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From wage regulation to wage gap: how wage-setting institutions and structures shape the gender wage gap across three industries in 24 European countries and Germany

Andrea Schäfer and Karin Gottschall*

Whilst a common and persisting feature of advanced market economies, the gender wage gap nevertheless varies across countries. Amongst the factors affecting this wage gap, industrial relations and industry differences still require further research. Using data from EU-SILC in 25 European countries, this article analyses how national wage-setting institutions impact wage differences between male and female full-time employees in three distinct industries. Complementing the country comparison is an in-depth study of the German case using data from the German Linked Employer-Employee Database, shedding light on the interaction of industry-specific wage-setting regulations and gender equity in living wages. Findings from the international comparison suggest a substantial gender wage gap for full-time employees across industries with specific country patterns. Country patterns seem to be due to the overall influence of trade unions and the relationship between pay bargaining strategies and specific minimum wage policies. The German case adds to these findings by analysing the impact of sectoral models of wage bargaining for industry-specific gender wage gaps, focussing on living wages for skilled full-time employees.

Key words: Gender equity in wages, Wage-setting institutions, Cross-national comparison, Inter-industry comparison

JEL classifications: J31, J45, J51, C21

1. Introduction

Irrespective of rising female employment rates and the inroads women have made in highly qualified jobs over the past decades, a substantial gender wage gap persists. More recently these shortcomings in achieving gender equality in the labour market have gained more political attention for social as well as economic reasons (OECD, 2012A, p 167). The secular trend of changing family forms generates a rising share of

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both female-headed single-parent households and households depending on women's income. Moreover, flexibilisation of labour markets and welfare state reforms, often entailing decreasing generosity in welfare entitlements and transfers, have made high and continuous labour force participation paramount for both men and women. In this context, the fact that women tend to earn less than men, even when working time and occupation are accounted for, often overlaps with the more specific difficulty of achieving a living wage, defined as a wage

that allows for meeting the basic needs of a worker in a given society.[1] This makes the quest for equal pay even more urgent.

Whilst abating the gender pay gap and enabling women to make a living wage is increasingly acknowledged as a legitimate political goal, understanding this complex socio-economic phenomenon still needs further research, drawing on databases able to capture more recent changes. Indeed, the gender earning gap[2] is not only a common and persisting feature of advanced market economies, but over the past decades it also varies increasingly across countries due to the enlargement of the European Union and German unification. Additionally, attention must be paid to the question of how the increase of wage dispersion, induced by an expansion of low-wage work and a weakening of unions and corporatism in some countries, affects the gender pay gap (Grimshaw et al., 2014B). Against this background, controversial current debates on a dualisation of labour markets and endangered middle classes indicate that an intersectional perspective on gender differences in the labour market is needed. This perspective must be sensitive not only to the diversity between men and women, but also to the diversity amongst women to capture social class and ethnic effects as well (Mandel and Shalev, 2009; Emmenegger et al., 2012; Gottfried, 2013, p. 28).

Amongst the broad spectrum of factors thus far identified to explain the gender earning gap are individual characteristics, such as education and effort, employment experience, years of seniority/skill difference and industry as well as segregation features, such as inter-industry segregation (women are concentrated in lower-paying industries) and intra-industry segregation (lower-paying occupations within firms). Additionally, the impact of labour market institutions and welfare state policies have been discussed. Controversial results (i.e. with respect to the effect of so-called women-friendly policies on gender equity in pay) again point to the need of paying more attention to the relative position of women in the job hierarchy (Mandel, 2012; Korpi et al., 2013). Industrial relations, though not ignored, seem to be less prominent in this strand of research, although the role of wage-setting institutions and collective actors obviously comes into play when looking at the institutional factors impacting the gender earning gap. Earlier research on the gendering of wage setting established that there is a 'direct gender bias based on sex composition of the job, and an indirect gender bias in which the returns to jobs' requirements for various types of skill and working conditions differ to whether the job characteristic is traditionally associated with women's or men's spheres' (England, 1997, p 84). This indicates that in comparisons within countries and across countries, a focus on both gender segmentation **(← p. 468)** within and across industries as well as returns by skill levels and factors affecting them is necessary. Moreover, as more recent research has established, an analysis of the role of collective bargaining should be sensitive to industry differences, since industrial relations originating from core male-dominated industries might play out differently between the industrial and service sectors or the market and state/non-profit sectors (Arulampalam et al., 2007).

[1] The phrase 'living wage' is a relational concept referring to a single worker's needs under specific societal and economic conditions and should be distinguished from the related but different concepts of minimum wage, basic income and poverty threshold. There is, however, a long-standing historical and ongoing political debate as to what extent the needs of sustaining a family (sometimes more specifically referred to as a 'family wage') should also be taken into account for defining a living wage (for the German debate and EU policy suggestions, see Gottschall and Schröder, 2013)

[2] The phrase 'gender earning gap' refers to earnings as well as wages. For the empirical analysis, however, it refers only to gross earnings.

Another aspect that has gained more attention recently is wage dispersion. Even though men's and women's earning differences seem to be influenced by structural features and institutions, different features and institutions might influence the bottom and the top of the income ladder (Blau, 2012; Korpi et al., 2013, p 30). Reflecting the inroads women have made in qualified and professional jobs, as well as the high and rising shares of female-headed households, not least in regions such as East Germany with high male unemployment (Klenner et al., 2012), the chances of women earning a living wage are of special interest. Here a closer look at the bottom and the middle of the income ladder, rather than at the top, and a focus on full-time employment might provide new and more nuanced insights into relevant factors affecting the gender earning gap.

The study presented here contributes to this strand of research by investigating the impact of wage-setting institutions on wages for full-time employed men and women in relevant industries, addressing structural and individual-level factors. The industries chosen represent relevant examples of male- and female-dominated areas of employment, as well as more gender-balanced industries. A broad country sample and a selected country case study, both based on recent data, refer to Western Europe and permit the consideration of the economic and political transformation in Eastern Europe and Germany and thus aim to account for recent relevant changes. The first step of the analysis focusses on the overall gender earning gap in a broad cross-country sample for three different industries. Here our interest lies in whether the gender gap in earnings varies between countries and if so, whether individual predictors and country-level predictors related to wage-setting institutions and structures contribute to this variation. In a second step, using a country case study on East and West Germany, we account for the rising importance of full-time employment of skilled women and the impact of industry-specific wage-setting institutions in analysing the national inter-industry wage differentials by gender with a special focus on the middle of the income ladder using the same set of industries. Concluding remarks address policy implications of the findings.

2. State of the research: policy, institutions and the gender gap in earnings in comparative perspective

Comparative research has generated rich insights into individual and institutional factors affecting the gender wage gap. Within the scope of institutionally oriented comparative research, we can distinguish two different strands of research. The first refers to broader analytical frameworks comparing ideal type employment and welfare regimes, and thus accounts for specific constellations of institutions in groups of countries. The second focusses on the impact of specific institutions across countries, such as wage-setting regulations, or specific institutional characteristics, such as industry-specific employment structures or workplace characteristics. Whilst the second strand is more informative for identifying the impact of wage-setting institutions, a recent **(← p. 469)** debate regarding the impact of welfare state institutions on wage differentials between men and women nevertheless provides valuable insights for further research.

Several scholars question the assumed positive role of so-called women-friendly policies,[3] emphasising that long-term maternity/parental leave, as well as part-time work (features that are more prominent in Scandinavian welfare regimes and co-ordinated economies than in liberal welfare states and market economies), in fact have negative effects on the gender gap in earnings and tend to create 'welfare state based glass-ceilings' (Gupta et al., 2006, p 80; see also Estévez-Abe, 2006). However, once the relative position of women within the occupational/class structure is taken into account, these effects seem to be moderated (Mandel and Semyonov, 2005; Mandel and Shalev, 2009). Indeed, as recent studies demonstrate, well-educated women might have reduced opportunities in terms of high income in (women-friendly) 'earner-carer' policy contexts (Korpi et al., 2013),[4] and long-term as well as generous family policies might increase earning inequality amongst highly skilled women (Mandel, 2012; Akgunduz and Plantenga, 2013). However, as Korpi and colleagues state as a result of their comprehensive meta-analysis, these negative effects tend to be over-stated and elements of policy and legal frameworks other than explicit women-friendly policies might come into play, calling not only for a more nuanced view of differences amongst women but also for more refined measures of wage distribution, policies and individual-level characteristics (Korpi et al., 2013, p 23).

Indeed, labour market structures and regulation seem to play an important role for earnings differentials between men and women. Regarding the overall wage dispersion, in countries with a high wage compression, that is, where strong unions and the government lower wage inequality, the gender gap in earnings is lower due to fewer rewards for skills and employment in high-wage sectors. Less-skilled women in low-rewarded sectors profit from high wage compression and from unions that focus on the bottom end of wage distribution (Blau, 2012, p 130). Blau (2012) holds that three factors—overall wage dispersion, wage compression and the centralisation of wage-setting institutions—affect a country's gender earning gap.[5] Using data from ISSP for 11 and 22 countries in the 1980s and 1990s, she finds that the more compressed the male wage structure and the lower the female labour market net supply, the narrower the gender gap in earnings. Her findings also establish that the higher the extent of collective bargaining coverage, the lower the gender earning gap (Blau, 2012, p 210).

Further research on gender wage differentials focusses on different wage regulation settings across countries: nuanced analyses generally confirm that wage-setting institutions play a significant role in reducing the gender earning gap (on trade union **(← p. 470)** density and share of women in top positions see Schäfer et al., 2012). As Christofides et al. (2013) report—using data from the 2007 EU Statistics on Income and Living Conditions in 26

[3] The term usually refers to policies that might stimulate female labour market integration and contribute to reconciling family and paid employment for mothers. Of special interest are family policies, although these may contain a variety of single policies that might have countervailing effects on women's employment. Several authors point out that to capture such multi-dimensionality, rather than using umbrella terms, the aims and effects of single policy measures and constellations of policies need to be defined (Korpi et al., 2013).

[4] 'Both earner-carer and traditional-family policy dimension are associated with somewhat lower probabilities for women with tertiary education reaching the highest wage quintile…. Market-oriented family policy constellation … may tend to increase representation of women with tertiary education in top quintiles' (Korpi et al., 2013, p 22).

[5] However, the impact of bargaining centralisation depends strongly on measurement, country selection and which other institutions are taken into account. Several studies (see Aidt and Tzannatos, 2005) agree that it is difficult to find a robust relationship between the centralisation of wage bargaining and economic outcomes.

member states on the unexplained part of the median earning gap[6]— countries with largely unregulated[7] labour markets show a significantly higher median gender earning gap and 90th quantile earning gap than broadly or highly regulated labour markets.[8] However, as other studies show, unions' impact on wage differentials varies along the wage distribution. Arulampalam et al. (2007) use harmonised data for the years 1995–2001 from the European Community Household Panel (ECHP) to analyse differences in the gender earning gap[9] across the public and private sectors in 11 countries.[10] Using quantile regression, they focus on union membership rates (and work–family reconciliation policies) and show that differences in wage-setting institutions across EU countries partly account for the variation in patterns by country and sector. The study provides tentative evidence that unions—which in many countries are indeed less present at the bottom of the wage distribution—may be less sensitive to the interests of members at the low end of the wage distribution. Furthermore, unions may be less likely to represent the interests of women effectively if they are perceived to have less attachment to the labour market, as Booth and Francesconi (2003) show for Britain with data from the British Household Panel Survey from 1991 to 1997. Whilst this holds for market employment, there is evidence that gender earning gaps in the public sector are lower due to wage policies inducing a more compressed overall wage structure not only by capping higher wages but also by establishing better wages for low-skilled workers (Arulampalam et al., 2007; Korpi et al., 2013).

Moreover, several studies sought to clarify the pay equity effects especially at the lower end of the income distribution concentrating on minimum wage systems in comparative perspective. Findings suggest that the empirical evidence is mixed: whilst some studies found no or negative effects of different minimum wage levels (Blau and Kahn, 2003; Salverda and Mayhew, 2009), others indicate that the protective function of a minimum wage for women in low-wage employment plays out as an improvement of women's total earnings and helps narrow the gender earning gap (for Croatia, Germany, Hungary, Spain and the UK see Grimshaw et al., 2014A; for the UK Dex et al., 2000). Furthermore, different pay equity outcomes of interaction between minimum wage and collective bargaining features have to be taken into account (Grimshaw et al., 2014B). All in all, findings indicate that labour market structures and regulations, such as collective bargaining institutions and minimum wage regulations, tend to provide enabling conditions for gender pay equity although they vary in level and value between sectors and industries (on private/public see Arulampalam et al., 2007). **(← p. 471)** At the same time there is a growing awareness that variation within countries may be as large as between countries and that sectors and workplace characteristics are also sources of wage diversity between men and women (Rubery et al., 2005; Gannon et

[6] The analysis relies on equivalised household income; employees aged 25–54 (subsample with full-time workers within the last year).
[7] Index taken from Du Caju et al. (2009). The indexation arrangements for 2006 for 25 countries result in three groups: 'largely unregulated' (the Czech Republic, Estonia, Hungary, Japan, Lithuania, Poland, UK and USA), 'broadly regulated' (Austria, Denmark, France, Germany, Greece, Ireland, Italy, the Netherlands, Norway, Portugal and Sweden), and 'highly regulated' (Belgium, Cyprus, Finland, Luxembourg, Slovenia and Spain) (Du Caju et al., 2009, p 3).
[8] However, results change if work–family reconciliation policies (using the Family Reconciliation Index) are considered, pointing to a complex interaction of labour market institutions and family policies in cross- country perspective
[9] Log of hourly wages (including overtime) deflated to 2001 prices.
[10] Individuals aged 22–54 working at least 15 hours a week from Austria, Belgium, Britain, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands and Spain.

al., 2007; Bechter et al., 2012).[11] Allen and Sanders (2002) used data from a variety of data sets for the early 1980s to the early 1990s in 12 countries[12] to develop an understanding of factors that contribute to cross-industry and cross-country variations in the gender gap in earnings.[13] In addition to a negative impact of the percentage of women in an industry on male and female wages in all 12 countries for all nine industries, they report a positive effect of union membership on earnings that lowers the effect of the share of women in an industry. Gannon et al. (2007) find with data from the European Structure of Earnings Survey for 1995 that for six European countries[14] the level of the gender earning gap varies substantially across countries and that industries play an important role in explaining the gap. Furthermore, wage dispersion is large in countries with decentralised bargaining and highly correlated with sectoral profitability. This again underscores the importance of different industrial relations systems in shaping gender earning gaps.

The reported findings provide rich evidence on relevant independent factors that contribute to the gender earnings gap: women-friendly policies, labour market structure, wage-setting institutions, sector and industry employment and regulation. Additionally, there is rich evidence that individual-level factors (i.e. skill level) and gendered employment patterns (such as lower employment rates, part-time, discontinuous work and occupational concentration of women) affect wage differentials by gender (for the UK see Olsen and Walby, 2004). The following analysis is interested in how the individual level and the institutional level interact in shaping male and female wage outcomes across countries and across main industries. For several reasons the focus of this study is on full-time employment, although high shares of women are still working part-time and part-timers tend to be disadvantaged in many (but not all) countries. Apart from rising socio-economic needs of households and increasing individual preferences of women for full-time employment, the current EU political agenda as well as the dominant national welfare reforms tend to promote an 'adult worker' model calling for full labour market integration of men and women. Furthermore, and relevant for the scholarly debate, there is evidence that understanding the gender wage gap calls for a nuanced analysis differentiating between full-time and part-time work. Current evidence not only suggests that the unexplained gender wage gap is lower for part-time than for full-time workers in countries with part-time pay penalties (for Germany, see Gallego Granados and Geyer, 2014, p 12)[15] but also shows that there is a larger gender earning gap and stronger evidence of glass ceilings for full-time full-year employees, suggesting more female disadvantage in 'better' jobs (Christofides and Michael, 2013). Overwork, which is only discernible for full-time **(← p. 472)** workers, may also add to these disadvantages as a recent study suggests (for the USA, see Cha and Weeden, 2014). This indicates that the set of factors explaining the gender wage gap between full-time workers—especially the nature of part-time employment, labour market segregation and occupation—and explaining earning differentials between full-time and part-time workers might be

[11] Each sector is shaped by specific product and labour markets, resulting in different workforces, different wage-setting regulations and different economic contexts.
[12] The sample consisted of Australia, Austria, Canada, West Germany, Ireland, Japan, the Netherlands, Norway, Sweden, Switzerland, the UK and the USA.
[13] The dependent variable is the natural log of (hourly) wages.
[14] The sample consisted of Belgium, Denmark, Ireland, Italy, Spain and the UK.
[15] Several cross-country comparison studies show a part-time penalty for most of the countries (Italy, USA, Canada, UK, Germany, Spain, Poland, France, Norway, Finland, the Netherlands, Austria), but not for Sweden, Belgium and Denmark: women working part-time in those countries earn significantly more than women working full-time (Bardasi and Gornick, 2008; Matteazzi et al., 2013).

different (Bardasi and Gornick, 2008; Matteazzi et al., 2013; Colella, 2014).[16] Thus, the focus on full-time employees in the study reflects changes in female labour market integration and participation and excludes the potential mix-up of differences and sources of a gender earning gap between full-time and part-time workers. It also takes into account the increased importance of female contributions to household income, which might indicate a new social relevance of female disadvantage in wages.

Moreover, most studies rely on data from the early 1990s to the mid-2000s for industrialised Western European countries. There is to date mixed evidence on institutional factors explaining the gender earning gap across a large number of countries including transition countries. We attempt to fill this void in the first part of our study using more recent data from 2009, a larger set of 25 Western co-ordinated and uncoordinated economies as well as transformation economies from Eastern Europe. In the second part, a case study on unified Germany making use of more specific and regional firm and industry data will allow for a more nuanced analysis of the gender earning gap in the middle of the income distribution in the selected industries by focussing on skilled male and female workers and the attainment of a living wage.

3. Country comparison data, measures and method

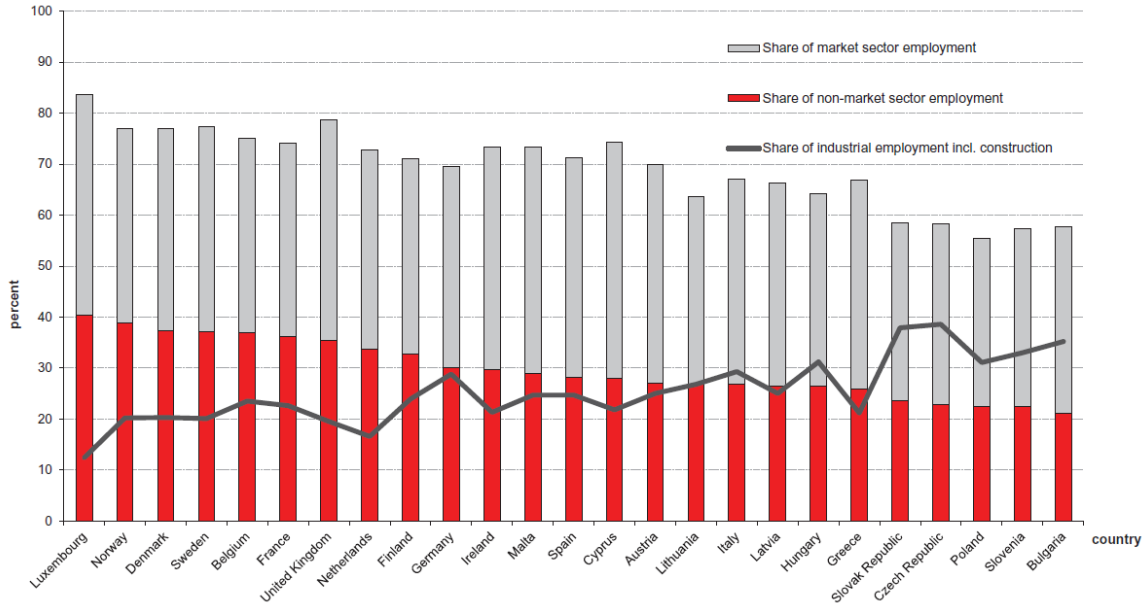
The selected 25 EU countries are representative of the considerable European heterogeneity in terms of female labour market participation, size of the gender wage gap and the economic and labour market structure. The sample covers interesting examples of 'varieties of capitalism' and industrial relations models and a range of old/new and non-member states and transformation states (Rubery and Fagan, 1995; Hall and Soskice, 2001; Rubery, 2010).[17] All of the liberal and co-ordinated market economy countries included have legislation concerning pay discrimination (Soumeli and Nergaard, 2002). In Finland, France, Germany, Greece, Italy, the Netherlands and Spain and to some extent in Belgium pay discrimination at work on the grounds of gender is explicitly prohibited by the constitutions. This national legislation is influenced by the EU framework for encouraging equal pay (Smith, 2012). Within these varieties of capitalism and industrial relations models there are variations in economic structure. Nordic (Norway, Sweden, Denmark, Finland) and Benelux (Belgium, the **(← p. 473)** Netherlands, Luxembourg) countries show a high share of non–market sector employment, such as human health and social work, and a low share of industrial employment (with Benelux countries at the lower end), such as mining and quarrying, manufacturing and electricity and gas and water (see Figure 1). New and non-member states and transformation

[16] With horizontal segregation as a relevant factor explaining the gender wage gap between full-time workers and vertical segregation explaining the full-time/part-time wage gap (Matteazzi et al., 2013).

[17] As Hall and Soskice (2001) argue, an interlocking set of institutions and actors (such as vocational systems and firms) leads to country-specific employment and production systems interlinked with an entrenched social system. They establish that decentralised structures in production processes in globalised and competitive markets can result in a co-ordinated ('organised') decentralisation of unions (in the case of co-ordinated market economies) or the deregulation of unions (in the case of liberal market economies). However, the approach focusses predominantly on large enterprises, largely ignoring developments in small and medium-size enterprises; also there is a bias focussing on the production sector and industry, largely ignoring the service economy and atypical employment arrangements (see Gottfried, 2013). Rubery (2010) presents a more encompassing and nuanced approach that combines varieties of capitalism ideas and labour market segmentation arguments and explicitly recognises diversity by sectors, class and gender. She focusses on four dimensions: employment security, working time, degree of autonomy and rewards for employment.

states show a low share of non–market sector employment and a high share of industrial employment, with the Southern and Middle European countries in-between.

The three industries chosen for our analysis represent examples of market/private sector and non-market/public sector as well as male- and female-dominated areas of employment: 'health' represents a female-dominated mainly non-market/public social service industry, where union density[18] is often high; 'manufacturing' represents a core male-dominated industry where union representation is traditionally very important, however union density rates have been in decline over recent years; and 'Finance' represents a gender-mixed commercial service industry characterised by low union density rates (see Du Caju et al., 2009). The selection facilitates harmonised cross-country comparison and is based on the NACE Rev 2.[19] Health industries are mainly public and thus are subject to government objectives and policies, which are more stringently enforced in the public sector. This especially refers to equal pay regulations. Manufacturing and finance are both private sector industries with less stringent enforcement of equal pay policies. Moreover, there are inter-industry wage differentials as Du Caju et al. (2010) explore.[20] These differentials are suggested to be consistent



Source: Eurostat, Labour Force Survey (LFS), 2009, annual averages, authors's calculations.
Note: data from lfsa_epgan2; Industry and construction: (NACE Rev. 2 section B-F) Mining and quarrying; Manufacturing, electricity, gas, steam and air conditioning supply; Water supply, sewerage and waste management; Construction. Market services: (NACE Rev. 2 section G-N) Wholesale and retail trade; Transportation; Accommodation and food service activities; Communication; Financial and insurance activities; Real estate activities; Professional, scientific and technical activities; Administrative and support service activities. Mainly non-market services: (NACE Rev. 2 section O-U) Public administration; Education; Health; Arts, entertainment and recreation; Other services activities; Activities of households as employers; Activities of extraterritorial organisations.

Fig. 1. *Employment by economic activity by country, 2009* **(← p. 474)**

[18] The proportion of workers in a workplace who are trade union members.
[19] See http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-RA-07-015/EN/KS-RA-07-015-EN. PDF. Health: human health and social work activities (NACE Rev. 2, Q); manufacturing: mining and quarrying, manufacturing and electricity, gas and water supply (NACE Rev. 2, B, C, D, E) and finance: financial and insurance activities as well as property, professional, scientific and technical, administrative and support service activities (NACE Rev 2, K, L, M, N).
[20] Their country sample contains Belgium, Germany, Greece, Hungary, Ireland, Italy, the Netherlands and Spain for two points in time (1995 and 2002) with data from the Structure of Earnings Survey (SES) and analyses of inter-industry wage differential at NACE2 level.

with rent-sharing mechanisms with the result that rent sharing (measured by real gross operating surplus per worker) is more likely in industries with firm-level collective agreements and with higher collective agreement coverage, such as in finance and manufacturing.[21] These three industries are also relevant for female employment: on average half of all female employees are concentrated in these three industries (OECD, 2012C). However, there is substantial country variation in the share of female employment between the three industries: in the Nordic countries as well as Belgium, Germany, France, Ireland, Luxembourg, the Netherlands and the UK the highest share of female employment is in health, whereas in new and non-member states and transformation states (such as Hungary, Bulgaria, the Czech Republic, Slovak Republic and Slovenia) we find a high share of women in manufacturing.

For cross-country simultaneous analysis of individual and country-level effects, we use the European Union Statistics on Income and Living Conditions (EU-SILC). Since 2005 individuals in private households aged 16 and over are regularly interviewed in the EU-SILC on wages, wage components, transfers and socio-economic characteristics. EU-SILC initially covered 24 EU countries as well as Norway and Iceland and since 2007 covers all 27 member states plus Turkey and Switzerland.[22] In 2009 the EU-SILC sample covered the 25 countries in our analysis.[23] The three main advantages of the EU-SILC data are (i) the earnings information provided is standardised across countries, (ii) the data set includes a range of different countries, including transformation countries and (iii) the occupational information provided is harmonised.

In our cross-country study we only consider employees (identified by self-defined economic status) aged between 25 and 64 who are employed full-time according to their current self-defined actual working hours. We consider those working more than 35 hours a week including overtime as full-time employees (employers, the self- employed and family workers are excluded).[24] The national sample size ranges from 3,473 in Cyprus to 15,428 in Italy for full-time employees aged 25 to 64 (Table 1). Overall the share of full-time employees (i.e. those working more than 35 hours a week, aged 25–64 years as a proportion of total employment) is on average two thirds and varies from 53.4% in Greece to 84.9% in the Slovak Republic (Table 1, second column). About a quarter of full-time employees work in one of the selected industries, ranging from 15.3% in the Netherlands to 40.3% in Germany (Table 1, third column). Thus, the study considers a relevant share of core full-time employment. However, full-time employment covers more men than women, since female full-time employment as a share of total female employment is on average 56% (73% for

[21] In line with this result, the highest earnings in our larger sample are on average in finance, followed by manufacturing, and the lowest earnings are found in health.

[22] National data introduce problems such as sampling errors, common interpretation, use of cross-walks from national classifications as well as imputation and aggregation (on data quality, see Frick and Krell, 2010; Goedemé, 2010; Iacovou et al., 2012). On problems related to the EU-SILC which are relevant for our analysis, see Iacovou et al. (2012).

[23] We eliminated Portugal, Iceland, Estonia and Romania because of low numbers and a high level of missing data for relevant variables. Reference year for the 2009 survey is 2008.

[24] The threshold might be biased with respect to Nordic countries where long part-time hours are more frequent than in other countries. Moreover, the Netherlands are a special case in terms of high part-time employment. Since the gender gap in employment as well as the gender gap in full-time employment vary amongst the countries, we controlled for this by introducing an indicator of probability of female full-time employment into the estimations.

men), ranging from 37% in the Netherlands to 87% in the Slovak Republic (data is available on request). **(← p. 475)**

Table 1. *Share of full-time employees aged 25–64 by industry, sex and country, 2009*

	Number of full-time employ-ees	Full-time employees as a share of total employment*	Full-time employees in the selected sectors as a share of total full-time employees	Female full-time employment as a share of total female employment (all employment, not only employees)		
				'Manu-facturing'*	'Finance' *	'Health' *
Country	N			(%)		
Italy	15428	56.3	30.8	72.1	58.9	65.5
Slovenia	13859	82.0	34.7	93.2	95.2	95.1
Poland	13779	72.8	27.9	91.6	86.6	83.8
Spain	13176	67.6	23.4	80.3	67.4	58.7
Hungary	11791	83.0	24.3	90.8	92.6	93.9
Czech Republic	10737	80.5	33.6	93.6	89.7	90.0
Finland	9437	76.4	17.9	93.0	80.7	84.5
Germany	8453	58.4	40.3	60.7	51.2	48.1
Slovak Republic	7699	84.9	29.2	94.8	91.4	93.3
France	7575	57.7	21.8	47.2	53.2	34.6
Netherlands	7015	54.2	15.3	34.1	39.3	14.7
Bulgaria	6748	81.8	26.6	96.2	83.6	93.4
United Kingdom	6652	68.2	30.6	73.2	47.1	51.0
Sweden	6234	67.3	21.8	81.1	74.8	55.2
Latvia	6036	83.6	20.1	88.6	90.9	87.5
Denmark	5666	71.9	19.2	72.9	67.4	53.5
Lithuania	5414	81.3	26.4	92.2	91.2	91.8
Belgium	5146	65.4	29.2	65.6	53.3	44.5
Austria	5042	69.1	26.2	61.3	47.9	51.3
Luxembourg	4939	78.6	25.1	62.8	67.7	51.5
Greece	4898	53.4	23.9	90.3	86.5	85.1
Norway	4719	64.9	17.4	74.7	75.0	60.3
Malta	3924	71.0	23.5	89.9	79.5	65.5
Ireland	3768	60.0	21.3	57.7	52.0	37.9
Cyprus	3473	73.3	25.1	76.5	83.5	88.1

Source: EU-SILC (2009), * weighted, authors' calculations.

In our study, especially in the new, non-member and transformation states, the share of female full-time employment across all industries is high, followed by the Scandinavian countries, whereas the UK, Germany, Austria, France and Belgium take a medium position (Table 1, columns (4)–(6)). In most countries female full-time employment covers 50% and more of all female employment in the respective industries, thus covering the core female employment pattern. Health tends to show significantly lower full-time employment rates than the other industries, and the Netherlands stand out with generally low full-time employment shares across all industries, reflecting a high prominence of part-time employment patterns for both women and men.

For the cross-country analyses information on gross annual earnings, total weekly hours worked in the main job and duration spent in different states during the year are **(← p. 476)**

available so that individual log gross hourly earnings in euros (before taxes and transfers, as reported by survey respondents) can be considered for cross-country analysis (on the strategy for computing hourly wages, see Engel and Schaffner, 2012).[25] Annual gross earnings are divided by number of months spent in employment. For those countries with information on income reported for the actual period (Greece, Spain, Ireland, Italy, Austria, Portugal, the UK, Bulgaria, Hungary, Poland and Iceland) the gross monthly earnings of each employee are taken instead.[26] The resulting monthly gross earnings are the basis for calculating hourly earnings by multiplying the weekly working hours by 4.2 and dividing the monthly gross earnings by the resulting monthly working hours (calculation follows the strategy proposed by Brenke and Grabka, 2011).[27]

Variables included—individual and institutional characteristics—are taken from several different databases.[28] In addition to the institutional and structural wage-setting variables of interest, we include a number of *individual-level variables* in the analyses: industry, age at time of survey in years,[29] sex, level of education, holding a managerial position requiring the supervision of other employees,[30] firm size and type of contract. Unfortunately, we do not have any reliable information on work experience for the cross-national analysis (on the implications of missing indicators for work experience see Weichselbaumer and Winter-Ebmer, 2005). However, following Mandel and Semyonov (2005, p 954) the probability of full-time labour force participation is included to assess the implications of selection into the labour force.[31]

In line with the literature review, the most important factors affecting earning differentials between men and women in terms of wage-setting institutions are the presence and influence of unions, the governability and enforcement of collective agreements, at which level bargaining takes place, who is covered by collective bargaining agreements and in terms of wage-setting structures the level of minimum wage.[32] Thus, in addition to individual characteristics, we consider not only collective bargaining (coverage, level and co-ordination) but also the interaction with other policies affecting wages, such as minimum wages.[33] In

[25] In some countries, the wage measure can be derived from income reported for the actual period and in others from income reported for the reference period (the year preceding the date of interview). As Engel and Schaffner (2012) show, 10% work less than 12 months a year.
[26] Based on the information on variable PY200G. Mean comparison tests for subsample of individuals aged 25–64 show (i) no significant difference between monthly gross earnings from actual period and those calculated from annual income for Poland and the UK; (ii) significantly higher values on monthly income calculated from annual data for Austria, Bulgaria, Portugal, Italia, Greece; and (iii) significantly lower values on monthly income calculated from annual data for Iceland, Hungary, Ireland and Spain.
[27] There is, however, some loss of information due to missing values in the working time variable for UK, Spain and Sweden.
[28] Sample description and description of variables can be requested from the corresponding author.
[29] All variables have been centred at the mean.
[30] The indicator on managerial position is based on the question of whether the employee has to supervise other employees. Of course, there are many more possibilities within firms to promote employees to higher pay scales. Due to data limitations, we cannot take into account firm-specific factors in the cross-national comparison. However, we focus on workplace characteristics, such as works council and female proportion in firms, in the case study on Germany.
[31] The indicator is estimated using logit regression equations predicting the odds of full-time employment in each country as a function of gender, marital status, age, education and the presence of children.
[32] Bargaining power of wage setters also depends on employer and union density. Furthermore, the existence of a procedure for legal extension of collective agreements can significantly broaden the coverage of collective agreements. Last but not least, the average duration and the level of wage agreements may influence wage flexibility. However, we have no harmonised cross-national data on these factors for our sub-sample in 2009.
[33] Tax and transfer policies that affect non-wage labour costs or the social benefits available are not considered.

total, we refer to these as 'wage-setting institutions **(← p. 477)** and structures'—that is, the direct and indirect mechanisms and structures determining wages received by employees in different industries. For the data on wage-setting institutions and structures indicators, we draw on the ICTWSS (Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts) Database (Visser, 2011) and on OECD data. Union influence and presence shown by degree of centralisation are taken from ICTWSS.[34] The same applies to information on collective bargaining such as coverage, co-ordination and level of collective bargaining agreements. Bargaining coverage is tested via adjusted bargaining coverage rates, describing the share of employees covered by collective (wage) bargaining agreements as a proportion of all wage and salary earners in employment with the right to bargaining (Visser, 2011). The indicator is adjusted for the possibility that some sectors or occupations are excluded from the right to bargain. Governability and enforcement of agreements are picked up in the data on the type of co-ordination of wage bargaining based on Kenworthy's five-point classification of wage-setting co-ordination scores (Visser, 2011). Those countries with mixed industry-wide and economy-wide bargaining (meaning central organisations negotiate non-enforceable central agreements— guidelines—and/or key unions and employers associations set the pattern for the entire economy) are compared to all others. Additionally, the dominant level at which wage bargaining takes place is taken into account. Here we distinguish between countries where bargaining takes place mainly at the national or sectoral level and those where bargaining takes place (fully or partially) at the local or company level. Furthermore, to consider the role of the minimum wage, we use the Kaitz index from the OECD, indicative of the ratio of the statutory minimum wage to the median wage.[35]

The hierarchical data structure of the EU-SILC with respondents nested in countries may potentially cause dependency amongst observations due to clustering. In addition, there are variables at both levels of the hierarchy with different sample sizes and therefore different degrees of freedom. To accommodate this issue, a multi-level model will be used to analyse the impact of the individual-level and country-level variables on earnings.[36] To implement our research question, models with random effects for the intercept and the female indicator variable are used in the analysis.[37] To account for the differences in the dependent variables for gross hourly earnings in euros we use multi-level mixed-effects linear regression. Recent literature questioned the reliability of estimates of country effects with small numbers of countries and suggests a reasonable number of cases at country level as well as a consideration of non-statistical techniques to assess country effects (Bryan and Jenkins, 2013). In line with this literature we have a reasonable number of cases at country level (N = 25) and employ **(← p. 478)** two techniques: on the one hand we use graphical data analysis

[34] Following Visser (2007), 'centralisation' refers to the level at which wage settlements are usually negotiated and to the enforceability—via authority and influence—of these agreements. 'Co-ordination' reflects the degree to which pay negotiations conducted in different bargaining units are synchronised. They also take into account the effects on each other and on the economy as a whole (Visser, 2007, p 131).

[35] A potential problem of contextual analysis is the high correlation between country-level variables. To clarify whether this applies to the present study, we estimated bivariate Pearson correlations at the setting level. The correlations are generally not high. There is substantial correlation between co-ordination of wage bargaining and level of collective bargaining agreement. However, we consider all factors separately one by one and not at the same time (Visser, 2011).

[36] In the past decades, researchers analysing the gender earnings gap have used a variety of different estimation methods (such as dummy variables, instrumental variables, quantile regression, panel, hierarchical estimation methods, Heckman selection, Blinder-Oaxaca decomposition as well as Neumark, Cotton, Brown and Reimers decomposition) (see Weiselbaumer and Winter-Ebmer, 2005 for an overview).

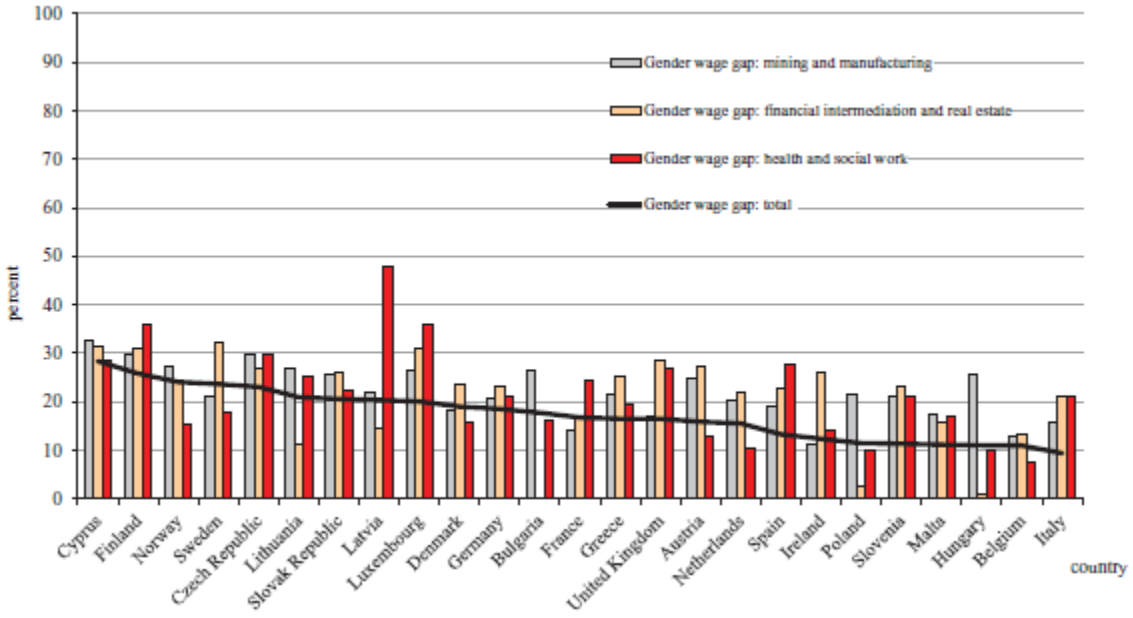
[37] All models are estimated using the maximum likelihood estimator of the mixed command in Stata 13.

and on the other we add a description of a country case in terms of workings of national wage-setting mechanisms.

4. Gender equity effects of wage-setting institutions and structures across 25 European countries: results for full-time employees in three industries

Irrespective of a decrease in the gender earning gap in most countries, the observed earning gap in 2009 is still substantial. For 3 out of 17 countries in our sample— including in Sweden—there was an increase in the gender earning gap between 2001 and 2011, in all other countries a reduction occurred in the overall gender earning gap to some extent (OECD, 2013A, p 262). As Figure 2 shows, in our sample we find substantial overall unadjusted gender earning gaps for all full-time employees aged 25–64 and unadjusted gender earning gaps for the three selected industries remain for each of the countries (in line with results of Christofides et al., 2013 on gender earning gap amongst full-time workers). For this sample of full-time employees, the gender earning gap was smallest in Italy (9.4%) and highest in Cyprus (28.3%). The Nordic countries, such as Finland, Norway and Sweden, rank relatively high on the gender earning gap of full-time employees (25.8%, 24.1% and 23.7%, respectively), replicating OECD results. Contrary to the usual notions, the Nordic countries have a relatively high gender earning gap for full-time employees, which might be due to a disproportionally high gender gap at the top of the earning distribution (see OECD, 2013B). Germany is amongst the countries with the largest gaps (18.6%), with a larger gap at the bottom than at the top of the earning distribution (see OECD, 2013B). Belgium, Poland, Hungary, Spain, Slovenia, Italy and Ireland are amongst the countries with the smallest gaps.

All industries show an internal overall unadjusted gender earning gap: The largest is in manufacturing followed by finance, and the lowest is in health. These results are



Source: EU-SILC 2009, authors' calculations

Fig. 2. *Average gender earning gap (unadjusted hourly gross wage) for full-time employees aged 25–64 by industry and country, 2009* **(← p. 479)**

in line with previous studies, showing a larger gender earning gap in the private market sector than in public non-market sector employment (Christofides and Michael, 2013). However, the extent varies substantially by country. Large gaps in manufacturing compared with other industries are found in Cyprus, Norway, Lithuania, Bulgaria, Poland, Malta and Hungary. In contrast, large gender earning gaps in the non-market service industry (health) compared with the other industries are found in Finland, the Czech Republic, Latvia, Luxembourg, France and Spain. All other countries have the highest gender earning gaps in finance in comparison to the other industries. This might point to the fact that this industry has relatively high earnings at the top and that here women are strongly under-represented.

The results of random intercept multilevel regression equations for the empty model (model 1) and the model including individual-level characteristics (model 2) for full-time employees working in one of the three industries chosen are given in Table 2. Statistics for the empty model show that country variance is substantial (about 70%) even when individual-level characteristics are included. However, the large variance attributed to the country level does not take any compositional effects into consideration. The effects of individual-level characteristics controlling for composition effects is shown in model 2. Results show that employees in less prestigious and responsible jobs, working in female-dominated industries, with low education and often in temporary contracts (most prominent amongst women), earn less on average. Moreover, net of all other variables, women's earnings are lower than men's earnings across all countries for the selected three industries.

Interaction effects between women and industry confirm the descriptive results (of unadjusted gender earning gap): women earn substantially less in manufacturing compared to men (not shown in table). At the same time, women and men on average across the country sample earn most in finance, followed by health and least in manufacturing in our sample.

The results of random intercept multi-level regression equations that examine the effect of wage-setting institutions and structures on the gender earning gap for full-time employees working in one of the three industries chosen are given in Table 3. All models estimate the impact of country-level factors separately including individual- level characteristics on log hourly gross earnings (Table 3, models 3–7).[38] Turning to wage-setting influences at the country level, the effect of the degree of centralisation, measured by the Iversen index (Iversen, 1999), on hourly gross earnings is positive and significant, implying that in countries with strong union influence—shown via authority and concentration—earnings are higher for full-time employees working in one of the three industries compared to countries with weak union influence and/or authority. In more detail, in countries with a highly centralised level of bargaining, that is, the collective bargaining takes place mostly at the industry level and with centralised co-ordination of wage bargaining (i.e. industry and economy-wide bargaining co-ordination), hourly gross earnings for full-time employees are higher. Finally, the higher the adjusted bargaining coverage rates, the better the earnings for full-time employees. However, the indicator for women is negative and significant, thus women always earn less than men.

More interestingly, Table 3 shows the results of including country-level factors and interaction effects with the female indicator variable one by one (Table 3, models **(← p. 480)**

[38] Results of the country-level factors are shown in the row 'effect on intercept' in Table 3.

Table 2. *Individual-level determinants of log hourly gross earnings in three distinct industries in 25 European countries for 2009 (multilevel random intercept model)*

Individual-level effects	Coef.	SE	Coef.	SE
Model	1		2	
Women (ref.: men)			-0.203	0.005***
Industry of Employment (ref.: Manufacturing)				
Finance			0.073	0.005***
Health			-0.009	0.006*
Age (years)			0.046	0.002***
Age^2			-0.001	0.000***
Education (ref.: middle education)				
High education			0.312	0.005***
Low education			-0.172	0.006***
No managerial position (ref.: managerial position)			-0.221	0.005***
Permanent job (ref.: temporary job)			0.227	0.008***
Firm size: small (ref.: firm size >= 50)			-0.141	0.004***
Constant	2.255	0.155***	2.396	0.142***
Statistical parameter				
Level 1 variance	0.248	0.001	0.175	0.001
Level 2 variance	0.601	0.170	0.495	0.140
Intra-class correlation	0.707	0.058	0.738	0.054
Log likelihood	-35,647		-27,051	
N level 1	49,169		49,169	
N level 2	25		25	

Notes: Indicators for missing values and labour force probability are included in estimation but not shown in table. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Source: EU-SILC (2009), unweighted results, authors' calculations.

3a–7a). Our results are consistent with previous studies in terms of the impact of the level of minimum wage regulations, collective bargaining coverage and type of co-ordination of wage bargaining on the gender earning gap. The estimates suggest a positive and significant relationship between Kaitz index and the female interaction variable ($b = 0.056$; $p = 0.01$). There is therefore some evidence to support the statement that countries with a higher minimum wage relative to median earnings have lower gender earning gaps than countries with a low value minimum wage or no minimum wage. For 15 out of 25 countries with a statutory minimum wage, the result of a positive and significant effect of the Kaitz index on the gender earning gap is confirmed ($b = 0.291$; $p = 0.01$). Moreover, the estimates suggest a positive and significant relationship between type of co-ordination of wage bargaining and the female interaction variable ($b = 0.028$; $p = 0.01$). Thus our analysis supports the statement that countries with industry-wide and economy-wide co-ordination of collective bargaining have lower gender earning gaps. Furthermore, as Grimshaw and colleagues (2014A, 2014B) propose, minimum wage effects on pay equity may be influenced by institutions of collective bargaining. Indeed, within our 15 countries with national minimum wage regulations even countries such as Lithuania, Poland, UK and Latvia, where the co-ordination of bargaining is fragmented mostly at company level, show on average higher net gender earning gaps than countries where central organisations **(← p. 481)**

(← p. 482)

Table 3. *Country-level and individual-level determinants of log hourly gross wages in three distinct industries in 25 European countries for 2009 (multilevel random intercept models)*

Country-level factors	Kaitz index		Type of co-ordination of wage bargaining: industry-wide and economy-wide bargaining		Collective bargaining coverage adjusted (%)		Summary measure of centralisation of wage bargaining		Level at which collective bargaining takes place: industry/ sectoral level	
Model	3	3a	4	4a	5	5a	6	6a	7	7a
Female (yes)	-0.203 (0.005)***	-0.221 (0.007)***	-0.203 (0.005)***	-0.212 (0.005)***	-0.203 (0.005)***	-0.196 (0.010)***	-0.203 (0.005)***	-0.168 (0.012)***	-0.203 (0.005)***	-0.187 (0.007)***
Effect on intercept (country-level factor)	-0.635 (0.585)	-0.659 (0.585)	0.509 (0.275)*	0.500 (0.275)*	0.019 (0.004)***	0.019 (0.004)***	1.641 (0.908)*	1.676 (0.907)*	0.537 (0.294)*	0.546 (0.294)*
Effect on interaction variable (female * country-level factor)[a]		0.056 (0.017)***		0.028 (0.008)***		-0.001 (0.001)		-0.094 (0.030)***		-0.021 (0.009)**
Statistical parameter										
Level 1 variance	0.175 (0.001)		0.175 (0.001)		0.175 (0.001)		0.175 (0.001)		0.175 (0.001)	
Level 2 variance	0.473 (0.133)		0.435 (0.123)		0.258 (0.073)		0.438 (0.124)		0.437 (0.123)	
Intra-class correlation for level 2	0.729 (0.055)		0.713 (0.057)		0.596 (0.068)		0.714 (0.057)		0.713 (0.057)	
N level 1	49,169									
N level 2	25									

Notes: Multilevel random intercept models, coefficients and standard errors in parentheses. Individual indicators included in estimation but not shown in the table. Only full-time employees aged 25–64 without missing individual characteristics. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

[a]The coefficient indicates the difference in the wage for women between countries with low values compared to countries with high values.

Source: EU-SILC (2009), unweighted results, authors' calculations.

negotiate non-enforceable central agreements or key unions and employers associations set the pattern for the entire economy, such as Spain, Belgium, the Netherlands, Greece and Slovenia (countries identified as highly and broadly regulated by Du Caju et al., 2009) (Table 4). As results for our 15 countries reveal, countries with high collective bargaining coverage rates (more than 50%) have on average a lower net gender earning gap.[39] Overall, these results suggest that in countries with either a high minimum wage or industry-wide and economy-wide collective bargaining, gender earning gaps amongst full-time earners are lower. However, the impact of minimum wage or collective bargaining may vary in terms of their extent (i.e. the quantity of employees covered by either of them).

However, the type of co-ordination of wage bargaining/wage setting says nothing about where the actual wage bargaining takes place and how the actors make use of the instrument of collective bargaining, although the type of co-ordination and the dominant level of collective bargaining agreement are often closely related, as is the case in Slovenia, Sweden, France, Norway, Luxembourg, Malta, Cyprus, the Czech Republic, Poland, Hungary, the UK, Bulgaria, Latvia and Lithuania (Appendix Table A1). To date, the relative performance of industry/sectoral and company/local-level wage bargaining in terms of gender earning gap is unclear. As Table 3 shows, in countries where collective bargaining agreements are set at the industry/sectoral level—such as in Austria, Belgium, Slovenia, Sweden, Finland, Spain, the Netherlands, Norway, Greece and Germany—women working full-time in one of the three industries earn on average less than those in countries where the dominant level at which wage bargaining takes place is more fragmented (e.g. at the local or company level) (b = -0.021; p = 0.05). This result is puzzling as one would assume that less co-ordinated and more heterogeneous company-level and local-level bargaining gives more discretionary power to individual actors and therefore might disadvantage women. Without offsetting this argument however, a potential male bias of collective bargaining also has to be taken into account. Indeed, in countries where collective bargaining agreements are set at the industry/sectoral level, the collective bargaining coverage rate is also relatively high (for example, as in Germany) especially for full-time skilled employees, a group historically, and still in most industries, dominated by men. As we know from historical research, active participation of women or representation of gender-specific claims in bargaining in male-dominated industries, such as manufacturing, tend to be low (on male-dominated bargaining culture, see Williams, 2014, p 129). Thus, whilst collective bargaining could be a powerful instrument for closing the gender wage gap, a respective tradition and practice in the use of this instrument seems to be missing and might exert negative effects on male- and female-dominated industries.[40] In addition, we find for our sample that the interaction of the measure of centralisation of wage bargaining, reflecting the authority and influence of trade unions, and the female indicator variable is negative and significant (b = -0.094; p = 0.01). This indicates that the higher the degree of centralisation, the less women earn, thus the gap between men's **(← p. 483)**

[39] The Pearson correlation between bargaining coverage rate and net gender earning gap is -0.196 for all countries with national minimum wage regulations. For our full sample, including countries without national minimum wage regulations, collective bargaining coverage does not play a substantial role in explaining full-time gender earning gaps in these three industries.

[40] See for example, Elvira and Saporta (2001, p 482); they show for the USA between 1975 and 1985 that unionisation reduces within-establishment gender gaps in pay in most industries, but not in the most female-dominated industries.

Table 4. *Kaitz index, level of collective bargaining agreement and net gender earning gap in three distinct industries in 15 European countries for 2009*

Country	Kaitz index	Type of co-ordination of wage bargaining	Collective bargaining coverage adjusted (%)	Net gender earning gap in logarithmised hourly gross earnings[a]
France	0.608	Mixed or alternating industry-level and firm-level bargaining	90.0	0.06
Latvia	0.519	Fragmented bargaining, mostly at company level	25.0	0.56
Belgium	0.516	Mixed industry-wide and economy-wide bargaining	96.0	0.26
Ireland	0.504	Mixed or alternating industry-level and firm-level bargaining	44.0	0.16
Slovenia	0.486	Mixed industry-wide and economy-wide bargaining	92.0	0.17
Greece	0.482	Mixed industry-wide and economy-wide bargaining	65.0	0.25
Hungary	0.478	Mixed or alternating industry-level and firm-level bargaining	33.5	0.16
Netherlands	0.470	Mixed industry-wide and economy-wide bargaining	82.3	0.41
UK	0.461	Fragmented bargaining, mostly at company level	32.7	0.27
Slovakia	0.454	Mixed or alternating industry-level and firm-level bargaining	40.0	0.23
Poland	0.448	Fragmented bargaining, mostly at company level	38.0	0.17
Spain	0.441	Mixed industry-wide and economy-wide bargaining	84.5	0.36
Lithuania	0.439	Fragmented bargaining, mostly at company level	15.0	0.28
Luxembourg	0.412	Mixed or alternating industry-level and firm-level bargaining	58.0	0.02
Czech Republic	0.360	Mixed or alternating industry-level and firm-level bargaining	42.5	0.39

[a]Using the covariates in model 2 (linear ordinary least squares regession estimates).
Source: OECD.Stat, ICTWSS (2011), EU-SILC (2009), unweighted results, authors' calculations.

and women's earnings seems to increase. Within the group of countries with very high degrees of centralisation (Austria, Sweden, the Netherlands, Norway, Germany, Slovakia and Latvia), affluent co-ordinated economies dominate—from Scandinavia **(← p. 484)** and Continental Europe where union power originates in core male-dominated industries and

where the gender gap in full-time employment is high. This might point again to a male bias in collective bargaining culture, which at this highly aggregated level of analysis cannot be clearly identified.

To sum up, the gender composition of industries influences wage levels in that male-dominated industries show higher wage levels than do female-dominated industries. At the same time, looking at inter-industry earning gaps reveals that women do not fare better in male-dominated sectors compared to other sectors. In turn, male employees make only relative gains in female industries. In countries with high collective bargaining coverage rates and a high minimum wage, the earnings of full-time working women seem to be higher and thus the gender earning gap amongst full-time employees is lower in the three selected industries. Nonetheless, findings on the level of bargaining and the impact of degrees of centralisation of wage negotiations on gender earning gaps for full-time employees do not follow this trend and instead indicate the need for a more sensitive measurement of the character of wage-setting level and a more nuanced assessment of the relation of the wage-setting institutions and structures. The findings presented here also reveal that countries grouped together in terms of similar impact of the wage-setting mechanisms on the gender earning gap show a substantial heterogeneity in socioeconomic structure, legal regulations and integration of women in the labour market (co-ordinated and liberal, new and older EU member states, transformation countries) making it difficult to discern unambiguous constellations of influence. The following case study on Germany is based on firm-level data. Therefore, it allows for better control of the effects of wage bargaining and employment structures and by focussing on full-time employed men and women with equal skill levels also permits a more specific analysis of factors affecting the gender earning gap.

5. Gender equity effects of wage-setting institutions and structures in Germany: results for skilled full-time employees in three industries

Germany, chosen for an in-depth case study of within-country differences in wages, represents an affluent co-ordinated market economy and a conservative welfare regime, characterised by a male breadwinner model that has been slightly weakened by rising female employment rates and defamiliarisation policies during the past two decades (Daly, 2011). Industry and construction still account for a large part of employment (see Figure 1), the labour force is highly skilled and industrial relations profit from relatively strong legal regulations of employment contracts. Collective agreement coverage (around 62% in 2009, see Appendix Table A1) is at medium level compared to higher figures in Scandinavia, the Benelux countries and France and the lower coverage in the UK and other EU countries. These national economic and social features are reflected in a relatively high share of full-time employment in the selected industries and a medium (manufacturing) to low share (health) of full-time working women within the selected industries (see Table 1). Equal pay regulations are covered by the 2006 General Equal Treatment Act (Allgemeines Gleichbehandlungsgesetz), replacing an earlier anti-discrimination clause in the German Civil Code which was of mere nominal importance (Fuchs, 2013). Irrespective of these legal provisions the (unadjusted) gender earning gap has been high, reaching 23.1% in 2010 (Smith, 2012, p 367), not least attributed to the restricted labour market integration of women and a persistent horizontal and vertical gender segregation. Finally, socio-political and **(← p. 485)** economic changes in Europe after 1990 make Germany an interesting case representing

a distinct within-country regional divide, with East Germany still reflecting the economic weakness of a transformation economy and the state socialist tradition of female full-time employment.

5.1 Data and methods

Whilst the focus on full-time employment and the industry sample is upheld, the following analysis centres on skilled employees,[41] capturing the skill level of the majority of working women and especially for female full-time employees in Germany (OECD, 2012B). More important, this focus allows excluding potential specific effects of both the lowest and highest skill levels.[42] Additionally, in light of the growing inroads women have made in desirable jobs as well as the rising shares of female breadwinners in East and West Germany (Klenner et al., 2012), the opportunities for women to make a living wage are of special interest. Therefore, rather than referring to the gender earning gap, the chance to make a living wage for men and women will be addressed.

The cross-sector within-country analysis is based on the Linked Employer-Employee Data Base (LIAB) for Germany for 2008 (revised extracts based on Schröder and Schäfer, 2013). The LIAB allows for a nuanced view on income, wage-setting institutions and structures as well as workplace characteristics at the firm level by industry.[43] For measuring cross-industry gender differences, we refer to a living wage as the threshold.[44] The threshold is the median adjusted daily gross wage for male full-time employees working in the manufacturing of metals or machinery with at least two years' job experience.[45] Analysis of living wages for men and women is run separately for East and West Germany. A logit regression (Long and Freese, 2006) reveals the odds of skilled full-time employees earning a living wage relative to not earning a living wage, between several groups (women and men, East and West Germany).

5.2 Context and results

Over the past decades Germany has faced serious challenges to the effectiveness of its industrial relations institutions due to the liberalisation of the European service industry, increased labour migration and a deregulation of workplace and labour market frameworks, also resulting in an expansion of low-wage work.[46] The share of workers not covered by a

[41] We consider skilled full-time employees aged between 25 and 64. The skill level taken into account refers to completion of a three-year vocational training programme (apprenticeship) or completion of higher secondary education and/or polytechnic degree. Self-defined full-time employment is mainly consistent with actual working hours (Vogel, 2009).

[42] Indeed, part of the high gender earning gap in Germany is attributed to differences in skill level and gender segregation by industry and occupation, whilst at the same time statistical analyses find that hourly wages for women are on average 7% lower than for men of comparable skill level (Destatis, 2013).

[43] The LIAB industry definitions (close to NACE 2) used here are (i) manufacturing: manufacture of metals or/and machinery (NACE Rev 2 Division 25 and 28), (ii) finance: financial intermediation (industry group 651–672) and (iii) health: health and social work (industry group 851–853).

[44] For other definitions and estimations of a living wage, see Figart et al. (2002) and WageIndicator (2013).

[45] The threshold for gross monthly living wage was about €3,252 euro in 2008. For details on this measurement, see Schröder and Schäfer (2013).

[46] The share of workers employed in the low-wage sector (below two thirds of the median wage in East and in West Germany, on the basis of the German Socio-economic Panel) rose from 16.5% in 1995 to 22.9% in 2010.

collective agreement rose from 31% in 2000 to 40% in 2010 in West Germany and from 49% to 57% in East Germany (Addison et al., 2012). Bargaining **(← p. 486)** coverage is highly segmented along industries, corresponding to the gender-specific segregation of industries, resulting in a lower coverage in female-dominated industries and services. However, coverage increases with firm size and the presence of works councils and is still more common for high-skilled and full-time employees (Du Caju et al., 2009; Düll, 2013).

Against this background the industries under study show a mixed picture: whilst manufacturing and finance are still characterised by a high bargaining coverage of around 80%, figures for the health industries are significantly lower (WSI-Tarifarchiv, 2012). With regards to wage dynamics, the picture becomes more gender-biased due to persisting and increasing wage differences between and within the three industries. Employing the living wage threshold reveals that the female-dominated health industry has the lowest share of employees with living wages and that in all industries living wages for women are lower compared to those of men (see Table 5). Living wages are more common amongst West German male workers and less common amongst women in East Germany (see Schröder and Schäfer, 2013, p 176). Long-term industry-specific collective bargaining results show the industry gap has been widening: whilst between 1995 and 2010 skilled workers in manufacturing profited from a wage increase of 45%, the rise in health was only 37% (Bispinck, 2013). Additionally, health industries have been more affected by the expansion of low-wage work than finance, and this trend extends to skilled workers who make up more than 50% of the overall low-wage labour market segment (Kalina and Weinkopf, 2012).

From these descriptive results we can establish that women in core industries are less likely to earn a living wage than their male counterparts even when they conform to the German male standard worker model performing full-time skilled work. Whilst the gender earning gap effects of low education and part-time work can be disregarded here, the impact of industry, workplace characteristics and industrial relations requires closer attention.

Indeed, when other factors, including industry, level of collective bargaining agreement and workplace characteristics, are taken into consideration, women are still significantly less likely to earn a living wage than men in both East and West Germany (see Appendix Table A2).

With respect to industry, there is obviously not only a between-industry but also concurrently a within-industry gender hierarchy: skilled male employees in West Germany working full-time in finance have the highest odds of earning a living wage, men working in manufacturing have lower odds and the lowest odds amongst men are for those working in health (Table 6, model 10). This industry pattern in the living wage is even more prominent in East Germany with higher odds for both men and women in

Table 5. *Share of skilled full-time employees with living wage by industry and sex in Germany for 2008 (%)*

	Total	Women	Men
Manufacturing	37	29	38
Finance	45	24	62
Health	6	3	13

Source: LIAB Cross-sectional Model 2 1996–2008, weighted results, authors' calculations. **(← p. 487)**

Table 6. *Factors affecting living wage of skilled full-time employees: interaction with gender in Germany for 2008 (results of logistic regression analysis [odds])*

West Germany	
Industry of employment (model 10)	
Male x finance	3.73
Male x manufacturing	3.29
Female x manufacturing	2.03
Female x finance	0.67
Male x health	0.23
Female x health	0.05
Level of collective bargaining agreement (model 11)	
Male x sectoral-level CA	2.50
Male x firm-level CA	2.30
Male x no CA	1.40
Male x no CA, following sectoral-level CA	0.96
Female x firm-level CA	0.62
Female x sectoral-level CA	0.48
Female x no CA	0.32
Female x no CA, following sectoral-level CA	0.15
East Germany	
Industry of employment (model 12)	
Male x finance	1.13
Female x finance	0.34
Female x manufacturing	0.28
Male x manufacturing	0.24
Male x health	0.07
Female x health	0.02
Level of collective bargaining agreement (model 13)	
Male x sectoral-level CA	0.32
Male x firm-level CA	0.25
Female x sectoral-level CA	0.12
Female x firm-level CA	0.11
Male x no CA, following sectoral-level CA	0.10
Male x no CA	0.08
Female x no CA, following sectoral-level CA	0.05
Female x no CA	0.03

Notes: Full-time employees: intermediate-skilled persons employed in dependent full-time employment subject to social insurance contributions. Living wage: the threshold for the living wage is the median adjusted daily gross wage for male full-time employees working in the manufacturing of metals or machinery with at least two years' job experience. A binary indicator identifies those above this threshold as individuals earning a living wage. CA: collective agreement. Two models were calculated for East and West Germany. They include the respective interaction variables (sex and industry, sex and collective agreement). Standard errors are clustered by firms. The regressions include all other control variables. Odds ratios show the probability of earning a living wage in relation to the probability of not earning a living wage. Values of odds ratios ordered descendingly.
Source: LIAB Cross-sectional Model 2 1996–2008, unweighted results, cited from Schröder and Schäfer (2013).

finance than in manufacturing and lower odds in health (Table 6, model 12). However, qualified female employees working full-time always have lower odds of earning a living wage than their male colleagues within the same industry, except for those working in manufacturing in East Germany, where women outperform men, which might still reflect the state socialist tradition of a higher presence of skilled women as workers and employees in this branch. Otherwise, these results not only confirm better chances for skilled workers to make a living wage in finance as compared with manufacturing **(← p. 488)** and health, but also indicate a wage penalty for female-dominated industries even for skilled women working full-time. Moreover, the within-industry earning gap points to lower returns on education for

women and raises questions with regards to the role of wage-setting institutions and procedures.

Here results reveal a general positive impact of sector-wide wage setting and works councils, features more prominent in industry and commercial services than in the social field (Appendix Table A2). Via extension procedures (which make a collective bargaining agreement binding for all employees and employers within its usual field of application) and pattern bargaining, both common but limited to specific sectors in Germany, the positive impact of sector-wide bargaining can be partly transferred. However, looking at gender differences shows that women profit far less from the wage-setting institutions and procedures than do men. Whilst in West Germany collective bargaining at the sectoral level clearly benefits male living wage earners, women always have lower odds to earn a living wage even compared with men working in firms with no collective agreement. Firm-level agreements were found to outperform other types of collective arrangement, specifically sectoral-level agreements for female living wage earners (Table 6, model 11). However, the differences are small and firm-level agreements are of minor relevance compared to sector-level agreements and non-coverage (8% compared with 55% and 37% for West Germany 2008, WSI-Tarifarchiv, 2012). In East Germany, where coverage by sectoral agreements is generally lower and non-coverage, for example in health, is significantly higher than in West Germany (see Ellguth and Kohaut, 2009), institutional and gender patterns turn out quite similar. Whilst in general male and female employees in firms under a sectoral agreement have the highest odds of earning a living wage, followed by those under firm-level agreements and then those without any agreements, a gender bias persists with men having higher odds of earning a living wage in each category (see Table 6, model 13).

These results confirm the frequently documented beneficial effect of sector-wide wage setting and works councils as well as of collective bargaining for women's wages (Gartner and Stephan, 2004; Heinze and Wolf, 2010) for the specific group of male and female skilled full-time workers in core industries in Germany. At the same time, however, the findings reveal that women in East and West Germany profit far less from well-established industrial relations, be they on an industry or firm level, a finding calling for further explanation. Whilst the industry effect in line with prior international results seems to confirm the devaluation theory (for Sweden, see Magnusson, 2013), the different effect of industrial relations for men and women of the same skill level and within the same industry remains puzzling. Findings from a recent qualitative case study looking into the organisation and process of collective wage bargaining in Germany on the basis of interviews with both employers and union representatives indicate that the relevant actors see little potential for collective agreements to reduce the gender earning gap, since they consider the agreements and the negotiations as irrelevant to the issue (Gärtner et al., 2014). One might also speculate that the strong family wage/male breadwinner tradition in Germany, supported by unions, parties and religious actors alike, still affects the engagement of industrial relations parties in that they give little priority to gender pay equity but are rather interested in increasing or moderating wages (Gottschall and Schröder, 2013). Other explanations point to seniority effects in wage scales and wage benefits for work experience, both disadvantaging women who might show more discontinuous work biographies (Appendix Table A2). **(← p. 489)**

6. Conclusion

The persistence of a gender earning gap in European countries irrespective of national and EU equal pay legislation is well documented. Nevertheless, the analysis of factors contributing to this gap remains challenging, as the gap itself captures both discrimination and the impact of the still marked differences that exist between women's and men's labour market activity and their differential valuation by relevant actors and institutions. Although the impact of wage-setting institutions and actors on pay equity is becoming more relevant in research and policy, so far the investigation of these factors has been limited. This study contributes to this strand of research by focussing on full-time employment (and skilled work) of men and women in key industries, thus accounting for the increasing level and necessity of female labour market integration and comparing the impact of wage-setting institutions on well-defined and comparable grounds.

Findings of the country comparison encompassing Western as well as Central European transition countries and the German case study not only reveal a 'wage penalty' for full-time workers in the female-dominated health sector as compared with manufacturing and finance but also a substantial gender earning gap within each sector. As to the role of wage-setting institutions and structures, findings of the country comparison confirm that industry-wide and economy-wide bargaining, high collective bargaining coverage and high levels of the minimum wage contribute to improving gender equity in wages for full-time employees. Whilst this points to a positive effect of institutionalisation and centralisation of wage setting for full-time employed women across all countries, results on the implementation level of wage bargaining and the centralisation of bargaining seem to not follow this course. The data indicate that sectoral (as compared with local) bargaining and strong unions are less favourable for women's earnings. Here more nuanced and also more qualitative assessments of the role of unions and the character of different levels of bargaining based on better consideration of national employment structures and institutions seem necessary. The German case study, based on firm-level data and focussing on skilled full-time workers, confirms the positive impact of high sectoral earnings for achieving higher wages and a living wage, but also shows that high sector coverage in market industries is accompanied not only by high earnings but also by a high gender gap in living wages, especially in West Germany. In turn, a large share of workers not under any agreement in non-market industries, such as health and social work, is accompanied by low earnings, lower shares of full-time employees earning living wages but at the same time a lower gender gap in living wages. Thus, both the level of earnings and the level of wage setting seem to play important roles in shaping the gender earning gap in different industries.

The fact that full-time working women and growing female-dominated service sectors, such as health, suffer from a substantial gender earning gap across European countries irrespective of institutional arrangements and that, as the German case shows, this earning gap might even persist when comparing men and women of the same skill level, calls into question the effectiveness of the various and long-standing EU gender pay equity norms. Experts point out that the EU turn to soft law approaches, including gender mainstreaming, might have been accompanied by a lowering of ambitions and effectiveness in the field of gender equality, but at the same time the European Employment Strategy has been promoting an adult worker model to secure social integration via employment, placing greater emphasis on the role of social partners in addressing the gender earning gap (Daly, 2005; Smith and Villa, 2010). As **(← p. 490)** Smith (2012, p 376) emphasises, in principle social partners are indeed able to

address some of the root causes of pay inequity, and our findings on the impact of wage-setting institutions and structures indicate that there is still room for more explicit and proactive engagement of unions and employers, be it in terms of pay raises in low-paid and female-dominated sectors or gender-sensitive monitoring of pay dynamics and evaluations of comparable work. However, declining union membership and decreasing bargaining coverage in many European countries do not speak in favour of more social partner engagement. Furthermore, the structure and supply-side principles of the current European Employment Strategy are considered to be ill-equipped to address earning gaps rooted in organisational, occupational and sectoral wage structures (Rubery et al., 2005). This might call for a broader political approach, including more binding equal pay legislation and anti-discrimination laws as well as policy measures encouraging more continuous work careers for women and a desegregation of training and employment. The economic crisis adds a further dynamic to this complex background of the generation of pay inequity and poses challenges to further research which should engage in more nuanced country comparisons as well as case studies.

Appendix

Table A1. *Wage-setting institutional and structural indicators in 25 European countries for 2009*

Country		Kaitz index	Type of co-ordination of wage bargaining[a]	Level at which bargaining takes place[b]	Collective bargaining coverage adjusted (%)	Summary measure of centralisation of wage bargaining
Austria	AT	/	4	3	99.0	0.929
Belgium	BE	0.516	4	3	*96.0*	0.464
Slovenia	SI	0.486	4	4	92.0	*0.450*
Sweden	SE	/	3	3	*91.0*	*0.506*
France	FR	0.608	2	2	*90.0*	*0.207*
Finland	FI	/	3	2.5	90.0*	0.401
Spain	ES	0.441	4	3	*84.5*	*0.375*
Netherlands	NL	0.470	4	3	*82.3*	0.571
Denmark	DK	/	3	2	80.0*	*0.439*
Italy	IT	/	4	2	80.0	0.342
Norway	NO	/	4	4	*74.0*	0.512
Greece	GR	0.482	4	3	*65.0*	*0.334*
Germany	DE	/	4	3	62.0	0.479
Luxembourg	LU	0.412	2	2	*58.0*	*0.304*
Malta	MT	/	1	1	*55.0*	*0.339*
Cyprus	CY	/	2	2	*52.0*	*0.249*
Ireland	IE	0.504	2	1	*44.0*	0.462
Czech Republic	CZ	0.360	2	2	42.5	0.246
Slovakia	SK	0.454	2	1	40.0	*0.495*
Poland	PL	0.448	1	1	*38.0*	*0.264*
Hungary	HU	0.478	2	2	33.5	*0.243*
UK	UK	0.461	1	1	32.7	0.415
Bulgaria	BG	/	2	2	30.0	*0.299*
Latvia	LV	0.519	1	1	*25.0*	0.511*
Lithuania	LT	0.439	1	1	*15.0*	*0.361*

Notes: Italics data from 2008, * data from 2007 or 2006, / no data.[a]Recoded: 1–3 = 0; 4 = 1.
[b]Recoded: 1 and 2 = 0; 2.5–4 =1.
Source: OECD.Stat; ICTWSS; 2011, authors' compilation. **(← p. 491)**

Table A2. *Factors affecting living wage of skilled full-time employees in Germany for 2008 (results of logistic regression analysis [odds ratios])*

Model	West Germany		East Germany	
	8		9	
Individual and human capital characteristics				
Women (ref.: men)	0.41	***	0.46	***
Age (years)	1.39	***	1.30	***
Age²	0.99	***	0.99	***
School education and vocational training degree (ref.: vocational training)				
Vocational training + higher secondary education	3.16	***	3.95	***
Polytechnic degree	10.00	***	8.86	***
Length of job experience: 2 years and more (ref: less than 2 years)	1.55	***	1.75	***
Industry of employment				
Industry of employment (ref.: manufacturing)				
Finance	1.54		2.11	***
Health	0.18	***	0.24	***
Level of collective bargaining agreement (ref.: sectoral-level CA)				
Firm-level CA	1.11		0.93	
No CA, following sectoral-level CA	0.78	*	0.57	***
No CA	0.98		0.49	***
Workplace characteristics				
Female proportion (ref.: male-dominated firm)				
Female-dominated firm	0.34	***	0.83	
Integrated firm	0.58	**	1.21	
Firm size: small (ref.: large-scale firm, number of persons employed ≥ 100)	0.37	***	0.68	***
Share of new hires (%)	0.98		0.97	***
Works council (ref: no works council exists)	1.51	**	2.07	***
Statistical parameter				
N (individuals)	572,004		196,327	
N (firms)	6,616		4,267	
Log-likelihood	-306,164		-57,769	
Wald chi² (18)	8,793		5,936	

Notes: Full-time employees: intermediate-skilled persons employed in dependent full-time employment subject to social insurance contributions); living wage: the threshold for the living wage is the median adjusted daily gross wage for male full-time employees working in the manufacturing of metals or machinery with at least two years' job experience. A binary indicator identifies those above this threshold as individuals earning a living wage. Standard errors clustered by firms. The regressions include controls for all other industries.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Source: LIAB Cross-sectional Model 2 1996–2008, unweighted results, cited from Schröder and Schäfer (2013).

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