irregular bonuses and other complements. The results of our analysis remain basically unchanged across wage measures, therefore we only show here results for hourly wage including regular bonuses and payment for overtime. We choose this variable for the sake of comparability with other SES studies that have also used it, and because we can construct it for practically all the countries and waves of our sample.⁸

Figure 1 summarizes the changes in the wage distribution from the two waves of the data and the eight countries of our sample (and our measure of wage). It displays (log) real hourly wages by decile. The patterns of changes across countries look rather heterogeneous. We will attempt to identify patterns between countries using three different criteria: the direction of wage changes (increases/upwards or decreases/downwards), the magnitude of wage changes, and the shape of the shift in the wage across deciles.

The magnitude of changes differs considerably across countris, the countries with the smallest movement in the wage distribution are Spain, where changes range between -0.04 and 0.03 log

⁸Except for Hungary , for which we cannot calculate the payment for overtime in eth first wave (1996) and we use a measure that excludes that payment, we think that this is a good proxy as paid overtime is very low in Hungary and in fact the variable and without overtime in 2002 in Hungary are very similar.

points, and Germany, with a similar range of wage-changes (excluding the one at the 10th decile). In Belgium and Italy, wages also have been relatively rigid (wage changes range generally lower than ± 0.1 log points). In contrast, the most remarkable shift in the wage distribution has taken place in Ireland, where pay changes appear consistently positive and larger than in any other country, a result reflecting Ireland's "golden age". Positive and large wage changes also took place in Hungary, one of the new and fast-growing EU-members, but with bigger variability across deciles. Greece and the Netherlands show minimal wage changes in the lower deciles, while larger changes take place at the higher deciles.

Comparing directions of change, one can distinguish between Belgium, Hungary, Ireland and Italy that never cross the zero line in our chart, showing zero downward movement in real wages (or downward real wage rigidity) at every decile, and Germany, Spain, Greece and the Netherlands that show negative real wage changes in at least one decile. Negative wage-changes are of special interest in the case of Spain and Germany; in Spain wages have decreased for the middle quantiles (except for women), while in Germany for the lowest quantiles, particularly for women, what could be an indication of low downward real wage rigidity.⁹

Finally, when comparing shapes of the wage distribution, on one hand there is the group of Ireland, Hungary and Spain that follow an U-shaped pattern, where wages in the middle of the wage distribution are those that have increased less, this shape has been typically identify with technology that has the effect of replacing routine jobs or jobs that require intermediate skills (e.g. Juhn, Murphy and Pierce 1993, Goos and Manning 2003), this is usually know as the skill biased technical change hypothesis. On the other hand there is the group of Greece, Italy, Belgium, Germany and the Netherlands, where wage changes trend upwards across the distribution whit the consequent spreading of the wage distribution. .

Table 7 takes a step further to contrast changes in measures of wage inequality across countries. It reveals patterns that were expected from the description above and broadly confirms (except for Hungary) the tendencies observed in the macro data (Table 1). As expected, the five countries where changes in the wage distribution follow an upward-trending pattern are the ones that experienced a widening in the wage distribution as indicated by the increase of the 90th to 10th percentile ratio, with Greece showing the biggest rise. The three countries with a U-shaped change in the wage distribution experienced a compression of the wage distribution, most of it

⁹ This is in line with the results for Spain of work carried out within the WDN. Using the International Wage Flexibility Projects methodology (see Messina et al, 2008)

stemming from wage changes at the lower deciles. Table 8 summarizes all this information allowing for easier cross-country comparisons of wage changes. The observed patterns are broadly consistent across gender-groups, with females experiencing larger changes in overall wage inequality (P90/P10) than males, excluding the case of Greece, where the reverse is true. In general, the changes observed in the wage distribution over the period under study provide rich material for the intended analysis.

Figure 1. Observed (log) wage changes by decile, SES: 1995-2002

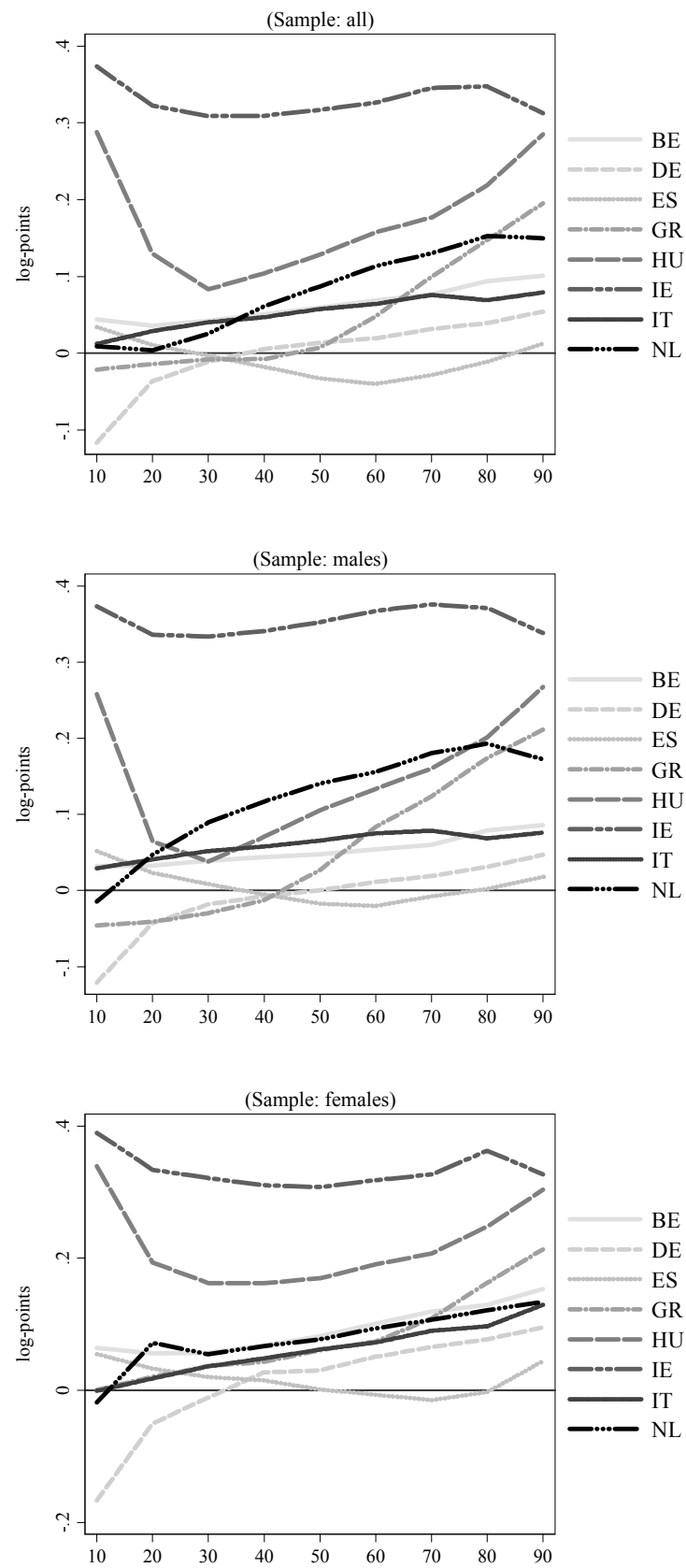


Table 7. Measures of wage inequality by country and sex-group

	All (Males & Females)					Males					Females				
	Std. Dev.	Median	P90/P10	P50/P10	P90/P50	Std. Dev.	Median	P90/P10	P50/P10	P90/P50	Std. Dev.	Median	P90/P10	P50/P10	P90/P50
BE															
1999	0.32	2.41	1.39	1.15	1.21	0.32	2.43	1.38	1.13	1.22	0.31	2.32	1.38	1.15	1.2
2005	0.35	2.46	1.41	1.15	1.22	0.35	2.48	1.4	1.14	1.23	0.34	2.41	1.41	1.16	1.22
Change	0.03	0.05	0.02	0	0.01	0.03	0.05	0.02	0.01	0.01	0.03	0.09	0.03	0.01	0.02
DE															
1995	0.35	2.64	1.4	1.19	1.18	0.33	2.71	1.37	1.17	1.17	0.31	2.46	1.37	1.17	1.17
2001	0.47	2.65	1.51	1.26	1.20	0.47	2.71	1.47	1.23	1.19	0.44	2.49	1.54	1.29	1.19
Change	0.12	0.01	0.11	0.07	0.02	0.14	0.00	0.10	0.06	0.02	0.13	0.03	0.17	0.12	0.02
ES															
1995	0.48	1.83	1.90	1.39	1.37	0.47	1.90	1.85	1.38	1.34	0.45	1.61	1.91	1.35	1.41
2002	0.46	1.80	1.86	1.33	1.40	0.45	1.89	1.79	1.32	1.36	0.43	1.61	1.86	1.29	1.44
Change	-0.02	-0.03	-0.04	-0.06	0.03	-0.02	-0.02	-0.05	-0.06	0.02	-0.02	0.00	-0.05	-0.06	0.03
GR															
1995	0.38	1.88	1.69	1.30	1.30	0.38	1.98	1.67	1.32	1.27	0.32	1.67	1.59	1.21	1.31
2002	0.47	1.89	1.85	1.33	1.40	0.48	2.01	1.86	1.37	1.36	0.41	1.73	1.74	1.25	1.39
Change	0.09	0.01	0.16	0.02	0.10	0.10	0.03	0.20	0.06	0.09	0.09	0.06	0.15	0.04	0.08
HU															
1996	0.53	5.82	1.27	1.12	1.13	0.53	5.89	1.27	1.13	1.12	0.51	5.74	1.26	1.12	1.12
2002	0.53	5.95	1.25	1.09	1.15	0.55	5.99	1.26	1.10	1.15	0.50	5.91	1.23	1.08	1.14
Change	0.00	0.13	-0.01	-0.04	0.02	0.01	0.11	-0.01	-0.03	0.02	-0.01	0.17	-0.02	-0.04	0.02
IE															
1995		2.11	1.84	1.36	1.35		2.20	1.79	1.34	1.34		1.98	1.78	1.35	1.32
2002		2.43	1.65	1.26	1.30		2.56	1.63	1.27	1.29		2.29	1.59	1.23	1.29
Change		0.32	-0.20	-0.10	-0.05		0.35	-0.16	-0.07	-0.05		0.31	-0.20	-0.12	-0.04
IT															
1995	0.35	2.09	1.46	1.17	1.25	0.36	2.12	1.48	1.17	2.27	0.29	1.99	1.40	1.14	1.23
2002	0.36	2.15	1.50	1.19	1.25	0.36	2.19	1.49	1.19	1.25	0.33	2.05	1.48	1.18	1.26
Change	0.01	0.06	0.03	0.02	0.00	0.01	0.07	0.02	0.02	-1.01	0.04	0.06	0.08	0.04	0.03
NL															
1995	0.43	2.41	1.50	1.24	1.22	0.43	2.20	1.55	1.28	1.21	0.40	2.47	1.44	1.19	1.21
2002	0.49	2.49	1.57	1.28	1.23	0.47	2.61	1.54	1.27	1.21	0.47	2.28	1.64	1.34	1.23
Change	0.07	0.09	0.07	0.04	0.02	0.04	0.41	-0.01	-0.01	0.00	0.07	-0.19	0.20	0.15	0.02

Note: Median figures are in euros for all countries except for HU, for which they are measured in national currency (HUF).

Table 8. Categorization of countries according to characteristics of wage changes

Shape of the change in wage distribution		Wage change			
		of relatively large scale		of relatively small scale	
		Always positive	Negative in at least one decile	Always positive	Negative in at least one decile
U-shaped	U-shaped	HU, IE		ES	
	Upward trending	GR, NL		IT, BE	DE

4. Accounting for observed wage changes

We now proceed to measure the different sources of changes in observed wages, concretely the changes due to the different characteristics of workers and jobs and the changes in the returns to those characteristics. For this measurement we rely on the estimation of extended Mincer equations for log (real) hourly wages using quantile regressions, as follows:

$$\ln w_{it}^g = Q^\theta(\ln w_{it} / X'_{it}) + \varepsilon_{it} = a_{it}^g + \sum_j \beta_{jt}^g X_{jit}^g + \varepsilon_{it}, \quad Q^\theta(\varepsilon_t / X'_{it}) = 0$$

where w_{it} is the wage of individual i in year t , $Q^\theta(\ln w_{it} / X'_{it})$ refers to the quantile of wages conditional on the vector of characteristics X_{it} and g denotes the quantile. α is a constant, and ε is the stochastic error. The covariates, x_{jit} , include workers' and job observable features (education, tenure, type of contract, sector, region etc., in most occasions captured by dummies).

To decompose observed wage changes, we use the procedure proposed by Machado and Mata (2005), based on mean characteristics of the individuals who are in each of the quantiles of the wage distribution. Thus, taking averages by quantile and subtracting between two periods yields:

$$\ln w_{t_1}^g - \ln w_{t_0}^g = (a_{t_1}^g - a_{t_0}^g) + \sum_j \beta_{jt_1}^g (\bar{X}_{jt_1}^g - \bar{X}_{jt_0}^g) + \sum_j (\beta_{jt_1}^g - \beta_{jt_0}^g) \bar{X}_{jt_0}^g + (\bar{\varepsilon}_{t_1}^g - \bar{\varepsilon}_{t_0}^g)$$

where w_t^g is the g^{th} quantile of the wage distribution in year t , $\bar{X}_{jt}^g$ is the vector of mean characteristics of quantile g and year t , and $\bar{\varepsilon}_t^g$ is the mean of the unobserved component.

From this, the wage change for each quantile can be decomposed as follows:

- A composition effect: $\sum \beta_{jt_1}^g (\bar{X}_{jt_1}^g - \bar{X}_{jt_0}^g)$. This is exclusively due to changes in employer or employee observable characteristics if the returns to these characteristics would have remained unchanged.
- The returns effect: $(a_{t_1}^g - a_{t_0}^g) + \sum (\beta_{jt_1}^g - \beta_{jt_0}^g) \bar{X}_{jt_0}^g$. This is due to changes in the returns to the characteristics only. Specifically, under the assumption that the characteristics remained unchanged, this term includes changes in the constant (i.e due to changes in features common among all employees that have not being included in the regression (e.g. unobservable) and/or changes in the coefficients of the omitted dummies) and changes in the returns to the observable characteristics.
- An unobserved or residual component $(\bar{\varepsilon}_{t_1}^g - \bar{\varepsilon}_{t_0}^g)$ due to changes in the remaining unobserved factors determining wages.

Figure 2 summarises the result of the decomposition described above, for the overall sample, for males and for females respectively. Each block of bars refers to a country, and within country each bar refers to a quantile. The three components of each bar add up to the observed change in real wage described in Section 3. The yellow segment of the bar is the change due to observable characteristics of the worker (dark yellow) and the job (light yellow), conditional on the returns to these characteristics; this is what is known as the compositional effect. The blue segment is the price effect or returns effect, originated by changes in the returns to the characteristics, if the characteristics would have remained constant. Finally, the white segment is the unexplained part of the observed wage changes.

According to the results from this decomposition, composition effects dominate over the returns effects in Italy (positive), except for the highest deciles. In Germany, composition effects are dominant mainly for the middle and lower deciles (negative), and, in fact, they are accountable for the overall negative wage-changes observed at the lowest deciles. In both cases, composition effects due to job characteristics are the ones that dominate. To a lesser extent, negative compositional effects dominate over returns effects in Spain at the middle quantiles, resulting in negative (almost zero) overall changes in those quantiles.

As for returns, they had on aggregate a positive contribution to the changes observed in wages, being positive for all the countries of our sample, except for Italy in the three lowest deciles. In Hungary and Ireland, the countries where higher wage changes took place, the returns component seems to be the dominant one along the whole distribution. This holds for the overall sample and for the gender sub-samples. In the case of Ireland these effects are higher at the lower deciles of the wage distribution, hinting a catching up process in returns to characteristics (see Figure 3a). This is also the case for Hungary, although the shape of the changes due to returns is "U-shaped", with the returns effects increasing significantly also at the highest deciles, while the intermediate deciles are those for which returns to characteristics increase less. In the Netherlands, the returns effects are sizeable and quite uniform across deciles in the three samples (total, male and female). They are larger than composition effects, except in the lower deciles. Similarly, returns effects dominate also in Greece, in this country only for the females sub-sample. In Figure 3, where only returns effects are plotted, it can be more easily seen that while in Ireland and the Netherlands, returns effects did not contribute to increasing inequality, the contrary happened in Belgium, Germany, Greece and Italy, while in Hungary and Spain they contributed to increasing wages at the two extremes of the distribution by more than they did at the middle.

Table 9 reports the mean observed wage changes and mean changes in returns (including the residual component) among countries, in three segments of the wage distribution, the three lowest, middle, and top deciles (conditional on country effects). While for observed wages, regardless of the sample used (all, males, and females) the changes are increasing along the distribution, once compositional effects are "purged out" there is clear evidence of some "polarisation" in the distribution of wage changes, with highest increases at the three lowest and the three top deciles.

Table 9. Mean Observed Wage Changes and Mean Changes in Returns

	ALL		MALES		FEMALES	
	Observed	Returns	Observed	Returns	Observed	Returns
3 Lowest Deciles	-0.032 [0.022]	0.038 [0.007]	-0.042 [0.021]	0.045 [0.005]	-0.036 [0.033]	0.0409 [0.012]
3 Middle Deciles	-0.002 [0.009]	0.032 [0.006]	-0.010 [0.009]	0.031 [0.003]	0.017 [0.013]	0.0298 [0.008]
3 Top Deciles	0.035 [0.008]	0.046 [0.004]	0.026 [0.009]	0.047 [0.005]	0.059 [0.014]	0.056 [0.007]
R-squared	0.845	0.947	0.834	0.961	0.822	0.919

Note: Regressions include country fixed effect. Country omitted: Germany. Heteroskedasticity-Robust Standard Errors in brackets. Weighted by the average sample size of the regressions used to compute changes in returns.

The dominance of return effects over compositional effects in Hungary, Ireland, the Netherlands and to some extent Greece is an interesting finding, as it suggests that wage changes in these countries are driven by market forces and relative demand and supply. In the US empirical literature the debate on this issue is ongoing. The view that wage changes are dominated by price effects and are directly linked to skill-biased demand shifts, as sustained by Juhn, Murphy and Pierce (1993) has been recently challenged by the so-called “revisionists” (e.g. DiNardo, Forin and Lemieux 1996, Lemieux, 2002, 2006b). They find that in the US wage changes are driven by non-market factors, in particular minimum wages and compositional effects associated to socio-demographic factors. As a result, they downplay the importance growing international trade and technological innovations in the determination of wages dynamics. In contrast Autor, Katz and Kearney, 2005a, 2005b, 2006 found that in the 90s wages increased at both ends of the distribution more in line with the technological change hypothesis. Recently, Autor, Katz and Kearney (2008) emphasise the complexity of the pattern of wage changes in the US and advocate for a modified version of the skill biased technical change hypothesis that emphasises the role of information technology. We provide some evidence about the impact of several technological, demographic, macroeconomic and institutional variables on wage changes and their components in the next section.

Finally, Tables A1 and A2 in the Appendix provide a detailed accounting of the several components of wage changes, highlighting some of the changes in return effects, namely, those due to education, sectors, and occupations. Changes in the returns to education are overall positive along the whole distribution, with the only noteworthy exceptions of Hungary and Italy, at the lowest deciles, and Spain, along the whole wage distribution. In the countries with rising returns to education, the changes are roughly similar for all the deciles, except in Italy, where the increase in the returns to education was much higher at the top of the wage distribution. Also, they have been generally higher for males than for women.

Figure 2a. Break-down of wage changes by country and decile, Sample: all

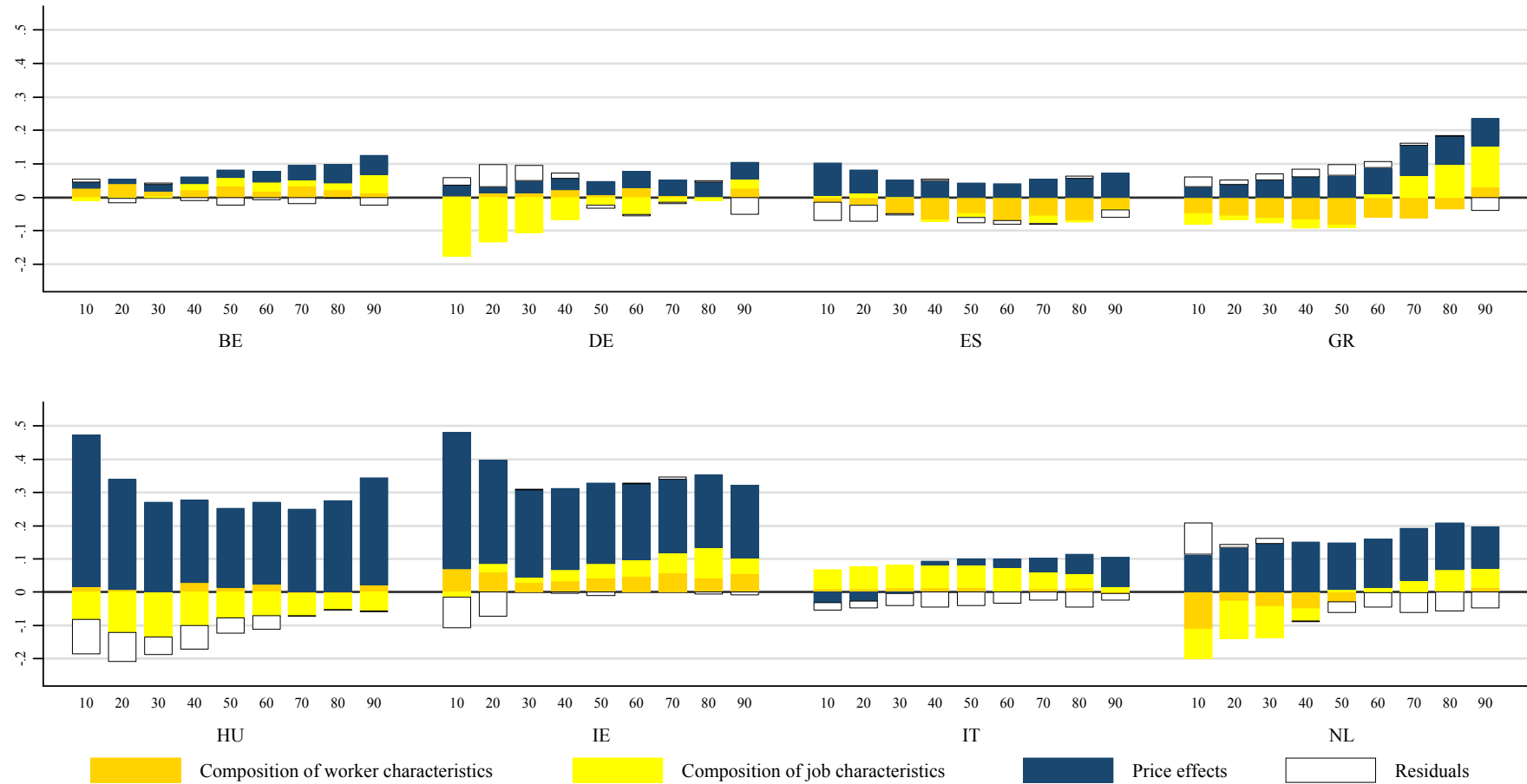


Figure 2b. Break-down of wage changes by country and decile, Sample: males

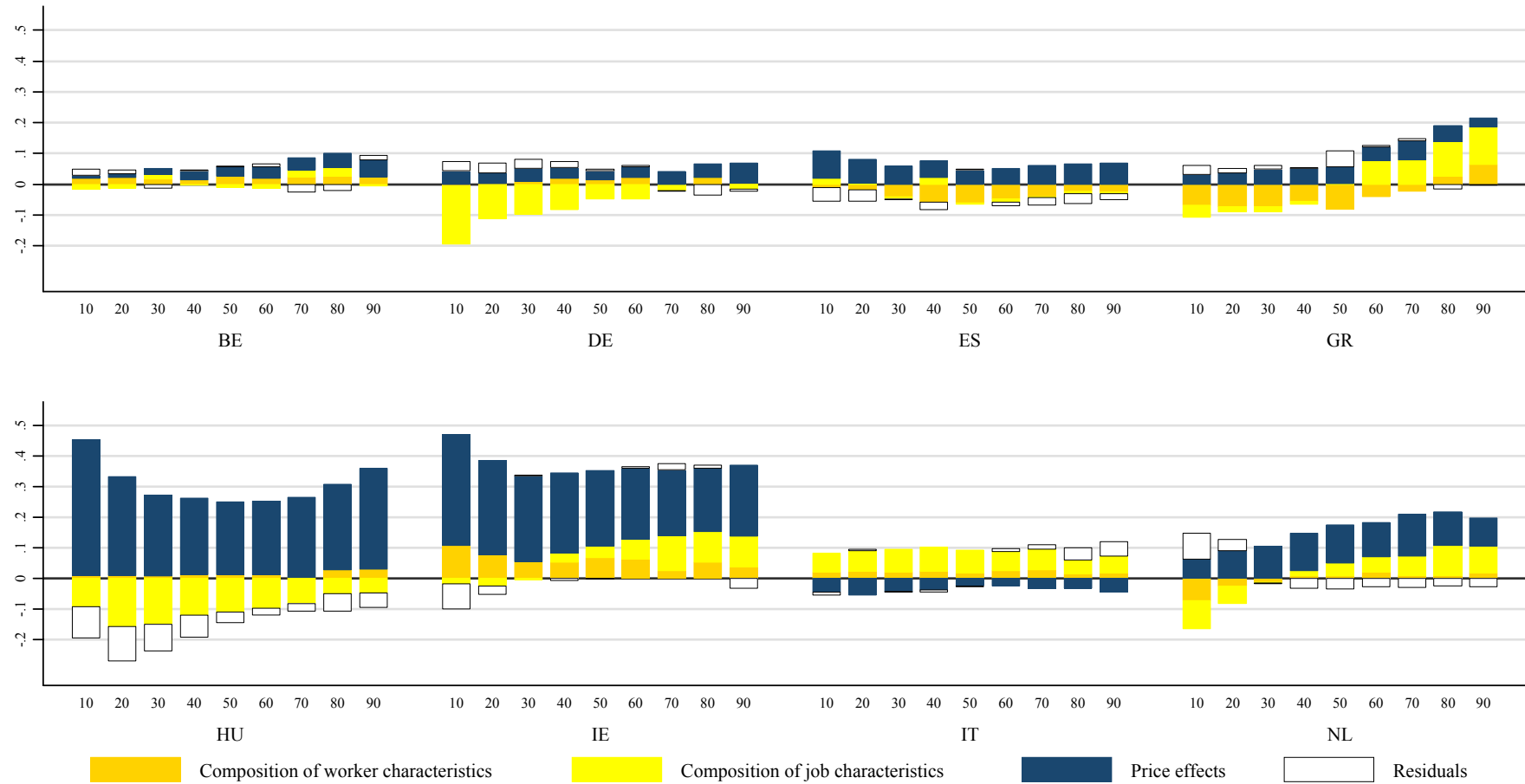


Figure 2c. Break-down of wage changes by country and decile, Sample: females

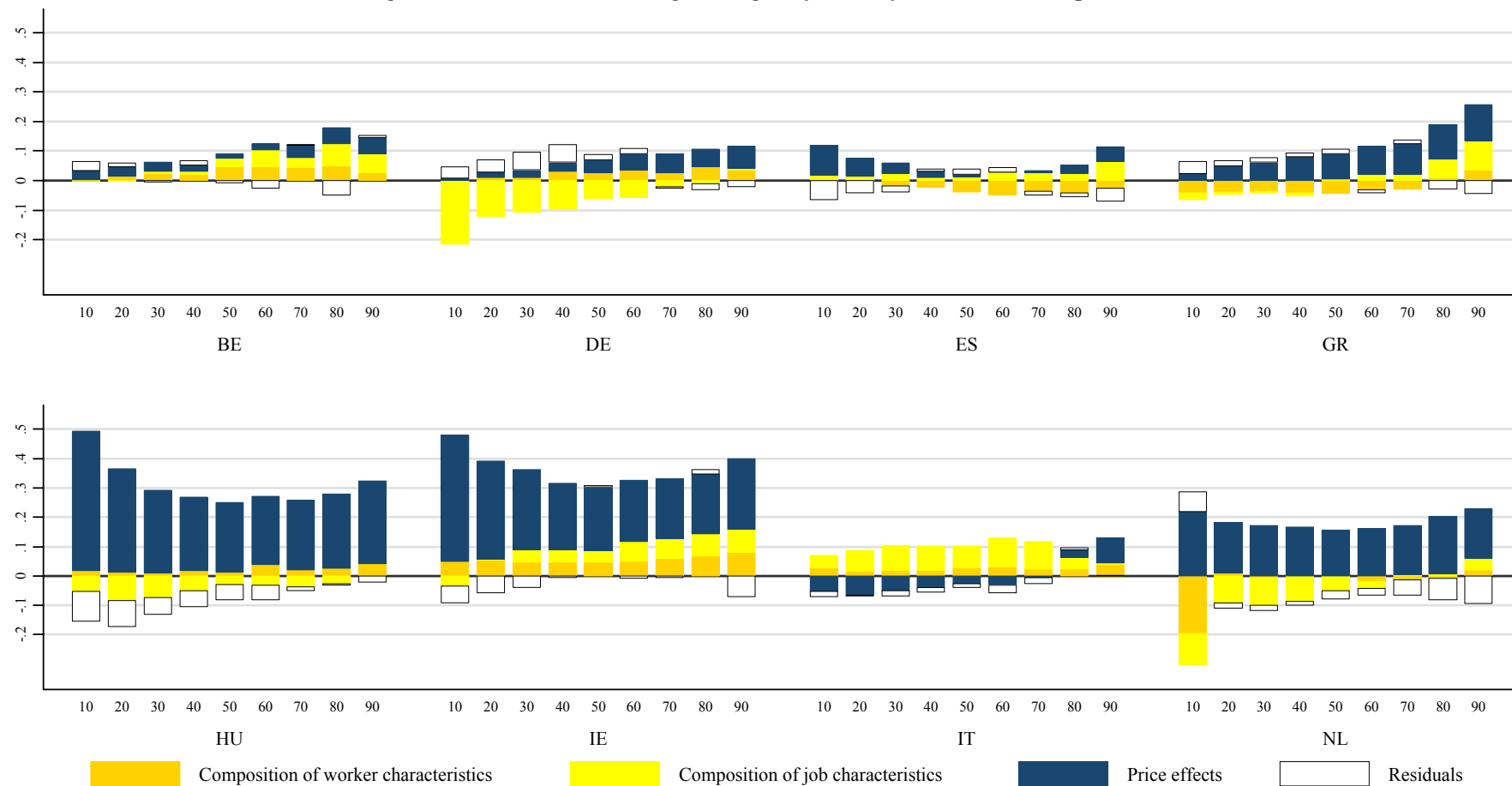


Figure 3a. Total price effects by country and quantile, Sample: all

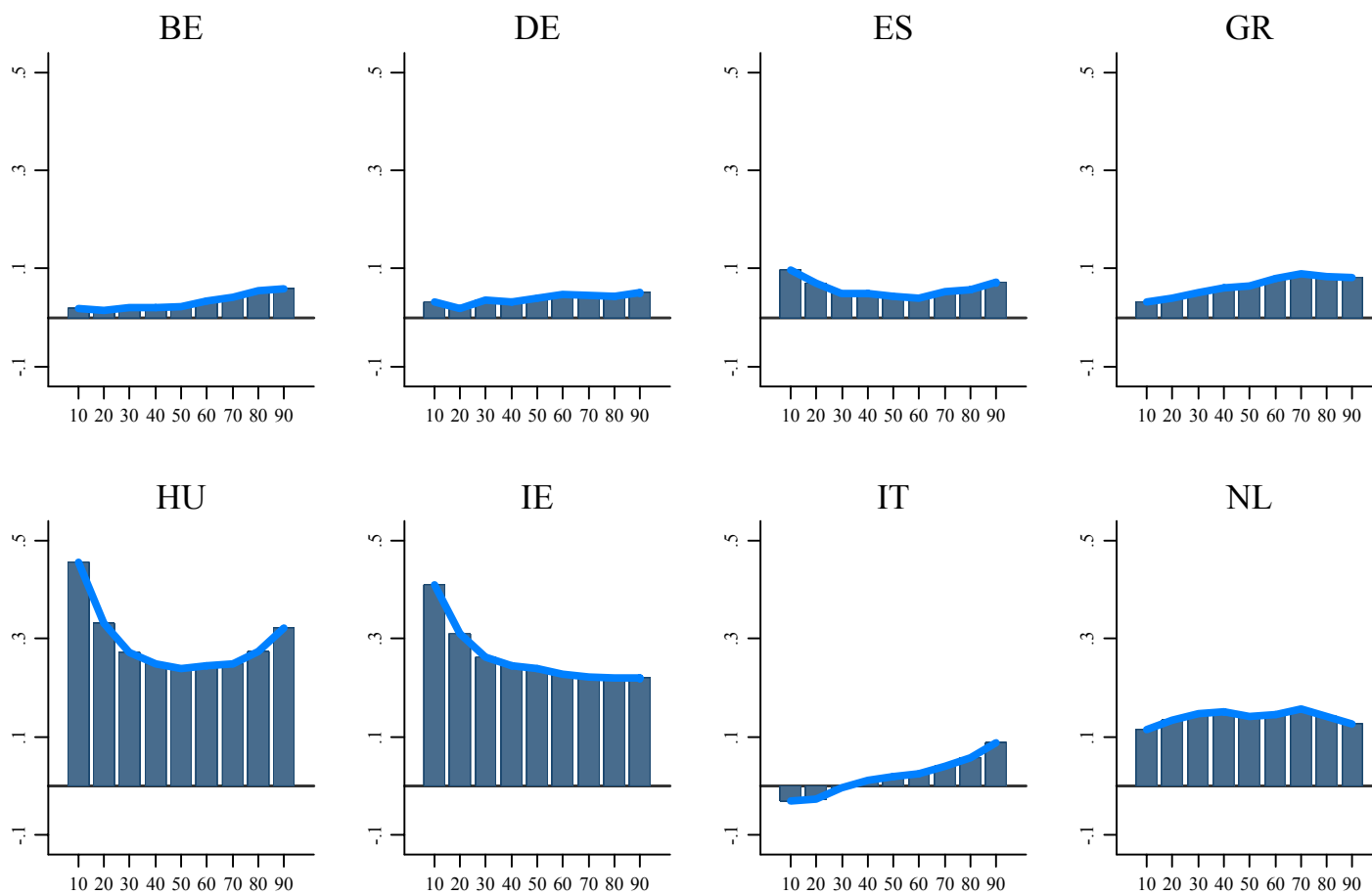


Figure 3b. Total price effects by country and quantile, Sample: males

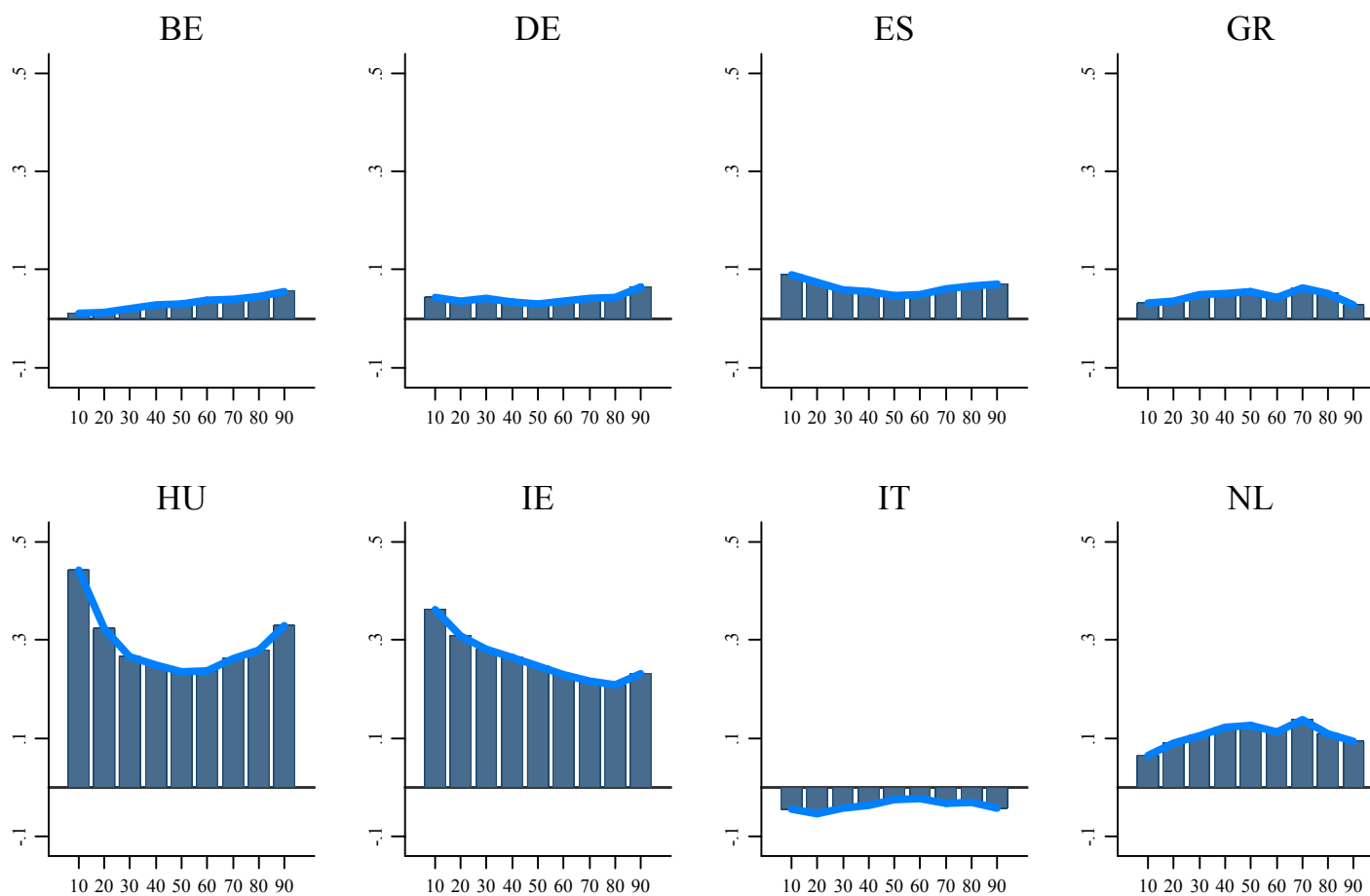
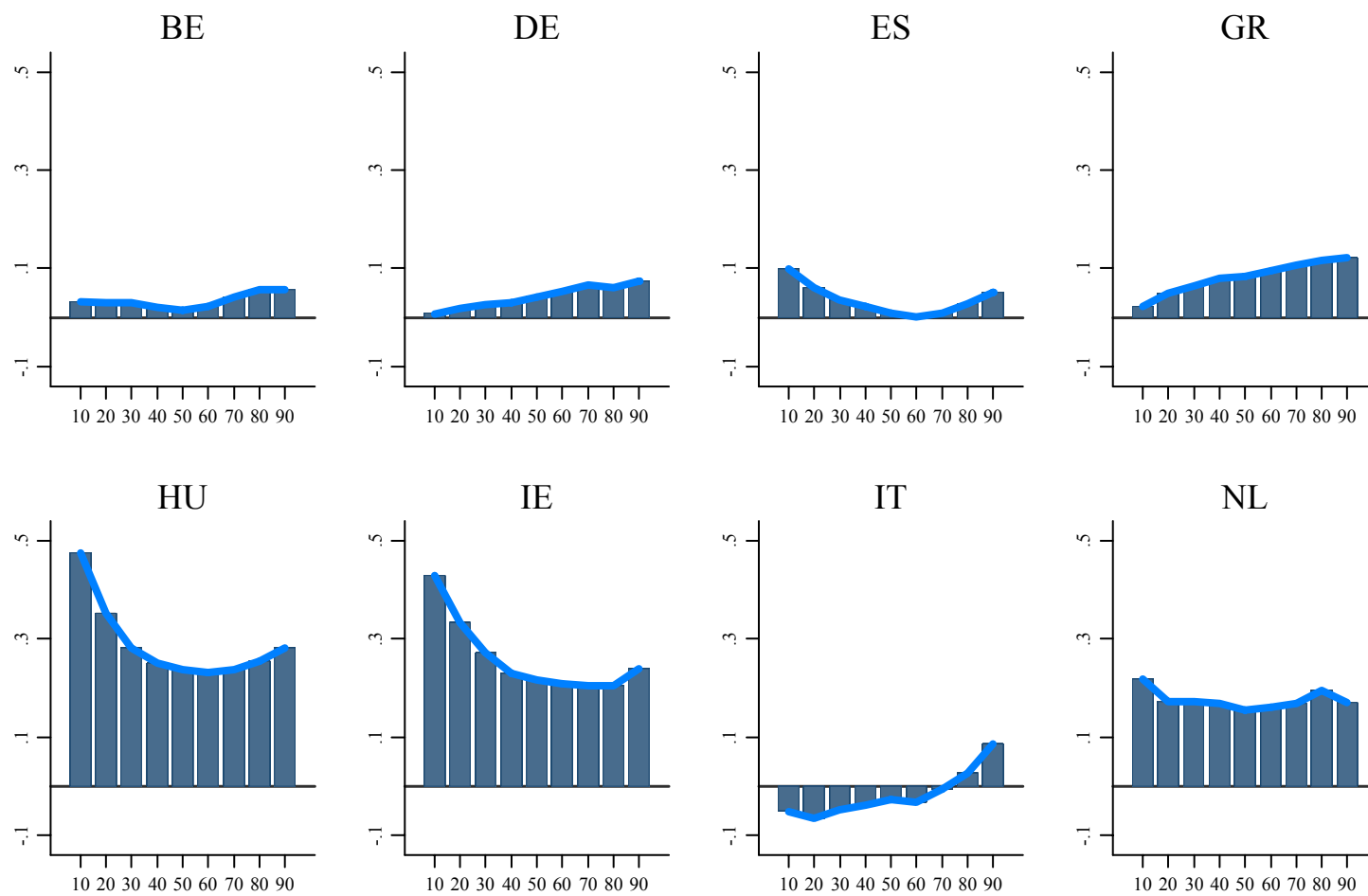


Figure 3c. Total price effects by country and quantile, Sample: females



5. Explaining changes in the wage structure

In this section we make an attempt to relate the several components of wage changes to some developments and changes in labour market and institutions. First, we look at the overall returns effect and then at the returns effects due to certain variables of interest, in particular, education, to evaluating the relevance of changes in return to skills and technological changes. For this we rely on some of the indicators of macroeconomic trends and labour market institutions described in Section 2.

Typically, in international comparisons of changes in wage structures, the number of countries for which data are available, is much lower than the number of potential candidates to explain changes in some single indicators of wage dispersion. We face more or less the same problem here. Nevertheless, the wealth of microeconomic data used for all the countries in the comparison gives us two advantages: i) we can use alternative measures of wage changes, either observed ones or some of their components identified from the extended Mincer equations using the Machado Mata (2005) decomposition, so that we can investigate to what extent changes in the returns to the characteristics of the labour force and the job, are relevant when searching for the relationship between macroeconomic and institutional developments and wage changes, and ii) we can use wages changes at different positions of the wage distribution, so that we can investigate if macroeconomic and institutional developments had a differential impact along the wage distribution. Thus, we estimate the following set of regressions:

$$\Delta w_s^\theta = \lambda_s + \lambda_{g'} + \beta x_s + \varepsilon_s$$
$$\Delta w_s^\theta = \lambda_s + \lambda_{g'} + \sum_{j=1}^3 \beta_j \lambda_{g'} x_s + \varepsilon_s$$

where Δw_s^θ are alternative measures of the wage change at decile θ in country s , λ_s is a country dummy, $\lambda_{g'}$ is a dummy for position at the wage distribution (three lowest, middle and top deciles) and x_s is a variable representing either demographic, macroeconomic or institutional changes. As for these covariates (included separately in alternative regressions) we choose the unemployment rate, some demographic variables (change in the female participation rate, change in the stock of foreigners in the labour force), some representing changes in the international economy (changes in trade balance in goods and services as a percentage of GDP, change in the

.globalisation index, as computed by Dreher, 2006), some technological variables (change in Total Factor Productivity, change in the contribution of ICT capital to GDP growth), and some indicators of product and labour markets reforms (changes in indexes for administrative regulation, product market regulation, economic regulations, as computed by the OECD, changes in the degrees of centralisation and coordination of collective bargaining, and changes in union density).

Some results are displayed in Tables 10 and 11. As for the simplest specifications that do not allow for different impact by decile (see Table 10), we obtain that unemployment and immigration changes are negatively associated and total factor productivity changes are positively associated with observed wage changes, while there is no significant statistical association between observed wage changes and the change in the globalisation index. With regards to changes in returns, two important differences are noteworthy. First, the change in the globalisation index is positively associated with changes in returns. Secondly, the coefficients of the decile dummies display a U-shaped pattern, with larger increases at the two extremes of the distribution, while in the case of observed wages these coefficients were always larger as moving upwards in the wage distribution.

When allowing for differential impact of variables by deciles (see Table 11), we find that changes in immigration are more negatively associated with observed wage changes at the top of the distribution, namely at the intermediate and upper decile, than at the lower deciles. Similarly, changes in the globalisation index are more positively associated with observed wage changes at the top of the distribution than at the lower deciles. Once we condition out the composition effect and look exclusively to changes in returns, the coefficients of both immigration and globalisation are uniform across deciles.

The coefficients of change in the contribution of ICT capital to GDP growth form a U-shape across the distribution; the two variables are positively associated with wage changes, with a larger coefficient at the top and bottom of the distribution. This hold both for the observed wage changes and for the changes in wages once the compositional effects have been conditioned out.

When looking at institution, our preliminary results suggest that there is a negative relationship between changes in union density and changes in wages (both observed and due to changes in returns) and this relation is uniform across the wage distribution.

As for changes in returns to education, an interesting result arising here is that there seems to be some complementarity between human capital and technological variables. Both the change in Total Factor Productivity and the ICT capital contribution to GDP growth appear with negative coefficients at the lower end of the wage distribution, switching to positive when moving towards the upper end.

Table 10a. Determinants of Observed Wage Changes

	<i>Covariate included in the regression</i>			
	<i>Change in unemployment rate</i>	<i>Change in proportion of immigrants</i>	<i>Change in globalization index</i>	<i>Change in TFP growth</i>
	-0.031 [0.024]***	-0.024 [0.050]***	-0.001 [0.001]	0.008 [0.001]***
	<i>Coefficient of decile dummies</i>			
3 lowest deciles	0.057 [0.020]**	0.0437 [0.016]*	0.030 [0.013]**	-0.000 [0.020]
3 middle deciles	0.088 [0.018]***	0.075 [0.012]***	0.061 [0.008]***	0.031 [0.013]**
3 highest deciles	0.124 [0.018]***	0.111 [0.013]***	0.097 [0.008]***	0.065 [0.014]***
Observations	72	72	72	63
R-squared	0.845	0.845	0.845	0.849

Heteroskedasticity-Robust Standard Errors in brackets. Country fixed effects.

Table 10b. Determinants of Changes in Returns

	<i>Covariate included in the regression</i>			
	<i>Change in unemployment rate</i>	<i>Change in proportion of immigrants</i>	<i>Change in globalization index</i>	<i>Change in TFP growth</i>
	-0.018 [0.002]***	-0.022 [0.004]***	0.002 [0.001]**	0.009 [0.001]***
	<i>Coefficient of decile dummies</i>			
3 lowest deciles	0.114 [0.011]***	0.136 [0.014]***	0.045 [0.009]***	0.103 [0.001]***
3 middle deciles	0.088 [0.010]***	0.110 [0.012]***	0.027 [0.008]***	0.076 [0.008]***
3 highest deciles	0.097 [0.011]***	0.119 [0.014]***	0.028 [0.010]***	0.085 [0.009]***
Observations	72	72	72	63
R-squared	0.932	0.932	0.948	0.932

Heteroskedasticity-Robust Standard Errors in brackets. Country fixed effects.

Table 11a. Determinants of Observed Wage Changes (differential impact by deciles)

<i>variable interacted</i>	<i>Change in unemployment rate</i>	<i>Change in female labour force participation</i>	<i>Change in the proportion of immigrants</i>	<i>Change in export performance</i>	<i>Change in globalization index</i>	<i>Change in (value added based) TFP growth</i>	<i>Change in ICT capital contrib. to GDP growth</i>
Interact. with 3 lowest deciles	-0.002 [0.002]	1.765 [0.790]**	-0.003 [0.005]	0.021 [0.004] ***	0.003 [0.003]	0.007 [0.003]**	0.055 [0.029]*
Interact. with 3 middle deciles	0.008 [0.002]***	- -	-0.033 [0.004]***	0.032 [0.003] ***	0.009 [0.002]***	0.007 [0.001]***	0.03 [0.010]***
Interact. with 3 highest deciles	0.008 [0.002]***	-0.063 [0.340]	-0.037 [0.004]***	0.029 [0.004] ***	0.007 [0.002]***	0.010 [0.001]***	0.065 [0.015]***
Decile effects	yes	yes	yes	yes	yes	yes	yes
Country effects	yes	yes	yes	yes	yes	yes	yes
Observations	72	45	72	72	72	63	54
R-squared	0.89	0.86	0.88	0.88	0.86	0.86	0.8
<i>variable interacted</i>	<i>Change in Administrative Regulation</i>	<i>Change in Product Market Regul</i>	<i>Change in Economic Regulation</i>	<i>Bargaining Centralisation 2000</i>	<i>Bargaining Coordination 2000</i>	<i>Union density 2000</i>	<i>Change in Union density</i>
Interact. with 3 lowest deciles	-0.032 [0.018]*	-0.232 [0.092]**	- -	0.058 [0.024]**	-0.073 [0.031]**	0.001 [0.001]	-0.020 [0.007]***
Interact. with 3 middle deciles	- -	-0.034 [0.043]	0.011 [0.048]	0.034 [0.011]***	0.033 [0.020]	0.002 [0.001]***	-0.034 [0.004]***
Interact. with 3 highest deciles	0.017 [0.013]	0.000 [0.000]	0.006 [0.049]	0.024 [0.001]***	0.046 [0.005]***	0.002 [0.000]***	-0.034 [0.003]***
Decile effects	yes	yes	yes	yes	yes	yes	yes
Country effects	yes	yes	yes	yes	yes	yes	yes
Observations	54	54	54	54	54	54	45
R-squared	0.84	0.87	0.83	0.83	0.87	0.83	0.84

Heteroskedasticity-Robust Standard Errors in brackets

Table 11b. Determinants of Changes in Returns (differential impact by deciles)

<i>variable interacted</i>	<i>Change in unemployment rate</i>	<i>Change in female labour force participation</i>	<i>Change in the proportion of immigrants</i>	<i>Change in export performance</i>	<i>Change in globalization index</i>	<i>Change in (value added based) TFP growth</i>	<i>Change in ICT capital contrib. to GDP growth</i>
Interact. with 3 lowest deciles	-0.003 [0.001]**	0.987 [0.358]***	-0.015 [0.004]***	0.017 [0.004]***	0.004 [0.002]**	0.013 [0.002]***	0.154 [0.025]***
Interact. with 3 middle deciles	0.002 [0.001]***	- -	-0.026 [0.002]***	0.022 [0.003]***	0.007 [0.001]***	0.008 [0.001]***	0.096 [0.005]***
Interact. with 3 highest deciles	0.002 [0.001]***	0.000 [0.197]	-0.024 [0.002]***	0.019 [0.003]***	0.006 [0.000]***	0.009 [0.001]***	0.105 [0.010]***
Decile effects	yes	yes	yes	yes	yes	yes	yes
Country effects	yes	yes	yes	yes	yes	yes	yes
Observations	72	45	72	72	72	63	63
R-squared	0.95	0.95	0.95	0.97	0.95	0.96	0.95
<i>variable interacted</i>	<i>Change in Administrative Regulation</i>	<i>Change in Product Market Regul</i>	<i>Change in Economic Regulation</i>	<i>Bargaining Centralisation 2000</i>	<i>Bargaining Coordination 2000</i>	<i>Union density 2000</i>	<i>Change in Union density</i>
Interact. with 3 lowest deciles	0.017 [0.014]	0.103 [0.047]**	-]	-0.007 [0.024]	0.052 [0.022]**	- -	-0.027 [0.005]***
Interact. with 3 middle deciles	- -	0.090 [0.032]***	-0.047 [0.018]**	-0.005 [0.013]	0.073 [0.012]***	0.001 [0.000]**	-0.026 [0.003]***
Interact. with 3 highest deciles	-0.025 [0.013]*	0.000 [0.000]	-0.086 [0.021]***	0.013 [0.006]**	0.048 [0.003]***	0.001 [0.000]***	-0.022 [0.002]***
Decile effects	yes	yes	yes	yes	yes	yes	yes
Country effects	yes	yes	yes	yes	yes	yes	yes
Observations	54	54	54	54	54	54	45
R-squared	0.95	0.95	0.95	0.94	0.94	0.94	0.94

Heteroskedasticity-Robust Standard Errors in brackets

Table 11c. Determinants of Changes in Returns to Education (differential impact by deciles)

<i>variable interacted</i>	<i>Change in unemployment rate</i>	<i>Change in female labour force participation</i>	<i>Change in the proportion of immigrants</i>	<i>Change in export performance</i>	<i>Change in globalization index</i>	<i>Change in (value added based) TFP growth</i>	<i>Change in ICT capital contrib. to GDP growth</i>
Interact. with	0.005	0.749	-0.044	0.002	0.007	-0.003	-0.114
3 lowest deciles	[0.002]**	[0.405]*	[0.004]***	[0.003]	[0.002]***	[0.001]***	[0.016]***
Interact. with	0.008	-	-0.062	0.003	0.007	0.003	-0.041
3 middle deciles	[0.001]***	-	[0.003]***	[0.003]	[0.002]***	[0.001]***	[0.012]***
Interact. with	0.007	0.683	-0.065	-0.002	0.003	0.006	0.000
3 highest deciles	[0.002]***	[0.334]**	[0.004]***	[0.003]	[0.001]***	[0.001]***	[0.011]
Decile effects	yes	yes	yes	yes	yes	yes	yes
Country effects	yes	yes	yes	yes	yes	yes	yes
Observations	72	45	72	72	72	63	54
R-squared	0.91	0.97	0.92	0.93	0.91	0.96	0.96
<i>variable interacted</i>	<i>Change in Administrative Regulation</i>	<i>Change in Product Market Regul</i>	<i>Change in Economic Regulation</i>	<i>Bargaining Centralisation 2000</i>	<i>Bargaining Coordination 2000</i>	<i>Union density 2000</i>	<i>Change in Union density</i>
Interact. with	0.003	-0.003	-	-0.036	-0.012	0.001	0.006
3 lowest deciles	[0.015]	[0.061]	-	[0.012]***	[0.018]	[0.001]**	[0.003]**
Interact. with	0.000	0.093	0.017	-0.024	0.051	0.001	-0.005
3 middle deciles	[0.000]	[0.048]*	[0.024]	[0.012]**	[0.014]***	[0.000]***	[0.002]*
Interact. with	-0.021	0.000	-0.069	0.041	0.061	0.003	-0.007
3 highest deciles	[0.019]	[0.000]	[0.026]**	[0.003]***	[0.004]***	[0.000]***	[0.001]***
Decile effects	yes	yes	yes	yes	yes	yes	yes
Country effects	yes	yes	yes	yes	yes	yes	yes
Observations	54	54	54	54	54	54	45
R-squared	0.97	0.97	0.98	0.98	0.98	0.98	0.92

Heteroskedasticity-Robust Standard Errors in brackets

6. Concluding remarks

In this paper we document changes in the wage structure of eight EU countries over the 1995-2002. Apart from using cross-country comparable data on wage variables and workers and jobs characteristics compiled with the same methodology, the main contribution of the paper is to disentangle the composition effects and the returns effects shaping those changes along the wage distribution.

Returns effects appear to explain a large fraction of the wage changes in most of the countries of our sample, suggesting that wage dynamics in these countries are driven by market forces and relative demand and supply. Germany and Spain are the only countries where compositional effects are somewhat larger than returns effects; in fact, they are accountable for the overall negative wage changes observed at the middle deciles in Spain and at the lower deciles in Germany.

Overall, there are relevant differences across countries regarding the size of wage changes and their components along the wage distribution. We have related these differences to some demographic, macroeconomic, and institutional variables. Our preliminary results, tentative until we are able to extend the sample size with more countries, show that: i) the relationships between these variables and wage changes differ among alternative measures of wage, namely between observed wage changes and the returns components of those changes only, indicating that composition effects may blur the identification of the driving forces of wage changes, and ii) the wage structure of EU countries seems to have responded to some extent to demand and supply changes indicated by aggregate measures of demographic and macroeconomic variables, as well as changes in institutions.

APPENDIX
Decomposition of observed wage changes in returns and composition effects.
Detailed results

Table A1a. Basic decomposition of observed wage changes by country and decile, males & females

	10	20	30	40	50	60	70	80	90
Belgium									
Observed pay change (in logs)	0.04	0.04	0.04	0.05	0.06	0.07	0.08	0.09	0.10
Composition effects	0.02	0.04	0.02	0.04	0.06	0.04	0.05	0.04	0.07
Price effects	0.02	0.01	0.02	0.02	0.02	0.03	0.04	0.05	0.06
Residual effects	0.01	-0.01	0.01	-0.01	-0.02	-0.01	-0.02	0.00	-0.02
Germany									
Observed pay change (in logs)	-0.12	-0.04	-0.01	0.01	0.01	0.02	0.03	0.04	0.05
Composition effects	-0.13	-0.09	-0.07	-0.03	-0.01	-0.01	0.01	0.00	0.06
Price effects	0.09	0.07	0.08	0.08	0.08	0.08	0.08	0.07	0.07
Residual effects	-0.07	-0.01	-0.02	-0.05	-0.06	-0.06	-0.05	-0.03	-0.07
Spain									
Observed pay change (in logs)	0.03	0.01	0.00	-0.02	-0.03	-0.04	-0.03	-0.01	0.01
Composition effects	-0.01	-0.01	-0.05	-0.07	-0.06	-0.07	-0.08	-0.07	-0.04
Price effects	0.10	0.07	0.05	0.05	0.04	0.04	0.05	0.06	0.07
Residual effects	-0.06	-0.05	0.00	0.00	-0.02	-0.01	0.00	0.01	-0.02
Greece									
Observed pay change (in logs)	-0.02	-0.01	-0.01	-0.01	0.01	0.05	0.10	0.15	0.20
Composition effects	-0.08	-0.07	-0.08	-0.09	-0.09	-0.05	0.00	0.06	0.15
Price effects	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.08	0.08
Residual effects	0.03	0.01	0.02	0.02	0.03	0.02	0.01	0.00	-0.04
Hungary									
Observed pay change (in logs)	0.29	0.13	0.08	0.10	0.13	0.16	0.18	0.22	0.29
Composition effects	-0.07	-0.12	-0.14	-0.07	-0.06	-0.05	-0.07	-0.05	-0.03
Price effects	0.46	0.33	0.27	0.25	0.24	0.25	0.25	0.27	0.32
Residual effects	-0.10	-0.09	-0.05	-0.07	-0.05	-0.04	0.00	0.00	0.00
Ireland									
Observed pay change (in logs)	0.37	0.32	0.31	0.31	0.32	0.33	0.35	0.35	0.31
Composition effects	0.05	0.09	0.04	0.07	0.09	0.10	0.12	0.13	0.10
Price effects	0.41	0.31	0.26	0.25	0.24	0.23	0.22	0.22	0.22
Residual effects	-0.09	-0.07	0.00	0.00	-0.01	0.00	0.00	-0.01	-0.01
Italy									
Observed pay change (in logs)	0.01	0.03	0.04	0.05	0.06	0.06	0.08	0.07	0.08
Composition effects	0.07	0.08	0.08	0.08	0.08	0.07	0.06	0.06	0.01
Price effects	-0.03	-0.03	0.00	0.01	0.02	0.02	0.04	0.06	0.09
Residual effects	-0.02	-0.02	-0.04	-0.04	-0.04	-0.03	-0.03	-0.04	-0.02
Netherlands									
Observed pay change (in logs)	0.01	0.00	0.03	0.06	0.09	0.11	0.13	0.15	0.15
Composition effects	-0.20	-0.14	-0.14	-0.09	-0.02	0.01	0.03	0.07	0.07
Price effects	0.11	0.13	0.15	0.15	0.14	0.15	0.16	0.14	0.13
Residual effects	0.09	0.01	0.02	0.00	-0.03	-0.04	-0.06	-0.06	-0.05

Table A1b. Basic decomposition of observed wage changes by country and decile, males

	10	20	30	40	50	60	70	80	90
Belgium									
Observed pay change (in logs)	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.08	0.09
Composition effects	0.00	0.01	0.03	0.01	0.02	0.00	0.05	0.05	0.02
Price effects	0.01	0.01	0.02	0.03	0.03	0.04	0.04	0.05	0.06
Residual effects	0.02	0.01	-0.01	0.00	0.00	0.01	-0.03	-0.02	0.01
Germany									
Observed pay change (in logs)	-0.12	-0.04	-0.02	-0.01	0.00	0.01	0.02	0.03	0.05
Composition effects	-0.16	-0.08	-0.07	-0.05	-0.02	-0.02	-0.01	0.02	0.00
Price effects	0.10	0.08	0.08	0.07	0.07	0.07	0.09	0.09	0.10
Residual effects	-0.06	-0.05	-0.03	-0.03	-0.05	-0.04	-0.06	-0.08	-0.06
Spain									
Observed pay change (in logs)	0.05	0.02	0.01	-0.01	-0.02	-0.02	-0.01	0.00	0.02
Composition effects	0.01	-0.01	-0.05	-0.04	-0.07	-0.06	-0.04	-0.03	-0.03
Price effects	0.09	0.07	0.06	0.05	0.05	0.05	0.06	0.07	0.07
Residual effects	-0.05	-0.04	0.00	-0.02	0.00	-0.01	-0.03	-0.03	-0.02
Greece									
Observed pay change (in logs)	-0.05	-0.04	-0.03	-0.01	0.03	0.08	0.12	0.17	0.21
Composition effects	-0.11	-0.09	-0.09	-0.07	-0.08	0.04	0.05	0.14	0.19
Price effects	0.03	0.04	0.05	0.05	0.06	0.04	0.06	0.05	0.03
Residual effects	0.03	0.02	0.01	0.00	0.05	0.00	0.01	-0.02	0.00
Hungary									
Observed pay change (in logs)	0.26	0.06	0.04	0.07	0.11	0.13	0.16	0.20	0.27
Composition effects	-0.08	-0.14	-0.14	-0.11	-0.10	-0.08	-0.08	-0.02	-0.01
Price effects	0.44	0.32	0.27	0.25	0.24	0.24	0.26	0.28	0.33
Residual effects	-0.10	-0.11	-0.09	-0.07	-0.03	-0.02	-0.02	-0.06	-0.05
Ireland									
Observed pay change (in logs)	0.37	0.34	0.33	0.34	0.35	0.37	0.38	0.37	0.34
Composition effects	0.09	0.05	0.05	0.08	0.11	0.13	0.14	0.15	0.14
Price effects	0.36	0.31	0.28	0.26	0.25	0.23	0.22	0.21	0.23
Residual effects	-0.08	-0.03	0.00	-0.01	0.00	0.01	0.02	0.01	-0.03
Italy									
Observed pay change (in logs)	0.03	0.04	0.05	0.06	0.07	0.08	0.08	0.07	0.08
Composition effects	0.08	0.09	0.10	0.10	0.09	0.09	0.10	0.06	0.07
Price effects	-0.04	-0.05	-0.04	-0.04	-0.03	-0.02	-0.03	-0.03	-0.04
Residual effects	-0.01	0.00	0.00	-0.01	0.00	0.01	0.01	0.04	0.05
Netherlands									
Observed pay change (in logs)	-0.01	0.05	0.09	0.12	0.14	0.16	0.18	0.19	0.17
Composition effects	-0.16	-0.08	-0.01	0.03	0.05	0.07	0.07	0.11	0.11
Price effects	0.06	0.09	0.10	0.12	0.13	0.11	0.14	0.11	0.09
Residual effects	0.08	0.04	0.00	-0.03	-0.03	-0.03	-0.03	-0.02	-0.03

Table A1c. Basic decomposition of observed wage changes by country and decile, females

	10	20	30	40	50	60	70	80	90
Belgium									
Observed pay change (in logs)	0.06	0.06	0.06	0.07	0.08	0.10	0.12	0.13	0.15
Composition effects	0.00	0.01	0.03	0.03	0.08	0.10	0.08	0.12	0.09
Price effects	0.03	0.03	0.03	0.02	0.01	0.02	0.04	0.06	0.06
Residual effects	0.03	0.01	-0.01	0.02	-0.01	-0.03	0.00	-0.05	0.01
Germany									
Observed pay change (in logs)	-0.17	-0.05	-0.01	0.03	0.03	0.05	0.07	0.08	0.10
Composition effects	-0.15	-0.09	-0.06	-0.04	-0.02	0.00	0.02	0.04	0.05
Price effects	-0.02	0.00	0.01	0.01	0.03	0.04	0.05	0.04	0.04
Residual effects	0.00	0.04	0.04	0.05	0.02	0.01	-0.01	0.00	0.00
Spain									
Observed pay change (in logs)	0.05	0.03	0.02	0.02	0.00	-0.01	-0.01	0.00	0.04
Composition effects	0.02	0.01	0.01	-0.01	-0.03	-0.02	-0.01	-0.02	0.04
Price effects	0.10	0.06	0.04	0.02	0.01	0.00	0.01	0.03	0.05
Residual effects	-0.06	-0.04	-0.02	0.01	0.02	0.01	-0.01	-0.01	-0.05
Greece									
Observed pay change (in logs)	0.00	0.02	0.04	0.04	0.06	0.07	0.11	0.16	0.21
Composition effects	-0.06	-0.05	-0.04	-0.05	-0.04	-0.01	-0.01	0.07	0.13
Price effects	0.02	0.05	0.06	0.08	0.08	0.10	0.11	0.12	0.12
Residual effects	0.04	0.02	0.01	0.01	0.01	-0.01	0.01	-0.03	-0.04
Hungary									
Observed pay change (in logs)	0.34	0.19	0.16	0.16	0.17	0.19	0.21	0.25	0.30
Composition effects	-0.03	-0.07	-0.06	-0.03	-0.02	0.01	-0.02	0.00	0.04
Price effects	0.48	0.35	0.28	0.25	0.24	0.23	0.24	0.25	0.28
Residual effects	-0.10	-0.09	-0.06	-0.05	-0.05	-0.05	-0.01	-0.01	-0.02
Ireland									
Observed pay change (in logs)	0.39	0.33	0.32	0.31	0.31	0.32	0.33	0.36	0.33
Composition effects	0.02	0.06	0.09	0.09	0.09	0.12	0.13	0.14	0.16
Price effects	0.43	0.33	0.27	0.23	0.22	0.21	0.21	0.20	0.24
Residual effects	-0.06	-0.06	-0.04	-0.01	0.00	-0.01	-0.01	0.02	-0.07
Italy									
Observed pay change (in logs)	0.00	0.02	0.04	0.05	0.06	0.07	0.09	0.10	0.13
Composition effects	0.07	0.09	0.10	0.10	0.10	0.13	0.12	0.06	0.04
Price effects	-0.05	-0.07	-0.05	-0.04	-0.03	-0.03	-0.01	0.03	0.09
Residual effects	-0.02	0.00	-0.02	-0.01	-0.01	-0.03	-0.02	0.01	0.00
Netherlands									
Observed pay change (in logs)	-0.02	0.07	0.05	0.07	0.08	0.09	0.11	0.12	0.13
Composition effects	-0.30	-0.08	-0.10	-0.09	-0.05	-0.04	-0.01	0.00	0.06
Price effects	0.22	0.17	0.17	0.17	0.16	0.16	0.17	0.20	0.17
Residual effects	0.07	-0.02	-0.02	-0.01	-0.03	-0.03	-0.05	-0.08	-0.09

Table A2. Wage Changes and Changes in Returns by Deciles

Decile	ALL					MALES					FEMALES				
	Observed	Returns	Education	Sectors	Occupations	Observed	Returns	Education	Sectors	Occupations	Observed	Returns	Education	Sectors	Occupations
<i>BELGIUM</i>															
1	0.044	0.019	0.093	0.018	-0.005	0.032	0.010	0.071	0.020	0.001	0.064	0.032	0.129	0.010	-0.012
2	0.036	0.014	0.095	0.014	-0.014	0.033	0.013	0.053	0.021	-0.002	0.056	0.031	0.150	0.012	-0.027
3	0.042	0.020	0.100	0.010	-0.018	0.039	0.020	0.058	0.013	0.001	0.056	0.029	0.153	0.012	-0.043
4	0.050	0.020	0.098	-0.001	-0.014	0.044	0.029	0.058	0.008	0.003	0.067	0.020	0.168	-0.001	-0.051
5	0.059	0.022	0.103	-0.012	-0.012	0.047	0.030	0.062	0.009	0.007	0.082	0.015	0.168	-0.016	-0.055
6	0.069	0.033	0.112	-0.024	-0.009	0.054	0.037	0.069	-0.003	0.009	0.101	0.022	0.167	-0.036	-0.046
7	0.076	0.042	0.115	-0.036	-0.005	0.060	0.039	0.081	-0.009	0.009	0.119	0.041	0.166	-0.053	-0.038
8	0.094	0.054	0.125	-0.058	-0.004	0.079	0.045	0.082	-0.029	0.017	0.130	0.056	0.156	-0.068	-0.036
9	0.101	0.058	0.129	-0.073	-0.015	0.086	0.056	0.097	-0.035	0.004	0.153	0.056	0.178	-0.076	-0.051
<i>GERMANY</i>															
1	-0.116	0.032	0.074	-0.023	0.000	-0.121	0.043	0.072	-0.041	-0.011	-0.167	0.008	0.073	0.004	0.024
2	-0.036	0.018	0.085	-0.028	-0.004	-0.043	0.035	0.073	-0.037	-0.014	-0.051	0.018	0.080	-0.003	0.015
3	-0.011	0.036	0.103	-0.027	-0.009	-0.018	0.042	0.096	-0.040	-0.017	-0.011	0.025	0.109	-0.003	0.008
4	0.005	0.033	0.124	-0.024	-0.013	-0.008	0.034	0.114	-0.032	-0.020	0.027	0.030	0.133	-0.003	-0.003
5	0.014	0.040	0.146	-0.022	-0.020	0.000	0.029	0.138	-0.019	-0.025	0.030	0.042	0.139	-0.005	-0.004
6	0.020	0.048	0.146	-0.018	-0.021	0.011	0.035	0.141	-0.011	-0.030	0.051	0.054	0.139	-0.008	-0.009
7	0.032	0.045	0.132	-0.021	-0.019	0.019	0.042	0.134	-0.008	-0.027	0.065	0.067	0.123	-0.010	-0.013
8	0.039	0.044	0.128	-0.023	-0.014	0.031	0.044	0.127	-0.006	-0.020	0.077	0.061	0.106	-0.020	-0.018
9	0.054	0.051	0.108	-0.024	0.004	0.047	0.064	0.109	-0.009	0.005	0.095	0.074	0.082	-0.019	-0.010
<i>GREECE</i>															
1	-0.021	0.031	0.040	0.042	0.034	-0.046	0.032	0.035	0.093	0.029	0.001	0.023	0.031	-0.008	0.040
2	-0.014	0.039	0.030	-0.007	0.034	-0.041	0.035	0.024	0.077	0.029	0.021	0.049	0.048	-0.058	0.033
3	-0.008	0.051	0.030	-0.017	0.031	-0.030	0.049	0.027	0.041	0.027	0.037	0.064	0.031	-0.097	0.033
4	-0.008	0.061	0.025	-0.037	0.038	-0.013	0.051	0.027	0.040	0.034	0.043	0.080	0.023	-0.080	0.033
5	0.007	0.065	0.019	-0.026	0.041	0.027	0.056	0.032	-0.117	0.040	0.060	0.084	0.025	-0.036	0.021
6	0.048	0.079	0.024	-0.023	0.049	0.084	0.044	0.035	-0.032	0.047	0.074	0.095	0.021	-0.013	0.028
7	0.100	0.090	0.027	0.015	0.058	0.124	0.063	0.045	0.060	0.056	0.109	0.106	0.023	0.009	0.032
8	0.147	0.083	0.024	-0.182	0.056	0.174	0.052	0.042	0.016	0.060	0.163	0.116	0.025	-0.233	0.044
9	0.195	0.082	0.037	-0.084	0.068	0.211	0.029	0.057	-0.001	0.056	0.213	0.123	0.025	-0.197	0.080

TABLE A2 (continued)

Decile	ALL					MALES					FEMALES				
	Observed	Returns	Education	Sectors	Occupations	Observed	Returns	Education	Sectors	Occupations	Observed	Returns	Education	Sectors	Occupations
<i>HUNGARY</i>															
1	0.288	0.457	-0.201	-0.006	-0.110	0.258	0.442	-0.211	-0.030	-0.106	0.339	0.476	-0.195	0.037	-0.115
2	0.130	0.332	-0.123	0.003	-0.108	0.065	0.323	-0.091	-0.023	-0.097	0.194	0.353	-0.181	0.041	-0.118
3	0.083	0.271	-0.088	0.001	-0.109	0.038	0.266	-0.055	-0.025	-0.101	0.162	0.282	-0.153	0.056	-0.129
4	0.104	0.249	-0.029	0.016	-0.101	0.070	0.248	-0.034	-0.017	-0.101	0.162	0.250	-0.098	0.042	-0.102
5	0.128	0.239	0.019	0.021	-0.085	0.106	0.236	0.020	0.007	-0.086	0.170	0.238	-0.063	0.034	-0.084
6	0.158	0.246	0.057	0.019	-0.069	0.133	0.238	0.066	-0.004	-0.065	0.190	0.233	-0.030	0.031	-0.064
7	0.177	0.250	0.089	0.019	-0.045	0.160	0.262	0.112	0.008	-0.049	0.207	0.237	0.032	0.079	-0.055
8	0.219	0.275	0.098	0.034	-0.010	0.201	0.279	0.115	-0.013	-0.007	0.248	0.254	0.047	0.063	-0.013
9	0.285	0.323	0.123	0.031	0.041	0.267	0.329	0.180	0.025	0.037	0.303	0.282	0.054	0.039	0.021
<i>IRELAND</i>															
1	0.373	0.410	-0.056	-0.007	-0.031	0.373	0.363	-0.046	-0.022	-0.012	0.390	0.431	-0.038	-0.028	-0.043
2	0.322	0.310	-0.007	-0.016	-0.039	0.336	0.309	0.010	0.018	-0.031	0.334	0.334	0.018	-0.017	-0.043
3	0.309	0.262	0.019	-0.016	-0.039	0.334	0.282	0.033	0.040	-0.034	0.321	0.272	0.028	-0.016	-0.049
4	0.309	0.245	0.024	-0.014	-0.039	0.341	0.264	0.047	0.008	-0.039	0.310	0.229	0.015	-0.012	-0.050
5	0.317	0.240	0.034	-0.027	-0.042	0.353	0.247	0.038	-0.011	-0.044	0.308	0.217	0.054	-0.026	-0.054
6	0.326	0.229	0.058	-0.033	-0.045	0.367	0.231	0.041	-0.032	-0.050	0.318	0.209	0.087	-0.046	-0.032
7	0.345	0.222	0.079	-0.086	-0.040	0.376	0.216	0.035	-0.052	-0.067	0.327	0.206	0.115	-0.092	-0.031
8	0.347	0.220	0.091	-0.112	-0.043	0.371	0.209	0.043	-0.093	-0.069	0.363	0.204	0.154	-0.134	-0.022
9	0.313	0.220	0.111	-0.123	-0.061	0.338	0.232	0.025	-0.108	-0.083	0.327	0.239	0.221	-0.135	-0.063
<i>ITALY</i>															
1	0.012	-0.032	0.015	0.058	-0.030	0.029	-0.045	0.020	0.063	-0.031	-0.001	-0.052	0.012	0.063	-0.035
2	0.029	-0.028	0.024	0.068	-0.029	0.041	-0.054	0.023	0.068	-0.026	0.018	-0.067	0.033	0.058	-0.019
3	0.040	-0.005	0.036	0.070	-0.023	0.052	-0.044	0.036	0.061	-0.023	0.036	-0.050	0.045	0.074	-0.018
4	0.047	0.011	0.052	0.068	-0.024	0.058	-0.037	0.052	0.049	-0.027	0.048	-0.039	0.051	0.070	-0.014
5	0.057	0.018	0.065	0.060	-0.022	0.066	-0.026	0.065	0.047	-0.030	0.062	-0.027	0.065	0.067	-0.009
6	0.064	0.025	0.086	0.055	-0.020	0.075	-0.023	0.081	0.049	-0.026	0.072	-0.033	0.088	0.059	-0.009
7	0.076	0.040	0.105	0.065	-0.026	0.079	-0.033	0.103	0.051	-0.044	0.090	-0.006	0.126	0.062	-0.011
8	0.069	0.057	0.118	0.068	-0.038	0.068	-0.032	0.110	0.045	-0.045	0.097	0.026	0.147	0.084	0.001
9	0.079	0.087	0.144	0.072	-0.059	0.076	-0.044	0.134	0.038	-0.076	0.130	0.087	0.169	0.114	0.004

TABLE A2 (continued)

Decile	ALL					MALES					FEMALES				
	Observed	Returns	Education	Sectors	Occupations	Observed	Returns	Education	Sectors	Occupations	Observed	Returns	Education	Sectors	Occupations
<i>NETHERLANDS</i>															
1	0.009	0.115	0.120	-0.048	-0.051	-0.015	0.064	0.146	-0.026	-0.030	-0.018	0.219	0.053	-0.062	-0.088
2	0.004	0.134	0.145	0.014	-0.035	0.047	0.090	0.162	0.044	-0.019	0.072	0.173	0.122	-0.035	-0.041
3	0.026	0.146	0.160	0.040	-0.022	0.090	0.105	0.168	0.068	-0.020	0.054	0.172	0.148	-0.009	-0.017
4	0.061	0.151	0.168	0.061	-0.013	0.117	0.122	0.167	0.076	-0.023	0.067	0.167	0.161	0.015	-0.011
5	0.087	0.142	0.159	0.074	-0.013	0.140	0.125	0.148	0.087	-0.020	0.077	0.156	0.184	0.026	-0.003
6	0.114	0.145	0.166	0.076	-0.017	0.156	0.113	0.148	0.081	-0.027	0.094	0.161	0.208	0.039	0.011
7	0.130	0.157	0.171	0.075	-0.021	0.180	0.137	0.166	0.073	-0.036	0.107	0.168	0.212	0.057	0.019
8	0.152	0.142	0.161	0.082	-0.021	0.193	0.108	0.153	0.074	-0.039	0.121	0.195	0.195	0.067	0.042
9	0.150	0.125	0.169	0.062	-0.030	0.172	0.093	0.148	0.040	-0.069	0.134	0.170	0.192	0.080	0.053
<i>SPAIN</i>															
1	0.034	0.098	-0.038	-0.061	0.004	0.052	0.089	-0.038	-0.055	0.018	0.055	0.100	-0.036	-0.056	-0.028
2	0.011	0.070	-0.043	-0.037	0.009	0.023	0.075	-0.041	-0.041	0.014	0.033	0.060	-0.041	-0.033	-0.017
3	-0.003	0.050	-0.046	-0.029	0.008	0.008	0.060	-0.045	-0.027	0.010	0.020	0.037	-0.044	-0.027	-0.009
4	-0.018	0.049	-0.048	-0.017	0.006	-0.005	0.054	-0.045	-0.024	0.007	0.015	0.022	-0.039	-0.020	-0.011
5	-0.033	0.044	-0.050	-0.009	0.004	-0.017	0.046	-0.047	-0.010	0.001	0.001	0.009	-0.037	-0.019	-0.008
6	-0.040	0.040	-0.053	-0.006	0.001	-0.020	0.050	-0.051	-0.003	0.000	-0.007	0.001	-0.043	-0.012	-0.019
7	-0.028	0.054	-0.060	0.007	0.000	-0.008	0.061	-0.059	-0.016	0.007	-0.015	0.009	-0.041	-0.004	-0.024
8	-0.011	0.057	-0.064	0.004	0.011	0.002	0.066	-0.071	-0.005	0.012	-0.003	0.028	-0.035	0.024	-0.029
9	0.013	0.073	-0.072	0.011	0.025	0.018	0.069	-0.091	-0.012	0.038	0.044	0.051	-0.013	0.031	-0.027

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