Gender pay gap in EU countries based on SES (2014)

Christina Boll, Andreas Lagemann

Justice and Consumers

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Country Abbreviations

AT	Austria	**FR**	France	**NL**	Netherlands
BE	Belgium	**GR**	Greece	**NO**	Norway
BG	Bulgaria	**HR**	Croatia	**PL**	Poland
CY	Cyprus	**HU**	Hungary	**PT**	Portugal
CZ	Czech Republic	**IE**	Ireland	**RO**	Romania
DE	Germany	**IT**	Italy	**SE**	Sweden
DK	Denmark	**LT**	Lithuania	**SI**	Slovenia
EE	Estonia	**LU**	Luxembourg	**SK**	Slovak Republic
ES	Spain	**LV**	Latvia	**UK**	United Kingdom
FI	Finland	**MT**	Malta		

Non-Technical Summary

Gender gaps in wages are an important facet of wage inequality and belong to the best documented facts in labour economics. The literature has produced an extensive set of theories helping to explain the persistence of the phenomenon (cf. Boll et al. 2016). With this study, we update existing figures on the gender pay gap in EU countries based on the Structure of Earnings Survey (EU-SES) for 2014. We thereby use the same data and the same methodological setting as in a preceding study relying on SES 2010 (Boll et al. 2016). This time, we use information from the Scientific Use File and from less anonymized data available at the Eurostat Safe Centre. This allows us to incorporate 25 EU countries plus Norway in our analyses. Due to missing information, Austria, Denmark and Ireland had to be excluded. We explore the magnitude and composition of the gender pay gap both as an average of the country aggregate and for 26 single countries. In what follows, we summarize the main results of our study.

Gender wage discrepancies are persistent all over Europe. From 2010 to 2014, the **cross-country unadjusted gender gap** in average wages slightly decreased by 1.1 percentage points, from 15.3 % (2010) to **14.2 %** (2014). The high persistence of pay gaps also holds true across OECD countries (OECD 2017). However, in line with previous estimations, a considerable country heterogeneity emerges. The pay gap that is attributable to different (observable) characteristics of women and men (explained gap) amounted to 4.8 %. The **adjusted gap** that compares men and women with similar characteristics was **9.4 %.** Thus, a greater portion of the overall gap was unexplained, referring the used data set. This has also been the case in previous years. Compared to 2010, the explained gap was rather stable (-0.4 percentage points), whereas the adjusted gap decreased by 1.4 percentage points on the cross-country level. It is important to note that the adjusted gap must not be equated with discrimination, as it incorporates unmeasured wage-relevant gender differences like e.g. actual work experience, job preferences or bargaining skills. On the other hand, what is statistically 'explained' is not necessarily free from discrimination. Genders might face unequal access to wage-attractive jobs (e.g. leading positions, full-time jobs). Therefore, both the explained and the unexplained part of the gap and their respective origins have to be analyzed with caution.

The adjusted gap is not fully unexplained. It is composed of two portions. One of it is a true 'blind spot', capturing factors already mentioned like unobserved gender differences in bargaining skills. This component named "constant term" dominates the adjusted gap. In 21 out of 26 countries, the constant term was above zero, increasing the adjusted gap (and thereby also the overall gap; the exceptions are Lithuania, Luxembourg, Latvia, Romania and Hungary). The second component of the adjusted gap refers to the part of the overall gap that can be explained by the fact that women and men are paid differently for the same characteristic.

On the country level, the unadjusted pay gap ranges from 1.0 % in Romania to 23.5 % in Estonia. Most Middle and Eastern European states are exhibiting gaps clearly below average, with the Czech Republic, Slovakia and Estonia marking the exceptions. Among the West European countries, only Belgium is exhibiting a very small gap (4.2 %). Moderate gaps are found for Scandinavian and Southern Eu-

ropean countries. Compared to 2010, most countries exhibited a decrease of the unadjusted gap, while it increased in only six countries (Bulgaria, Czech Republic, Italy, Latvia, Poland and Portugal). However, changes were mostly moderate. Only in Belgium and Romania (Latvia), the decrease (increase) was above four percentage points.

The country heterogeneity is not limited to the size of the unadjusted gap, but also concerns its composition. The explained gap is negative in seven countries and practically zero in two further countries. In 17 countries, the explained part is positive, that is, it increases the overall gap, with a maximum explained gap in Germany (14.9 %). Only in Germany, Belgium and the Netherlands, the explained part exceeds the unexplained part of the overall gap. However, the unexplained part is nowhere identified to be negative. Only in Belgium it is lower than 5 %. It is thus this term that comprises the bulk of factors that prevent women from catching-up throughout Europe. Between 2010 and 2014, the adjusted gap decreases by 1.5 percentage points in the cross-country sample. The drop has been highest in Belgium and UK (-3.8 pp each).

Concerning the **contributions of single characteristics**, a gendered sorting into industries and into atypical employment (part-time work, temporary jobs) predominantly widens the pay gap. In all countries except the Netherlands, sector segregation of male and female workers contributes to the wage gap. In general, women are overrepresented in industries with low pay levels (and accordingly underrepresented in well-paid industries). The deviating result for the Netherlands originates in the stark underrepresentation of females in comparatively low-paid manufacturing sectors in the Dutch economy. Differences in educational levels mitigate the gap. In all countries but Germany, women are on average more highly educated than men. Additionally, women work more often in part-time and temporary jobs than men. In most countries, both features are associated with lower hourly earnings. Since 2010, working hours gained importance for the gender pay gap in the EU-average and even more in Germany and the UK, whereas the factor lost importance in Belgium. Furthermore, firm characteristics (firms size, public control) tend to decrease the pay gap. Occupational segregation mitigates the gap in most countries. This common result in multivariate analyses like this one has to be interpreted in the context of several further factors: Some occupations are concentrated in few sectors, and although the segregation of workers 'typical' male and female occupations is an EU-wide phenomenon, the pay-attractiveness of occupations differs between countries. Hence, it does not come as a surprise that role of occupational segregation notably differs on the country level: Whereas it significantly adds to the pay gap in UK, it notably decreases the gap in Italy.

Some characteristics are very important for a correct understanding of the gender pay gap. First, actual work experience is not directly measurable with the data at hand. Hence, gender differences in work interruptions and their earnings consequences are part of the unexplained gap. Yet, a rich body of literature confirms severe earnings losses of women due to family-related breaks, in particular from the life course perspective (e.g. Boll et al. 2017 for Germany). Second, some characteristics carry different wage premiums for women and men. For example, in 22 out of 26 analyzed countries, men receive on average higher wage premiums than women for the same sector affiliation. This hints at a considerable intra-sectoral gender heterogeneity with respect to the sorting into occupations and hierarchical positions. Furthermore, wage disadvantages associated with flexible and part-time jobs differ between sectors such that women which regularly value these jobs higher than men are penalized more strongly in some sectors than in others.

Finally, the findings point to a **trade-off between** two key aims of gender mainstreaming policy, **low gender wage gaps and high female employment rates**. From the cross-country analyses the picture evolves that still, we cannot have both. Several reasons might apply for this result. First, countries with rather egalitarian gender roles and a vast provision of flexible work arrangements and part-time jobs enable women to enter the market which results in a high female employment rate, but this comes at the cost of severe wage deductions in these jobs which primarily affects women. By contrast, in countries with a low compatibility of family and career, e.g. due to a poor public childcare infrastructure and scarce flexible work arrangements, only women with a high earnings potential access the market, but after having passed this hurdle, these women apparently access attractive job attributes as easily as men. This results in rather low gender wage gaps as they are observed for Eastern Europe countries. Furthermore, typical low-paid female tasks like nursing and caring regularly decrease women's average pay. Therefore, in countries where these tasks are mainly operated outside the market, pay gap statistics appear to be more favorable for women, albeit alongside with a less favorable female employment statistics.

What are the **political implications** of this study? First, to get a full picture of women's earnings perspectives in Europe, one has to take female participation opportunities into account. A mere focus on pay gaps would be short-sighted. Strategies that foster female employment have a double dividend as they also boost female wages since any improvements in the reconciliation of work and family help women to better use their talents. Second, *four strategies* seem crucial to close gender pay gaps: Breaking stereotypes, avoiding long family breaks, combatting part-time penalties, and fostering female career advancement and leadership.

Breaking gender and occupational stereotypes is key to combat gender-typical occupational choices. Furthermore, this challenge requires the social partners to be involved, checking prevalent work evaluation schemes with a special focus on a potential devaluation of 'female' work. Relatedly, more positive role models should be established, concerning working mothers, female leadership and women in STEM professions. The public sector has a pioneer role in this regard.

Action both on the state and on the firm level is needed to combat long family breaks. On the side of the public, full-time and high quality childcare facilities remain an urgent necessity, as well as parental leave systems that stimulate fathers' family support. Moreover, extensive transferable leave proved to enforce a rather traditional intra-couple work division. On the firm level, flexible work arrangements are crucial to balance work and family needs and to ease a quick job re-entry after family breaks.

Working hours are, together with segregation, the two main drivers of current gender pay gaps, as far as what is observable in earnings data. Part-time is a continuous trend shaping women's employment patterns in Western Europe. Still, reduced weekly working hours are penalized in hourly wages. The literature suggests that the extent as to which this happens notably differs between sectors, related to sector-specific time and leadership cultures and technologies. Thus, regards the roots of part-time wage penalties, a stronger focus should be set on the sector and firm level, addressing the responsibility of social partners.

Vertical segregation does not directly show up in our data, but gender specific sector premiums (and a vast body of literature) hint at the importance of gender-differences in hierarchical sorting within firms. To break down the barriers for women to climb up the career ladder, a mix of (partially already named) policies seems ap-

propriate. On the level of the state and society, these are positive role models, the introduction of quotas for women's representation in boards and a more extensive provision of full-day childcare. On the firm level, more strategies fostering women's participation in training and promotion programs are required, particularly for part-time working women. Last but not least, positive role models are also pertinent on the firm level.

Hence, a 'one size fits all'- policy to close the gender gap in pay seems inappropriate. Much has to be done in collaborative effort from different actors.

1. Introduction

The persistence of gender differences in wages belongs to the best documented facts in labour economics. It has been motivation for a tremendous body of work analyzing its roots and implications. Despite the variety of research approaches, many facets of the gender gap are still insufficiently explored. This is mainly due to the enormous behavioral complexity created by interlinkages between a person's work- and family-related decisions. Without a profound understanding of the causes of observed wage discrepancies, however, policy-makers are unable to design the right policy mix for addressing the issue. The analysis of large amounts of individual data on job and worker characteristics is a necessary step on this way. This has led the European Union to promote research in this area. By exploiting data from the large-scale EU Structure of Earnings Survey (SES), a detailed picture of wage inequality in Europe can be obtained. For 2015, the gender gap in hourly earnings is estimated to be 16.3 % for the EU-28, with considerable differences at country level (Eurostat 2017). To interpret these figures, researchers have developed decomposition techniques that attribute fractions of the gap to gender differences in certain observed characteristics. In this way, adjusted gaps are attained, representing the unexplained part of gender wage differences.

The literature on the determinants of gender gaps in average payment has produced an extensive set of theories helping to explain the persistence of the phenomenon. We refer to the literature overview presented in Boll et al. (2016). Our study contributes to this literature in several ways. First, we provide an update of existing figures on the unadjusted and adjusted gender pay gaps in EU countries based on year 2010 (Boll et al. 2016). The update refers to year 2014 as the most recent wave of the SES microdata that is currently available. As a decomposition method, we apply the most well-known Oaxaca-Blinder-method (Oaxaca, 1973; Blinder, 1973). In this way, we are as close as possible to the methodology Eurostat employs when calculating and decomposing national wage gaps. Second, we enrich the literature by undertaking comprehensive country comparisons of the gap components. Overall, we analyze 25 EU countries (plus Norway), which clearly exceeds the scope of existing microdata studies (e.g. Arulampalam et al., 2007; Simón, 2012). Third, we differ from other studies in that we also examine and compare the sources of the unexplained gap, thus providing additional insights into the sources of the pay differential. Finally, we discuss our decomposition results in the broader context of female labour market participation, pointing to the role of selection effects and statistically unobserved gender segregation in industries and occupations.

The outline of the remainder of the study is as follows. Section 2 describes the measurement method and the data and section 3 the model setup. The results are discussed in section 4, and section 5 concludes.

2. Measurement and Data

Over the years, researchers have developed several methods to analyze a gender gap in wages. Starting with the seminal work of Oaxaca (1973) and Blinder (1973), decomposition approaches have become the most popular tools. Their common idea is to split the observed gap into several parts, which are assigned a meaningful economic interpretation. In this way, the impact factors underlying the gap are distilled and assessed with respect to the magnitude of their contribution to the overall pay gap. The single approaches differ in two respects. First, the aggregate gap itself is defined in different manners. The classic Oaxaca-Blinder decomposition focuses on the gap in average hourly earnings between male and female workers. Other approaches undertake gender comparisons at different quantiles of the wage distribution (e.g. Albrecht et al., 2003) or make use of measures from the poverty literature (Del Rio et al., 2011). Second, researchers favor different decomposition techniques. In the original Oaxaca-Blinder approach, a static decomposition of the current gap in a part explained by differences in worker characteristics and a remaining unexplained part is performed. Alternatively, Juhn et al. (1993) proposed to decompose changes in the wage gap over time into a portion due to gender-specific factors and a portion due to changes in the overall level of wage inequality. Moreover, several semiparametric techniques have been developed and implemented (DiNardo et al., 1996; Firpo et al., 2007).

For our estimations, we prefer to stick to the original Oaxaca-Blinder-model, both because of its widespread use in official statistics and its relative simplicity. Our strategy can therefore be summarized as follows: first, we compute the gender gap in average hourly wages for the aggregate sample as well as at country level. Then, an Oaxaca-Blinder-decomposition of these gaps into explained and unexplained parts is executed (for an introduction to this decomposition method, see next section or Methodological Guides). In this process, a series of worker characteristics included in our dataset is used as explanatory factors for gender differences in wage levels. Finally, the composition of the explained parts is analyzed and compared across countries, i.e. the contribution of the single worker characteristics to the wage gap is discussed.

Our dataset consists of the most recent (2014) wave of the EU Structure of Earnings Survey (SES). The SES is a large enterprise sample survey providing detailed information on the relationships between the level of remuneration and individual characteristics of employees (sex, age, occupation, length of service, highest educational level attained, etc.) and those of their employer (economic activity, size and location of the enterprise). The national statistical institutes are responsible for selecting the sample, preparing the questionnaires, conducting the survey and forwarding the results to Eurostat. The sample regularly includes enterprises which have at least 10 employees and which are from sections C to O of the Statistical Classification of Economic Activities in the European Community (commonly referred to as NACE). However, public administration is excluded in some countries, which induces us to drop employees from this sector in our analysis. As further restrictions, no self-employed are included and information on sectors and occupational groups are only available at a limited level of disaggregation.

Given that data availability concerning individual and job-related characteristics differs to some extent between countries, we had to weigh the aim of accounting for as many insightful characteristics as possible against the need to preserve a sufficient number of countries for our analysis. In the end, we were left with 26 countries (25 EU countries plus Norway).[1] The total number of observations is 8,885,469. In the following, the explanatory variables are described. As individual worker characteristics, age and education were included. Age is measured in terms of six categories, where the youngest group comprises the 14-19 years old workers and the oldest group the more than 60 years old. The measure of education is derived from an aggregation of ISCED levels (ISCED-2011) into three categories (ISCED 0-2, ISCED 3-4, ISCED 5-8). As job-related characteristics, contract type, firm tenure, hours of work, occupational group as well as branch, ownership and size of the enterprise were taken into account. Contract type is captured by a dummy variable that is equal to one for temporary and zero for permanent contracts. Firm tenure is split into four time spans (0-1 years, 2-4 years, 5-14 years, > 14 years). Hours of work are also only available as a categorical measure, distinguishing between full-time workers, those who work 60 to less than 100 % and those who work less than 60 % of a full-time worker's normal workload. Occupational groups are identified based on the ISCO-08 classification at the two-digit-level, discriminating between 43 different groups. The branch of the enterprise is assigned based on an own aggregation of the NACE-Rev.2- classification, motivated by the need for cross-country harmonization. It allows us to distinguish between 15 different sectors. Sector O (Public Administration) is excluded. Concerning the impact of ownership, we include a dummy variable that is set equal to one if the firm is under public control. This is defined to be the case if a share of more than 50 % is in public ownership. The size of the enterprise is measured by its number of employees, broadly categorized into enterprises with more and enterprises with less than 50 employees. Among firms with less than 50 employees, those with less than 10 employees are underrepresented since their inclusion is optional and not observable in the SUF data. Finally, in the estimations based on the aggregate cross-country sample, we add country fixed effects to the wage regressions. The country fixed effects capture statistically unobserved heterogeneity across-countries.

Both official Eurostat data and HWWI calculations of the unadjusted gender pay gap are based on the average gross hourly earnings in the reference month (variable b43) and the grossing-up factor for employees (b52). Nevertheless, differences arise due to different data sets and exclusion criteria. While official Eurostat data covers economic sections from B to S (where O is optional) and only enterprises with 10 employees or more, HWWI calculations exclude sector O for all countries. As HWWI figures are based on scientific-use file (SUF) data for most countries (BE, BG, CZ, DE, EE, ES, FI, FR, IT, LT, LV, NL, NO, PL, PT, RO, SE, SI, SK, UK), we cannot drop enterprises with less than 10 employees because of a different coding of the firm size variable (a12) in the SUF. Moreover, unlike Eurostat calculations we do not include apprentices.

The descriptive statistics for the cross-country sample can be found in **Table A1** in the appendix.[2]

1 Missing EU countries: Austria, Denmark, Ireland.

2 The descriptive statistics for all 26 separate countries are available from the authors on request.

3. Model

Formally, the Oaxaca-Blinder-decomposition consists of two estimation steps. As a first step, estimations of the determinants of hourly wages are carried out separately for male () and female () workers. This takes the form of separate wage regressions (for a brief note on the regression method see Methodological Guides). In a log-linear model, logarithmized hourly wages () are regressed on a set of explanatory factors, i.e. a range of worker and job-related characteristics (). In the language of the literature, these characteristics are also termed *endowments*, as they are viewed as observable indicators of productivity differences partly explaining the wage gap. Formally, the regression equations look as follows (with representing the estimated coefficient of the characteristic indexed withand representing a residual term):

$$\ln W_{m;i} = \beta_m^0 + \sum_j \beta_m^j X_{m;i}^j + \varepsilon_{m;i}$$

$$\ln W_{f;i} = \beta_f^0 + \sum_j \beta_f^j X_{f;i}^j + \varepsilon_{f;i}$$

Afterwards, the resulting coefficient estimates are used to decompose the gender difference in the average wage levels (). This is achieved by replacing gender-specific log mean wages by the right-hand side of the two equations above. Following Blinder (1973), rearranging terms leads to the following expression:

$$\overline{\ln W_m} - \overline{lnW_f} = \sum_j (\overline{X_m^j} - \overline{X_f^j})\, \beta_m^j + \sum_j (\beta_m^j - \beta_f^j)\, \overline{X_f^j} + (\beta_m^0 - \beta_f^0)$$

The overall gender gap in log mean wages is thus split into three components. The first component represents a weighted sum of gender differences in observed characteristics, where each characteristic is weighted with the corresponding coefficient estimated for male workers. Economically, this term thus represents the part of the wage gap attributable to gender differences in observed endowments. It is therefore termed the *characteristics effect (*or *endowment effect).* For the analysis, the characteristics effect can be further decomposed into the contributions of the single characteristics. The second component is the weighted sum of gender differences in estimated coefficients, where the female endowments are the weighting factors. It shows which part of the wage gap is due to the fact that the same endowment generates different market returns for male and female workers. More precisely, it measures the change in the wage gap that would occur if the female endowment would be subject to the rewards estimated for men. Again, the contributions of single characteristics to this effect can be determined. Finally, the third component represents a *constant term*. It captures the influence of all statistically unobserved wage determinants on the gender wage gap, such as personal ability, negotiating skills and institutional setting. The sum of second and third component is termed *the coefficients effect.* It represents the unexplained part of the gender wage gap, as it cannot be traced back to observed endowment differences.

In the literature, the unexplained part is sometimes interpreted as an indicator of the extent of gender discrimination in payment (e.g. Del Rio et al., 2011). This is however misleading in several respects. On the one hand, the fact that the unex-

plained part comprises also the influence of endowment differences in statistically unobserved characteristics between male and female workers could induce this indicator to overestimate the real level of discrimination. On the other hand, discrimination is likely to influence female workers' incentives to accumulate skill and therefore the *characteristics effect*. For instance, it could represent a contributing factor to gender differences in work experience. In this regard, the unexplained part will tend to underestimate the real extent of gender discrimination. Moreover, in interpreting the decomposition results, one has to be aware that endowment differences are evaluated with coefficients from the male wage regression and thus with labour market returns for male workers. The relative magnitudes of contributions to the *characteristics effect* therefore allow only limited conclusions on the effects of an elimination of endowment differences on the pay gap. This is of particular concern for characteristics whose wage effects are of opposite sign for male and female workers.

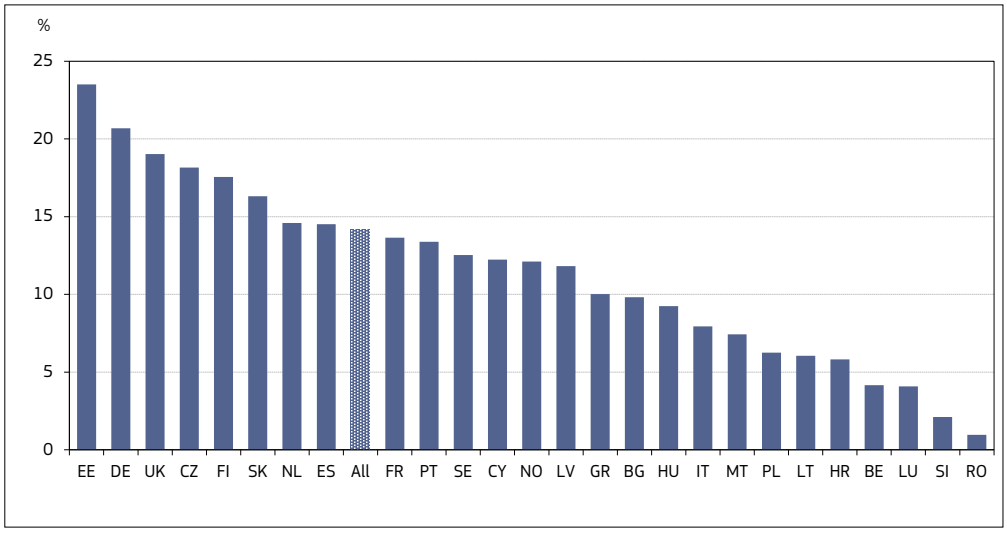
Furthermore, we need to stress that our approach does not include a selection correction when estimating individuals' earnings. Heckman (1979) or Lewbel (2007) established estimation procedures that take selection into labour market participation into account. We consider this issue relevant since women and men might be differently selected into employment, resulting in inconsistently estimated wages. However, as argued above, such an investigation fell apart from the intended update of the pay gap calculations according to the methodology used by Eurostat. So we end up with stating that our analysis focuses on wages of the employed only. As a consequence, no speculations on the counterfactual wage distributions for women and men in the absence of employment selection are made. This has to be left for further research.

4. Results

4.1 Unadjusted gender pay gap

As a first result, we measure the cross-country gap in average wages of men and women to be about 14.2 %. This number is slightly lower than the 16.7 % published by Eurostat for the EU-28 in 2014.[3] The discrepancy is explicable by data constraints (see chapter 2). At country level, the picture however varies drastically. **Figure 1** depicts the unadjusted gaps in descending order. "All" denotes the value for the cross-country sample (14.2 %).

Figure 1: Unadjusted gender pay gap 2014



Sources: SES (2014); HWWI (2017).

As shown in the diagram, figures range from 0.96 % for Romania to 23.51 % for Estonia. As in 2010, Estonia, Germany, Finland and UK ranked among the Top Five in 2014.

From a geographical perspective, it is noticeable that most Middle and Eastern European states are exhibiting gaps clearly below average, with the Czech Republic, Slovakia and Estonia marking the exceptions. Among the West European countries, only Belgium is exhibiting a very small gap (4.2 %).

Unadjusted gender pay gap: Changes 2014/2010

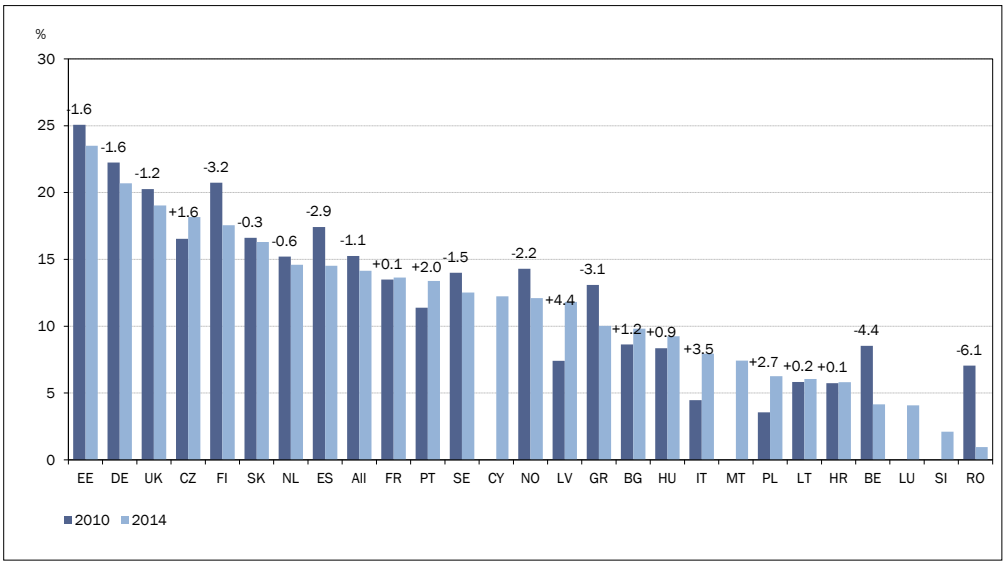
Comparing the unadjusted gap between 2010 and 2014 (**Figure 2**), most countries (Belgium, Germany, Estonia, Spain, Finland, Norway, Romania, Sweden, UK) exhibit

3 Last update=08.03.2017, extracted on 17.10.2017, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=earn_gr_gpgr2&lang=en

a slight decrease, while the gap increased in only six countries (Bulgaria, Czech Republic, Italy, Latvia, Poland and Portugal). Despite these developments, changes were rather modest in most cases. Only in Belgium, Latvia and Romania, the difference between 2010 and 2014 was above four percentage points. Showing changes below one percentage point, the unadjusted gap remained relatively stable in France, Slovakia, the Netherlands and Lithuania. For Luxembourg, Malta, Slovenia and Cyprus, we cannot refer to 2010 values as these countries were not incorporated in our previous study.

Looking at different regions in Europe, unadjusted gender pay gaps in Eastern European (including Baltic) countries, i.e. countries with low gaps except Estonia, mostly increased or remained stable, whereas gaps in Scandinavia and Western Europe decreased over time or hardly changed. Results for Southern European countries are ambiguous with a decline in Spain and rising gaps in Italy and Portugal.

Figure 2: Unadjusted gender pay gap: 2014 vs. 2010 (difference in percentage points)



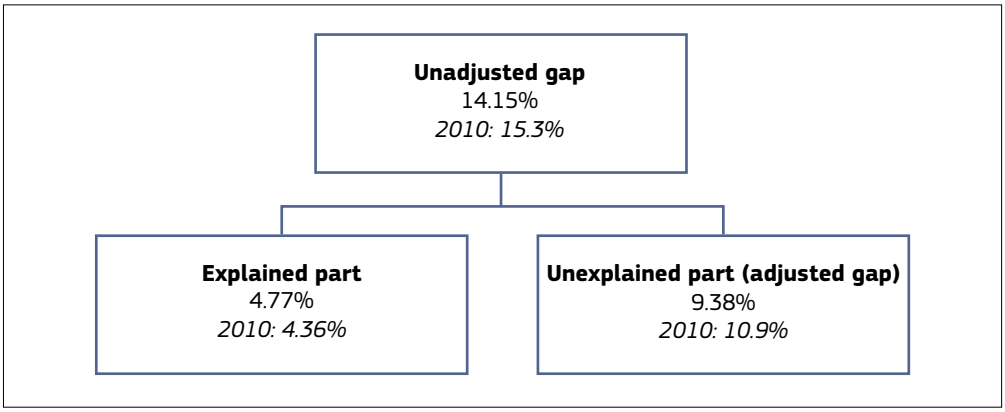
Sources: SES (2010, 2014); HWWI (2017).

4.2 Decomposition in explained and unexplained gender pay gap

As discussed in the model section, the decomposition of the overall gap relies on gender-specific earnings regressions. **Table A2** in the appendix depicts the earnings regression results for the cross-country sample.[4] Applying the decomposition method outlined above, we find that roughly one third of the unadjusted pay gap (4.8 %) can be traced back to the role of the explanatory factors included in our analysis (**Figure 3**). A wage difference of 9.4 % remains as the unexplained gap. Hence, only a smaller part of the overall gap (14.2 %) is due to gender differences in measured worker attributes.

4 Earnings regressions results on the country level can be obtained from the authors on request.

Figure 3



Sources: SES (2010, 2014); HWWI (2017).

The decomposition results markedly differ between countries (**Table 1**). The country ranking with respect to the explained gap changes substantially compared to the unadjusted gap. The role of gender differences in average worker features is in some countries not only more pronounced than in others, it also works in opposite directions. For instance, it is striking that most countries with small unadjusted gaps (i.e. Croatia, Italy, Lithuania, Poland, Romania, Slovenia) exhibit negative explained gaps (i.e. female workers would earn more than male workers according to the explained gap alone). Hence, the average female worker in these countries is endowed with better characteristics than her male counterpart, at least concerning those characteristics included in our dataset. The reason why also in Croatia, Italy and Poland female workers nevertheless have lower average earnings than men is exclusively to be found in the unexplained residual.

Table 1: Unadjusted, explained and unexplained gender pay gap based on SES 2014 data, in %

Country	Unadjusted gap	Explained gap	Unexplained gap (adj.)	Country	Unadjusted gap	Explained gap	Unexplained gap (adj.)
Belgium	4.16	2.17	1.98	Lithuania	6.05	-8.16	14.20
Bulgaria	9.82	1.09	8.73	Luxembourg	4.09	-2.04	6.13
Croatia	5.81	-4.67	10.49	Malta	7.43	-0.01	7.44
Cyprus	12.24	1.96	10.28	Netherlands	14.60	7.96	6.63
Czech Republic	18.16	5.10	13.07	Norway	12.11	5.14	6.97
Estonia	23.51	6.83	16.67	Poland	6.26	-5.45	11.70
Finland	17.56	6.98	10.57	Portugal	13.39	2.16	11.23
France	13.64	4.45	9.20	Romania	0.96	-4.91	5.87
Germany	20.69	14.89	5.80	Slovakia	16.31	2.75	13.56
Greece	10.03	3.58	6.45	Slovenia	2.11	-8.18	10.29
Hungary	9.25	-0.01	9.25	Spain	14.52	4.18	10.34
Italy	7.94	-3.96	11.90	Sweden	12.53	5.57	6.96
Latvia	11.81	1.30	10.51	UK	19.03	8.57	10.46
				Total	*14.15*	*4.77*	*9.38*

Sources: SES (2014); HWWI (2017).

Moreover, this unexplained part is nowhere identified to be negative. Only in Belgium, the unexplained part is lower than five percent. It is thus this term that comprises the bulk of factors that prevent women from catching-up. As explained above, it consists of two different kinds of effects. First, it acknowledges that the same endowment could be evaluated differently by the market, depending on whether the person is male or female. Second, it includes the impact of gender differences in those market-relevant characteristics not controlled for in our model. This second aspect is of special relevance, as our dataset does not allow us to assess potentially important gender differences related to actual work experience. It is interesting to see that some of the countries with negative explained gaps like Croatia, Italy, Lithuania, Poland and Slovenia perform worse than the country average when it comes to the unexplained gap. Apparently, one cannot conclude from that fact that women outperform men in attributes like education on a more egalitarian labour market environment in general. This provides justification for a more disaggregated analysis of the sources of the gender pay gap.

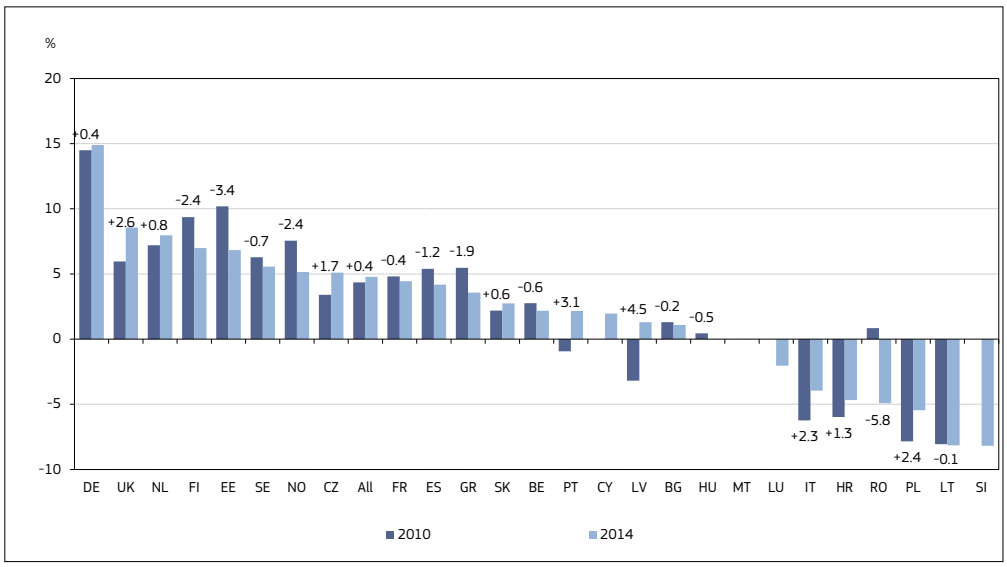
Explained and unexplained gaps: Changes 2014/2010

Figure 4 and Figure 5 depict changes over time in the explained and the unexplained part of the gap, respectively. Countries are ranked according to their values in 2014.

As **Figure 4** shows, the cross-country explained gap slightly increased by 0.4 percentage points. In countries with negative explained gaps in 2010, the explained gap became mostly less advantageous for women over time (HR, IT, PL), or even turned into a disadvantage for women (LV, PT). A strong decrease in the explained part has been the main reason for the reduction of Romania's unadjusted gap.

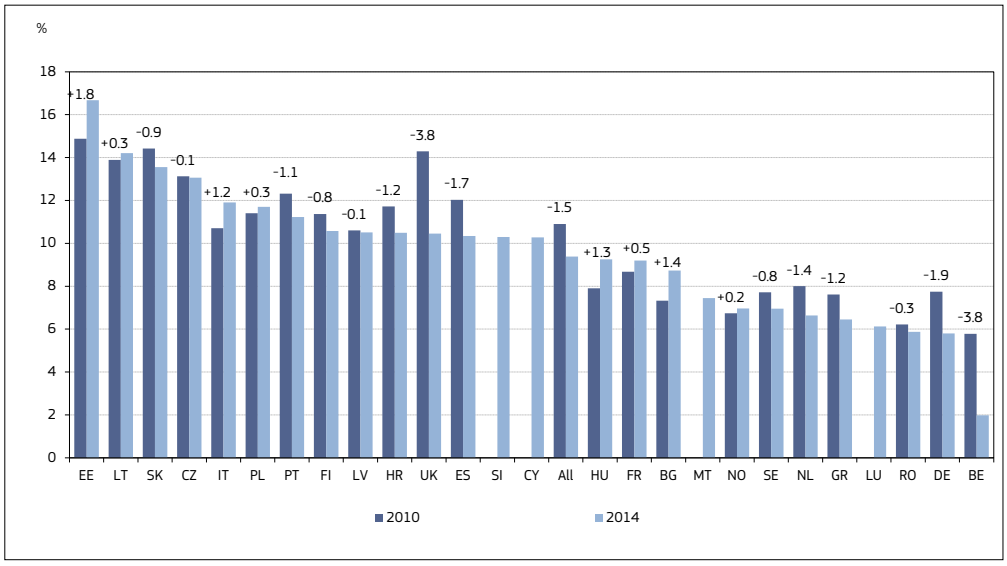
As can be seen in **Figure 5**, the unexplained part decreased in 14 countries and increased in 8 countries. The decrease in the cross-country sample amounted to 1.5 percentage points. The drop has been highest in Belgium and UK (-3.8 pp each). The pattern of changes is not straightforward. Neither is a further increase associated with a formerly low level of the gap, nor does a clear regional pattern emerge. When looking at the changes over time in the gaps' compositions, it becomes apparent that in Belgium, the stark decrease of the overall gap was due to changes in the unexplained part, whereas the development in Latvia and Romania was caused by changes in the explained part of the gap.

Figure 4: Explained part of the gender pay gap: 2010 vs. 2014 (difference in percentage points)



Sources: SES (2010, 2014); HWWI (2017).

Figure 5: Unexplained part of the gender pay gap: 2010 vs. 2014 (difference in percentage points)

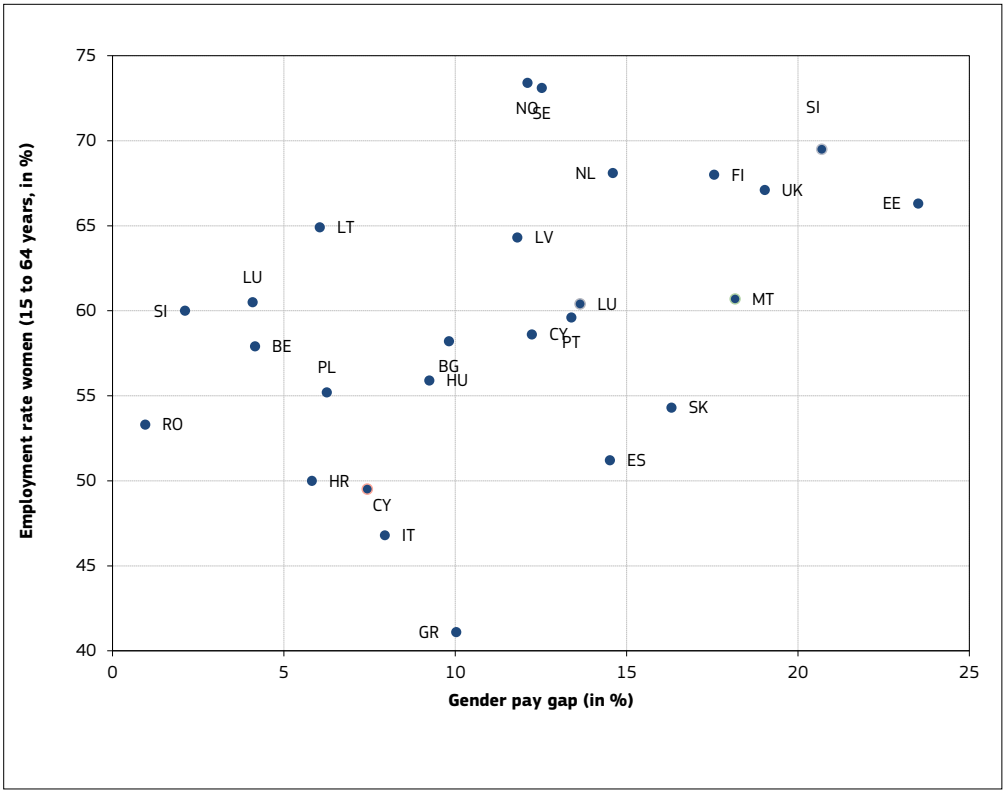


Sources: SES (2010, 2014); HWWI (2017).

Relationship between female employment rate and unadjusted gender pay gap

Before further decomposing explained and unexplained gap into the contributions of single variables, it is important to shed light on a particular form of bias aggravating the interpretation. In analyzing the gender gap, the comparison necessarily refers to actual wages paid to the working population, excluding the potential payment unemployed or inactive persons could receive. This creates a bias, given that the participation decision is also likely to depend on the potential earnings of the person. The expectation of low rewards could have motivated some share of women to stay outside the labour market, which would imply that we underestimate the real gender pay gap from the perspective of earnings potentials. Recently, in analyzing US census data, Jacobsen et al. (2015) find evidence for a switch to such a positive selection during the last fifty years. If the opposite response occurs (as estimated by Beblo et al. (2003) for Germany), the implication is an overestimation, respectively. Moreover, such a bias does potentially not only concern the cross-country gap, but also the comparison of country values. **Figure** 6 displays the unadjusted pay gaps together with the employment rates of women in the single countries. It documents a clear positive relationship between the two measures: countries with high female employment tend to exhibit high statistical pay gaps and vice versa. This seems to provide some confirmation for the positive selection hypothesis. Based on this, different clusters of countries can be identified.

Figure 6: Relationship between gender pay gap and female employment in SES



Sources: Eurostat (2017), SES (2014), HWWI (2017).

Taking a closer look, we can distinguish four country clusters, one group with low wage gaps and low female employment (henceforth named *A*), one group with medium wage gaps and low female employment (*B*), one group with medium wage gaps and high female employment (*C*) and finally one group with high wage gaps and high female employment (*D*).

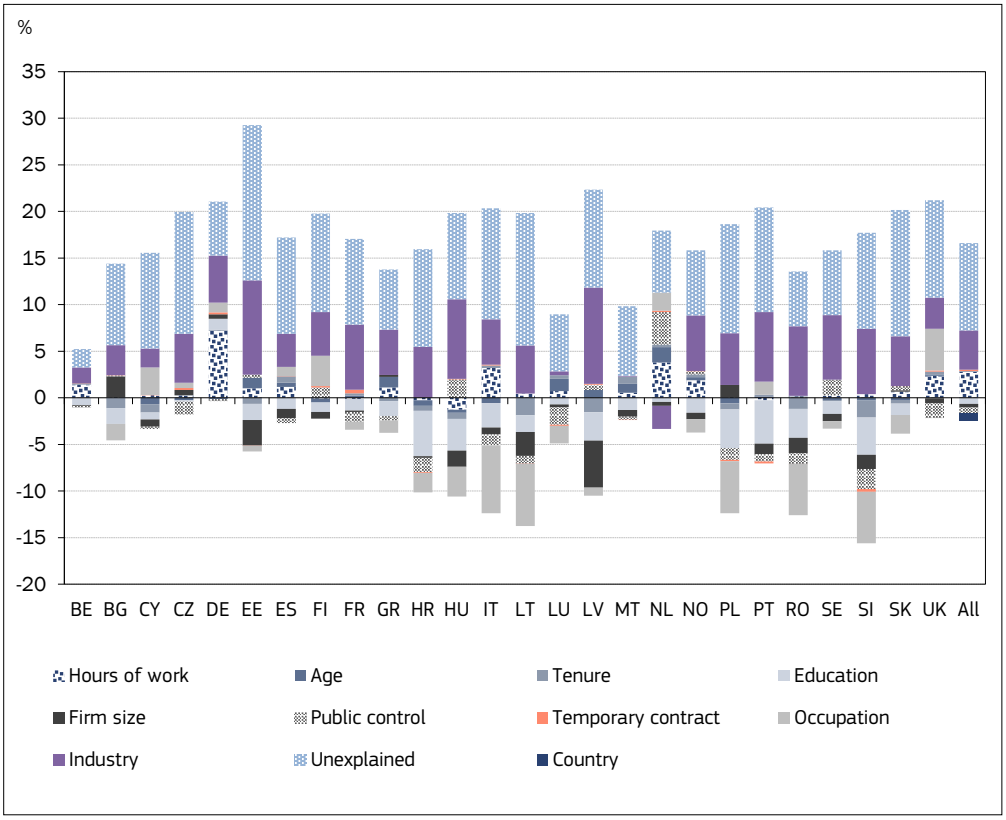
Beginning with *A*, this cluster is characterized by low, mostly negative, explained gaps (MT, BE, GR, SI, HR, RO, LU, ES, PL, IT, HU). That is, women's endowments rarely differ from men's or endowments are even in favor of women. The latter is the case in all countries except Belgium, Greece and Spain. In Croatia, Italy, Luxembourg, Poland, Romania and Slovenia, occupational sorting is measured to be an important factor: women tend to cluster in better paid occupations. However, this results needs to be qualified against the background of employment selection and data limitations, as discussed below. Most countries that join cluster *B* are similar to *A* with respect to low endowment effects, but differ concerning the size of the unexplained gaps (SK, BG, CZ, FR, LV, LT, CY, PT). Cluster *C* differs from *B* in that *C* countries exhibit high female employment rates. Countries of group *C* (NL, NO, SE) share an explained gap between roughly 5 and 8 % and an equally high unexplained gap. This symmetry is special to group C. Finally, cluster *D* is found at the other end of the scale, with high female employment and high gender pay gaps (DE, EE, FI, UK). Here, Germany stands out with the highest explained gap (14.9 %) in this country comparison, being also the only country where the explained gap exceeds the unexplained gap.

All in all, countries with female employment rates lower than 65 % have one thing in common, namely explained gaps below 5 % or slightly above (CZ: 5.1 %). That is, a strong employment selection of women corresponds to low gender differences in pay-relevant endowments. Apparently, access to the market seems to substitute access to wage relevant job attributes. In countries with low female labour market participation, only women with a high earnings potential access the market but after having passed this hurdle, these women apparently access attractive job attributes as easily as men. However, it has to be noted that they are paid worse for the same attributes and/or differ in unmeasured attributes from men. In countries with high access of women to the market (high female employment rates), women have more difficulties to access pay-attractive jobs than men, as reflected by endowment effects amounting to 5-10 %. This holds for Czech Republic, Estonia, Finland, the Netherlands, Norway, Sweden and the UK (Germany stands out with 14.8 %). This is likely to be related to a high part-time share among employed women and/or more egalitarian gender roles. In five out of eight of the aforementioned countries, at least 35 % of employed women aged 15-64 worked part-time (Eurostat-Data Explorer 2015; the exceptions refer to the Czech Republic (9 %), Estonia (11 %) and Finland (19 %)). Thus, in all countries joining group *C* or *D* (except Estonia), egalitarian gender roles, mostly combined with family-compatible work arrangements enable women to enter the market, but this comes at the cost of a worse access to attractive job attributes (a higher endowment effect) compared to countries with female employment rates near 65 % or below.

4.3 Decomposition of the explained gender pay gap

Figure 7 documents which share of the explained part of the gender pay gap can be attributed to which measured characteristic. Precise numbers can be found in **Table A3** (for cross-country sample) and in **Tables A4 and A5** (for the country-specific samples) in the appendix.

Figure 7: Decomposition of the explained part of the gender pay gap (in %), 2014



Sources: SES (2014), HWWI (2017).

While some features show similar effects across countries, the role of others is highly heterogeneous. Something that can be noticed for all countries except the Netherlands is that the selection of male and female workers into different **sectors** contributes to the existence of wage differences. Hence, a significant part of the gender gap is due to the fact that women are overrepresented in industries with low pay levels (and accordingly underrepresented in well-paid industries). This is consistent with recent results by Simón (2012) for the 2002 wave of the same dataset. In the cross-country sample, women are particularly overrepresented in Education as well as in Health and Social Work Activities. At the same time, they are highly underrepresented in Construction and in manufacturing sectors such as Chemical Products, Electric and Transport Equipment.

In a country comparison, the largest effects of sectoral distribution are measured for Latvia and Estonia, where its contribution to the overall gender gap amounts to 10.3 % and 10.1 %, respectively. In both countries, the comparatively small presence of women in well-paid jobs in the area of Manufacturing and Construction is

again responsible for this result. At the other extreme, there are three countries where the industry effect remains fairly marginal or even negative: the Netherlands (-2.5%), Malta (0.1 %) and Luxemburg (0.4 %). In the Netherlands and Luxemburg, manufacturing sectors are an important part of the explanation. Women in both named countries show a lower participation in these sectors than in cross-country average. At the same time, these sectors offered, all else being equal, comparatively low (male) wages compared to the reference sector P (Education) in the Netherlands and Luxembourg, whereas in other countries, the opposite relation applies. In Malta, the conditional wage bonus in construction is measurably lower than in cross-country average. In general, we need to remain cautious with our interpretation, given that the real industry effect could be diluted by the congruence between occupational choice and sector.

With respect to **changes 2014/2010** in the role of sector affiliation**,** the importance slightly decreased in the cross-country sample (-1pp). However, the aggregate change masks notable changes in several countries, with highest decreases in Romania (-3.8 pp), Germany (-3.6 pp), the Netherlands (-2.4 pp), opposed to stark increases in Croatia (+4.5 pp), Estonia (+ 2.9 pp) and Hungary (+2.3 pp).

Among the remaining characteristics effects, there is none that works in the same direction in each country. One that is at least almost homogeneous is the effect of **firm size**. The fact that the genders are differently distributed across firms with different size mitigates the wage gap by 0.4 % in the cross-country estimation. In the cross-country average, women work more often in large firms. Firms with more than 50 employees exhibit a higher share of female workers than smaller firms in the aggregate sample. In addition, the payment level in large firms is ceteris paribus higher, a result that is well documented in the labour economics literature (Oi and Idson, 1999). Explanations could be the occurrence of productivity gains through higher division of labour or the need to pay compensating differentials due to the unpleasantness of working in an impersonal atmosphere (Masters, 1969). As a consequence, the characteristics effect of firm size reduces the gender pay gap. The only conflicting evidence at country level is obtained for Bulgaria, Czech Republic, Germany, Poland, and Greece. In these countries, this is not caused by a reversal in the wage effect of firm size, but by the fact that women are underrepresented in large firms. Nevertheless, the result for firm size might be sensitive to sample selection, given that very small firms with less than 10 employees are underrepresented in the SES.

There have been **only minor changes 2014/2010** in the role of firm size**,** amounting to less than one percentage point (**c**ross-country sample= +0.2 pp; BG= +0.6 pp; CZ= +0.5 pp; DE= +0.8 pp; LT= -0.9 pp; LV= -0.7 pp; RO= -0.9 pp).

Moreover, the role of **schooling** tends to contribute to wage convergence. It is an unsurprisingly unanimous result in our estimations that graduates from tertiary education received higher average earnings than workers at lower educational levels. A more insightful outcome is that female workers in most countries exhibited a higher average level of education than their male counterparts, at least when measured on our three-level scale. The consequence is a diminution of the cross-country gender gap by 0.6 %, clearly exceeding previous results by Simón (2012). In four countries, Croatia, Poland, Portugal and Slovenia, the diminution even exceeds 4 %, foremost due to large gender differences in the shares of college graduates. On the other hand, we witness with Germany a case where differences in schooling further nourished the wage gap by 1.2 %. This is explained by the fact that unlike in most other countries, German women still lag behind regarding participation in

tertiary education. **Between 2010 and 2014**, the role of formal education **hardly changed**, with changes exceeding 1 percentage point in Norway (-1.4 pp) and Croatia only (-2 pp). In the EU average, education still works to women's advantage, which even slightly increased by 0.3 pp.

The form of **economic control** over the firm is another factor which predominantly reduces the gender wage differential. The fact that male and female workers are unequally distributed between private and public companies helps to narrow the gap. In all observed countries at the given point in time, female workers were overrepresented in publicly controlled firms. At the same time, conditional remuneration was in the majority of countries higher in public than in private firms, implying a reduction of the wage gap by 0.6 % in the aggregate and up to 2.2 % (Slovenia) at country level. Among the opposite outliers, the Netherlands and Hungary stand out. Here, working in the public sector implied a wage penalty, yielding an increase in the gender gap by 3.5 % and 2.0 %, respectively. As to **changes between 2010 and 2014**, the importance of public control increased strongest in Hungary (+2.3 pp); during that time, a slight advantage turned in a disadvantage for women. Changes in other countries and for the EU aggregate were comparatively smaller (cross-country sample: +0.4 pp; HU= +2.3 pp; LV= +1.3 pp; NL= +1.1 pp; CZ= -0.4 pp; FI= -1.6 pp; IT= -0.4 pp).

In contrast, a job characteristic that predominantly raises the wage gap is **hours of work**. In all countries under observation, female workers have more often been employed part-time than male workers. In most of them, part-time work was, all else being equal, associated with lower hourly earnings. As discussed in the literature section, this can be related to perceived coordination costs and restrictions in the access to internal training. In all, it contributes to a widening of the cross-country gender pay gap by 2.8 %. This fits recent evidence by Goldin (2014) for the US, who assigns working time arrangements a key role for explaining the incomplete gender convergence on the US labour market. An outlier concerning the magnitude of this effect is Germany, where it reaches a level of 7.2 %, the largest of all measured characteristics effects in this country. This is mainly attributable to the pronounced gender differences in part-time work of low scale (less than 60 % of a full-timer's normal hours). Exceptions in the other direction is Hungary, where the effect is slightly negative (-1.3 %), due to the surprising result that part-time workers experienced a wage bonus. As to **changes 2014/2010**, hours gained importance in the EU average (+1.2 pp), in Germany (+2.2 pp) and UK (+1.7 pp) and lost importance in Belgium (-1.9 pp), Estonia (-0.5 pp) and Latvia (-0.5 pp).

Another channel that tends to widen the gender gap is the distribution of **temporary vs. permanent contracts**. Working in a temporary position reduces the expected earnings in almost all country regressions. This is consistent with general findings of the literature (Booth et al., 2002). Temporary workers have less incentive to accumulate job-specific human capital, as they face the risk of depreciation when the contract is not prolonged. For the same reason, employers are also less inclined to give them access to internal training. Temporary workers are also likely to represent a selection in the sense that they tend to be unsure about their future career and are therefore generally less willing to make any specific human capital investments. The outcome is a lower payment due to lack of specific skills. In turn, this contributes to the wage gap because temporary positions are more frequent among female workers in the majority of countries. This seems intuitive in presence of self-selection: facing a higher risk of career interruptions through childbirth, women on average are less inclined to commit to a certain career path. Nevertheless, the overall effect remains of low magnitude. In our cross-country sample, temporary work

widens the wage gap by only 0.1 %. At country level, the maximum contribution is 0.4 % (France). Cases where the effect goes in the other direction comprise those countries where the gender distribution of temporary work is reversed. In Slovenia and Portugal, this implicates a modest reduction in the gender pay gap by 0.3 % and 0.2 %, respectively. The importance of temporary work **hardly changed between 2010 and 2014**, with modifications below one percentage point both in the EU average (+0.04 pp) and in single countries (FR= +0.1 pp; NL= +0.2 pp; PL= +0.1 pp; BE= -0.1 pp; FI= -0.3 pp; HR= -0.4 pp).

The role of the remaining characteristics is highly ambiguous in country comparison. First, this concerns workers' **age distribution**. To ensure a correct interpretation, we need to emphasize here that the measured impact of age is just like the impacts of other characteristics a ceteris paribus-effect, i.e. it is conditional on all else being equal. That is, the single effect of age arising from our estimations measures the wage difference between women and men of different age who exhibit the same qualification, experience, occupation and other wage-relevant characteristics. Therefore, this effect must not be confused with age-specific wage profiles for men and women which usually feature an increasing wage gap with increasing age. This is mainly due to the fact that in these cross-sectional illustrations, age simply carries (not displayed) other relevant factors like experience that notably differs between men and women. In the aggregate estimation, the net effect of age differences is practically zero (-0.03%). Effects of the single age groups are of a similar magnitude. A look at the wage regressions shows that this is not due to an irrelevance of the factor age in wage setting. Compared to the reference group of 40-49 years old workers, workers in most other age groups are estimated to receive significantly lower earnings in the cross-country regression for male workers, reproducing the typical inversely U-shaped wage evolution from the literature (Skirbekk, 2004). Rather, differences in the age distribution of male and female workers are simply too small to let this affect the wage gap. Nevertheless, this cross-country average does not adequately describe the situation in many single countries. On the one hand, we see a country like the Netherlands where gender differences in the age distribution of workers are estimated to raise the gender pay gap by 1.6 %. This results from the interplay of two factors. Dutch female workers are on average younger than their male counterparts. At the same time, seniority is apparently a more important factor for wage setting in the Netherlands than in other EU countries. Older groups of male workers (50-59 and 60+) are measured to receive a wage bonus compared to the reference of 40-49 years old. On the other hand, we have a country like Cyprus, where age differences reduce the gap by 0.7 %. Here, we observe an inversely U-shaped wage structure. Moreover, female workers in Cyprus show higher relative frequencies than men in the best-paid group of the 40-49 years old. **Changes between 2010 and 2014** in the role of age are negligible (cross-country sample: -0.1 pp; LV= +0.4 pp; NL= +0.8pp; PT= +0.3 pp; GR= -0.5 pp; HR= -0.4 pp; IT= -0.5 pp).

A second highly ambiguous effect is measured for **firm tenure**. In the aggregate sample, differences in tenure raise the gender pay gap by merely 0.1 %, which is significantly lower than the 0.5 % estimated by Simón (2012) for his dataset of nine European countries. In line with basic intuition, longer job tenure is associated with higher earnings in the cross-country regression. This can both be explained by a mechanism of self-selection (higher wages imply higher job satisfaction, thus workers stay longer) and the productivity-enhancing accumulation of job-specific human capital over time (Topel, 1991). Moreover, women exhibit a slightly shorter average tenure in the cross-country sample. At country level, the positive relation-

ship between wages and tenure is confirmed, except in Norway. Differences arise from the correlation of tenure and gender. In Malta, firm tenure contributes to the overall wage gap with 0.7 %. Here, this can be traced back to a comparatively high share of female workers with short tenure. In Lithuania, on the other hand, the impact of tenure on the wage gap is measured to be – 1.9 %, reflecting a high local share of female workers with very long tenure. **Changes between 2010 and 2014** in the importance of tenure are minor, with an overall change (in the cross-country sample) of practically zero (-0.01 pp) and changes in single countries below one percentage point (EE= +0.2 pp; IT= +0.4 pp; LT= +1.2 pp; ES= -0.6 pp; GR= -1.2 pp; HR= -0.6 pp).

Finally, the characteristic causing the most heterogeneous effects is **occupatio**n. Its contribution to the gender gay gap in the aggregate sample is – 0.03 %. Hence, at the time of observation, women tended to cluster in the better paid occupational groups (from a male perspective). At a first sight, this seems to reject the theories linking occupational segregation to gender pay differences laid out in the previous section. However, we need to remain cautious with our interpretation, due to several data limitations. First, we merely distinguish between 43 occupational groups, thereby not capturing the full extent of gender heterogeneity in occupational sorting. Second, we can expect a high degree of correlation between occupational choice and sector, up to the point that some occupations are only observed within some sectors. Concerning the industry effect, we had seen that selection of male and female workers into different sectors almost uniformly raised the gender pay gap. Hence, some part of the effect of occupational segregation could have been attributed to industry differences. Thirdly, with the occupational classification at hand, it is not possible to adequately control for vertical hierarchy. This is an important point since the different allocation of women and men to hierarchical positions within occupations is a robust finding in the literature (e.g. Bettio/Verashchagina, 2009). Note that, according to the formula of the wage gap decomposition, the characteristics effect is the gender difference in occupational characteristics weighted with male returns to that specific characteristic. That is, a negative characteristics effect with respect to occupation signals that women are more frequently allocated to occupations with above-average (male) wages. However, the characteristics effect does not tell us anything about the wage differential between women and men in a particular occupation. Instead, the effect of vertical segregation on gendered pay is captured by the coefficient effect of occupation (see below). Last but not least, employment selection matters: In some countries, tasks associated with a female image are still largely executed outside the formal labour market (Bettio, 2002).

Referring to these particularities, the moderate effect measured for occupational endowment achieved from the aggregate sample appears a bit less striking, especially since it does not stand out in the literature (cf. Bettio/Verashchagina, 2009; Ministère du travail, de l'emploi, de la formation professionelle et du dialogue social 2015 for France). Moreover, the overall effect hides tremendous heterogeneity across countries. In the UK, occupational differences are measured to contribute by 4.5 % to the overall wage gap, implying this to be the prime factor responsible for the existence of a positive explained gap in the UK. In Italy, we witness a massive negative impact reaching levels of -7.3 %, nourishing the result that occupational endowment differences in total work in favor of women. A detailed analysis of the contributions of the single occupational groups reveals that this is mainly the outcome of a strong concentration of female workers in one group: Teaching Professionals. The concentration of female workers in the group of teaching professionals is in Italy twice as high as in the EU average. Furthermore, the result regards oc-

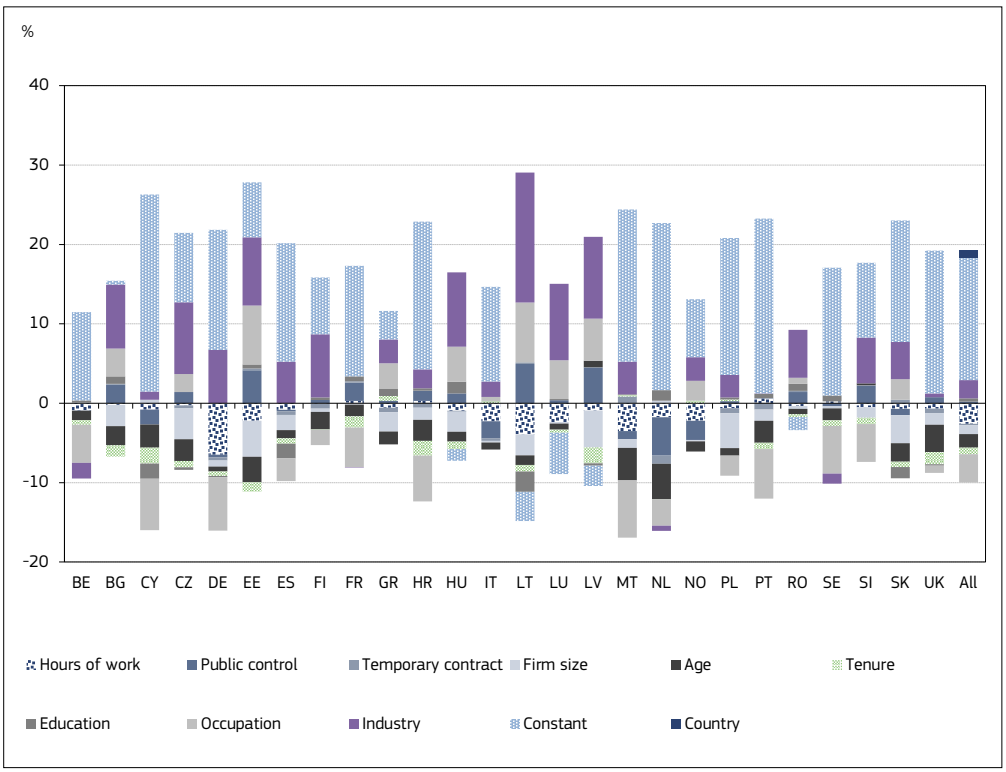
cupation has to be interpreted in the context of employment selection. As displayed in Figure 6, Italy belongs to the group of European countries with low wage gaps and comparatively low female employment rates. Apparently, this is a reflection of the fact that some typically low-paid service tasks like nursing and cleaning, which have traditionally been viewed as women's work, are in these countries to a large part still not delegated through formal work contracts, but mostly executed within households. Hence, they are not observed in the data. The result is a statistical reduction in the observed gender pay gap, which is ascribed to the occupation effect. The role of occupation notably **changed from 2010 to 2014** in several countries. In Belgium, Latvia and Poland, the occupational advantage of women decreased by 4.3, 3.7 and 2.7 percentage points, respectively. In Estonia and Hungary, a female disadvantage turned into an advantage, and in Spain, the disadvantage became less pronounced (EE= -4.9 pp; ES= -2.6 pp; HU= -4.1 pp).

4.4 Factors behind the unexplained gender pay gap

Results in Table 1 have shown that the unexplained gap is everywhere positive and makes up the largest part of the overall gender wage gap in almost all countries under observation (with Belgium, Germany and the Netherlands marking the exceptions). Given the unavoidable data limitations, this does not come as a surprise. Foremost, this results from the lack of a measure for actual work experience. An approximation by potential experience as measured by a worker's age has to remain highly imperfect, as it does not account for gender differences in labour market absence, especially related to birth and child care. Endowment effects resulting from these differences are implicitly included in the residual gap. Moreover, it is also likely to include those effects of hierarchical and occupational sorting, which cannot be captured by the precision and aggregation level of an occupation measure like ours. Similar statistically unobserved effects could stem from factors like personal abilities and negotiating skills. For this reason, it is important to repeat our warning from above that the unexplained variation should not be interpreted as the extent of gender discrimination in wage setting.

Nevertheless, this does not mean that the sources of the unexplained gap have to remain completely in the dark. As a result of our decomposition method, the residual gap comprises of the constant term (which captures the influence of all statistically unobserved wage determinants on the gender wage gap as described in the previous paragraph) and the coefficient effects, the latter measuring the effects of different evaluations of observable characteristics in the male and female subsamples (see Section 3 and, for further explanations, the Methodological Guidelines in the study of Boll et al. 2016). These effects can again be assessed in their magnitude for the single characteristics. **Figure 8** plots the contributions to the unexplained gap at country level. Positive contributions imply that male workers receive a higher monetary reward for exhibiting the particular wage-relevant characteristic than female workers, a fact that widens the gender pay gap. Accordingly, negative contributions express the opposite. They imply that women are better paid for a particular characteristic than men, which mitigates the gender pay gap.

Figure 8: Decomposition of the unexplained part of the gender pay gap (in %), 2014



Sources: SES (2014), HWWI (2017).

Eye-catching is the dominant contribution of the constant term, contributing to the gap in all countries except LT, LU, LV, RO and HU. As is the case with the characteristics effect, sources of the coefficients effect differ substantially between countries. Nevertheless, some major patterns can be identified. First, **industry** is estimated to exert a sizeable positive coefficients effect in almost all countries except Belgium, France, the Netherlands and Sweden (in the UK and Portugal, the effect practically equals zero). For the aggregate sample, different sector remunerations of genders account for 2.3 %. In Lithuania and Latvia, the magnitude even exceeds 10 %. That is, there is a relative within-sector male wage premium in the female dominated sectors in all countries except the four named above.

This indeed hints at considerable intra-sectoral gender heterogeneity with respect to the sorting into occupations and hierarchical positions. Apparently, much of the sorting takes place within rather than between industries. An implication is that the wage level effects of different wage setting regimes at industry level (e.g. centralized vs. decentralized, influence of trade unions) in most countries do not fully make up the pay effect of sorting although admittedly, such a conclusion has to be drawn with caution, due to the limited disaggregation of our industry variable. However, Goldin (2014) brings some light into the question what the true sources of the unexplained gap might be about. In a nutshell, she argues that they are not driven by different human capital of men and women but by firm level differences in the cost of time flexibility. Hours worked are of different worth in different sectors and occupations, hence ignoring the interaction of sector with hours worked leaves a crucial source of pay differentials out of the analysis (leaving it to the 'unexplained' part or more concrete: the coefficient effect of industry). Based on American Com-

munity Survey data, Goldin shows that occupations of different sectors differ in their ability and cost to provide employees with reduced working hours in the occasion of family events. Technically, this results in a nonlinear relationship between earnings and hours of work: Since deviations from the 'full-time full-year' (FTFY)-scheme is perceived as costly by the firm, long hours and continuous careers are honored with high wage premiums and short hours and/or career disruptions are strongly penalized. Due to a lack of compatibility with family tasks, particularly women quit employment in the occurrence of births and high wage penalties upon reentry combined with further penalties for short hours result in high gender pay gaps in those industries. A rich body of literature confirms severe earnings losses of women due to family-related breaks, in particular from the life course perspective (e.g. Boll et al. 2017 for Germany). By contrast, industries which had successfully adapted to flexibility demands of their (not only female) workforce are shaped by almost linear earnings/hours worked-relationships and hence smaller gender pay gaps. Goldin concludes that to further reduce the gap, sectors should strive to develop strategies to decrease the cost of time flexibility. We support this view in stating that policies focusing on the sector level aiming at closing the within-sector pay gap could be viewed as an important supplement to a cross-sectoral harmonization of wage setting institutions in tackling the gender gap.

Between 2010 and 2014, sector premiums notably narrowed between genders in Belgium, Romania and Bulgaria (decreasing the overall gap by 7.5, 5.7 and 5.6 pp, respectively), whereas the opposite holds for Lithuania and Hungary where the premium gap between genders further increased to men's advantage, increasing the importance of this factor to the pay gap (LT= +7.4 pp, HU= +4.8 pp). In the EU-aggregate, the contribution of gendered sector premiums to the gap decreased by 2.4 percentage points.

The second consistent pattern is the negative coefficients effect of the **age composition**. It reduces the gender pay gap by 1.7 % in the aggregate sample. It is also negative throughout the single country estimations except in Latvia and Slovenia, but not always significant (Lithuania). It reaches impacts of more than -4 % in Malta and the Netherlands. The interpretation of these results strongly hinges upon the estimated distribution of wages over the lifecycle. Our cross-country wage regressions provide evidence for an inverse U-shaped relationship between age and wage level for male workers, with conditional pay being highest in the reference group of 40-49 years old. This finds support in large parts of the labour economics literature (Skirbekk, 2004), . For female workers, conditional wages are also U-shaped in the cross-country estimation. However, in many countries, conditional wages are estimated to be continuously higher for older age groups.

Thus, being evaluated like male workers would result here in an average wage loss for women, explaining the negative coefficients effect. Two reasons for these gender-specific age patterns seem plausible. First, statistically unobserved occupational sorting could again impair our estimations in the sense that women are underrepresented in some physically highly demanding jobs in crafts and manufacturing. In executing these jobs, physical degradation in the process of ageing is coupled with a strong productivity decline. If this primarily harms earnings perspectives of old male workers, another channel through which occupational segregation affects the wage gap is established. Second, selection effects associated with the employment decision are another candidate. If with increasing age more and more women exit the labor market (i.e. become inactive) and the remaining active women represent on average a positive selection in terms of productivity-relevant characteristics, the statistical result of a beneficial age effect emerges. Even though we are not able to

quantify the relevance of these selection processes, their pure existence requires that any policy recipes should be checked for their indirect impacts on women's employment decisions. Concerning the change in the role of the returns to age **between 2010 and 2014**, the only minor change for the EU-average (+0.4 pp) masks some controversial effects on the country level. To be more concrete, the contribution of gendered age premiums to the wage gap increased by 2.8 pp in UK and by 1.3 pp in Hungary whereas the contribution decreased in Estonia by 2.1 pp and in Croatia by 2.3 pp.

Finally, the **constant term** represents a major contributing factor in the majority of countries. With a contribution of 15.4 % in the cross-country sample, it is almost exclusively responsible for the existence of an unexplained wage variation. It captures the influence of statistically unobserved variables in the data set at hand. As discussed above, gender differences in actual work experience over the lifecycle are expected to make up the bulk of this amount. The wage-reducing effect of a temporary labour market absence of women due to birth and childcare is nowhere explicitly accounted for in our approach. However, this factor alone does not elucidate the occurrence of four striking exceptions at country level in this regard. In Lithuania, Luxembourg, Latvia and Hungary, the constant term is negative. Again, this points to the natural limits large-scale cross-country studies like ours face in disentangling the socioeconomic interrelations behind a certain observation. Illuminating these particularities requires further detailed country studies incorporating the interplay of individual decision-making and institutional backgrounds. **Between 2010 and 2014**, the contribution of the constant to the overall pay gap increased most notably in the EU-aggregate (+7.7 pp), Germany (+12.7 pp), Romania (+11.5 pp) and Bulgaria (+15.1 pp). By contrast, the contribution decreased in Lithuania (-12. pp) and Hungary (-20.2 pp).

Conclusion

This study has investigated size and sources of gender wage gaps in the most recent wave of the EU-SES. Our first result was already a crucial one: a significant wage gap between male and female workers is still an undeniable reality in every single EU country under observation. Nevertheless, our wage decomposition analyses revealed a tremendous degree of country heterogeneity concerning the roots of this phenomenon. This holds in particular for the size of the gap that is attributable to gender differences in the measured wage-related worker and job characteristics. While this explained gap operates in some countries like Germany and Estonia decisively in favor of men, in others like Poland and Italy it advantages women. An analysis of the relationship of the gender pay gap with female employment rates hints at selection effects as a major source of these country differences. Countries with low wage gaps tend to be characterized by low female labour market participation, suggesting the existence of a positive selection of working women with respect to productivity-relevant characteristics and/or a trade-off between family-compatibility and attractive pay. Therefore, one of our major conclusions is that in discussing wage gaps it has to be kept in mind that a more or less significant part of the female population is not in our sights. By utilizing the correlation with employment rates, we form four clusters of countries differing in labour market perspectives for the female workforce.

Concerning the contributions of the single observed characteristics, gender differences in the sorting into industries are identified as the strongest contributing factor by our decomposition method. This result is consistent with a previous study by Simón (2012). However, we need to be cautious with interpreting this effect, given its close relation with occupational choices and the limited level of disaggregation in our data. In many countries, the overrepresentation of women in atypical employment in the form of temporary and part-time jobs entails an additional wage penalty for women. On the other hand, factors that mitigate the pay gap in the majority of countries are the distribution of male and female workers into firms of different size as well as gender differences in schooling. The role of occupational segregation is measured to be highly heterogeneous across countries. This is explainable both by the biasing effect of its correlation with the industry variable, its interplay with female employment rates and the lacking control for vertical hierarchy. Finally, our results for the composition of the unexplained gap confirm our intuitions on the role of intra-sectoral pay equity and the role of selection effects. First, as Goldin (2014) points out, it is likely that sectors which do not manage to reduce the cost of time-flexibility in terms of working hours and temporary employment breaks compensate their employees who stick to the 'full-time full year' (FTFY) standard with high wage premiums, explaining the within-sector pay inequity with firms' personnel management rationales and not with human capital related differences between men and women in statistically observable "endowments". Goldin concludes – and we would adopt this suggestion based on our findings – that policies aiming at tackling the gender gap in pay should address both across-sector and within-sector differences in gendered pay. In the latter respect, it seems particularly important to support sectors to develop strategies to decrease the cost of time flexibility, instead of only striving to even the distribution of men and women over sectors and occupations. In this context, secondly, it will be important keep the selection issue on the screen.

In a cross-country but also importantly in a lifetime perspective, the goal must be to eliminate the trade-off between low pay gaps and high female employment rates and instead combine attractive pay with time-flexible work-arrangements.

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Appendix

Table A1: Descriptive statistics: cross-country sample

	Men		Women	
	Mean	**SD**	**Mean**	**SD**
Hourly wage	16.068	14.538	13.277	9.372
Log hourly wage	2.495	0.796	2.354	0.736
0-59 % of a full-timer's normal hours (in the local unit)	0.098	0.297	0.239	0.426
60-99 % of a full-timer's normal hours (in the local unit)	0.048	0.213	0.162	0.369
Public control (>50 %)	0.143	0.350	0.283	0.451
Temporary contract	0.126	0.331	0.143	0.350
Size of the enterprise 1-49	0.320	0.466	0.296	0.456
Age				
14-19	0.013	0.114	0.016	0.125
20-29	0.169	0.374	0.167	0.373
30-39	0.252	0.434	0.235	0.424
40-49	0.267	0.442	0.278	0.448
50-59	0.225	0.417	0.238	0.426
60+	0.075	0.263	0.065	0.247
Tenure				
0-1 years	0.234	0.424	0.234	0.424
2-4 years	0.209	0.407	0.208	0.406
5-14 years	0.338	0.473	0.349	0.477
15+ years	0.219	0.413	0.208	0.406
Qualification				
ISCED 0-2	0.183	0.387	0.156	0.363
ISCED 3-4	0.505	0.500	0.490	0.500
ISCED 5-8	0.312	0.463	0.354	0.478
Occupation				
Commissioned armed forces officers	0.000	0.004	0.000	0.003
Non-commissioned armed forces officers	0.002	0.043	0.001	0.037
Armed forces occupations, other ranks	0.001	0.032	0.002	0.043
Chief executives, senior officials and legislators	0.011	0.102	0.003	0.059
Administrative and commercial managers	0.024	0.153	0.017	0.130
Production and specialised services managers	0.030	0.169	0.013	0.115
Hospitality, retail and other services managers	0.011	0.106	0.009	0.093
Science and engineering professionals	0.043	0.202	0.014	0.116
Health professionals	0.015	0.122	0.048	0.215
Teaching professionals	0.039	0.194	0.091	0.288
Business and administration professionals	0.038	0.191	0.036	0.187
Information and communications technology professionals	0.028	0.166	0.007	0.082
Legal, social and cultural professionals	0.012	0.107	0.021	0.143
Science and engineering associate professionals	0.059	0.236	0.014	0.118

Health associate professionals	0.012	0.107	0.053	0.223
Business and administration associate professionals	0.051	0.220	0.070	0.255
Legal, social, cultural and related associate professionals	0.013	0.113	0.025	0.158
Information and communications technicians	0.014	0.117	0.004	0.060
General and keyboard clerks	0.016	0.127	0.056	0.230
Customer services clerks	0.017	0.128	0.037	0.188
Numerical and material recording clerks	0.040	0.197	0.038	0.192
Other clerical support workers	0.013	0.112	0.028	0.164
Personal service workers	0.034	0.181	0.048	0.215
Sales workers	0.042	0.201	0.101	0.301
Personal care workers	0.012	0.107	0.077	0.267
Protective services workers	0.014	0.119	0.003	0.053
Market-oriented skilled agricultural workers	0.005	0.069	0.001	0.030
Market-oriented skilled forestry, fishery and hunting workers	0.000	0.017	0.000	0.006
Subsistence farmers, fishers, hunters and gatherers	0.000	0.002	0.000	0.002
Building and related trades workers, excluding electricians	0.048	0.213	0.002	0.046
Metal, machinery and related trades workers	0.073	0.260	0.004	0.063
Handicraft and printing workers	0.005	0.074	0.002	0.049
Electrical and electronic trades workers	0.027	0.162	0.002	0.039
Food processing, wood working, garment and other craft and related trades workers	0.021	0.142	0.017	0.130
Stationary plant and machine operators	0.041	0.199	0.018	0.134
Assemblers	0.013	0.113	0.008	0.090
Drivers and mobile plant operators	0.081	0.272	0.005	0.074
Cleaners and helpers	0.017	0.129	0.068	0.252
Agricultural, forestry and fishery labourers	0.003	0.052	0.001	0.034
Labourers in mining, construction, manufactoring and transport	0.051	0.220	0.024	0.153
Food preparation assistants	0.008	0.091	0.017	0.129
Street and related sales and service workers	0.001	0.026	0.001	0.023
Refuse workers and other elementary workers	0.017	0.131	0.013	0.112
Sector				
Nace 10_to_13 + 14_15	0.036	0.187	0.038	0.192
Nace 16_to_18 + 58_to_60	0.024	0.154	0.013	0.113
Nace 26_to_27_33 + 19_to_22 + 23 + 29_30 + 31_32	0.107	0.309	0.042	0.201
Nace 24_25 + 28	0.067	0.250	0.014	0.119
Nace 45_46	0.095	0.293	0.046	0.209
Nace 47	0.113	0.317	0.132	0.338
Nace 49_to_52	0.026	0.159	0.008	0.088
Nace 70_71_78_81_82 + 64_to_66_69_80 +53_61_ to_63_79	0.186	0.389	0.169	0.375
Nace 75_86_to_88	0.061	0.239	0.234	0.423
Nace 68_72_to_74_77_95 + 90_to_93_96	0.051	0.220	0.056	0.230
Nace 94	0.008	0.086	0.014	0.117
Nace B + 35_36 + 37_to_39	0.035	0.184	0.010	0.098
Nace F	0.087	0.282	0.015	0.122
Nace I	0.041	0.199	0.055	0.228
Nace P	0.062	0.241	0.154	0.361

Country				
Belgium	0.017	0.129	0.014	0.119
Bulgaria	0.012	0.109	0.015	0.122
Cyprus	0.001	0.037	0.001	0.038
Czech Republic	0.032	0.175	0.027	0.163
Germany	0.212	0.409	0.234	0.423
Estonia	0.003	0.055	0.004	0.063
Spain	0.070	0.255	0.064	0.244
Finland	0.010	0.099	0.012	0.109
France	0.125	0.331	0.118	0.323
Greece	0.011	0.103	0.010	0.099
Croatia	0.006	0.077	0.006	0.077
Hungary	0.014	0.119	0.014	0.116
Italy	0.068	0.251	0.057	0.231
Lithuania	0.008	0.090	0.009	0.097
Luxembourg	0.003	0.053	0.002	0.043
Latvia	0.005	0.073	0.007	0.083
Malta	0.001	0.034	0.001	0.029
Netherlands	0.056	0.229	0.054	0.227
Norway	0.018	0.131	0.016	0.127
Poland	0.057	0.231	0.054	0.227
Portugal	0.016	0.124	0.018	0.132
Romania	0.033	0.178	0.029	0.169
Sweden	0.024	0.154	0.027	0.161
Slovenia	0.005	0.073	0.005	0.068
Slovakia	0.012	0.108	0.012	0.109
United Kingdom	0.182	0.386	0.188	0.391
Observations No.	4,338,055		4,547,414	

Sources: SES (2014); HWWI (2017).

Table A2: Wage regressions for the Oaxaca-Blinder-decomposition: cross-country sample

	Men			Women		
	Coefficient	SE	P>|t|	Coefficient	SE	P>|t|
0-59 % of a full-timer's normal hours (in the local unit)	-0.129	0.002	0.000	-0.056	0.002	0.000
60-99 % of a full-timer's normal hours (in the local unit)	-0.084	0.002	0.000	-0.032	0.001	0.000
Public control (>50 %)	0.044	0.002	0.000	0.037	0.001	0.000
Temporary contract	-0.082	0.002	0.000	-0.070	0.002	0.000
Size of the enterprise 1-49	-0.163	0.001	0.000	-0.125	0.001	0.000
Age (reference: 40-49 years)						
14-19	-0.362	0.005	0.000	-0.303	0.004	0.000
20-29	-0.156	0.002	0.000	-0.103	0.002	0.000
30-39	-0.053	0.001	0.000	-0.025	0.001	0.000
50-59	-0.001	0.001	0.526	-0.001	0.001	0.629
60+	-0.025	0.002	0.000	-0.017	0.002	0.000
Tenure (reference: 5-14 years)						
0-1 years	-0.107	0.001	0.000	-0.076	0.002	0.000
2-4 years	-0.062	0.001	0.000	-0.049	0.001	0.000
15+ years	0.095	0.001	0.000	0.087	0.001	0.000
Qualification (reference: ISCED 3-4)						
ISCED 0-2	-0.043	0.001	0.000	-0.027	0.002	0.000
ISCED 5-8	0.119	0.002	0.000	0.100	0.001	0.000
Occupation (reference: labourers in mining, construction, manufactoring and transport)						
Commissioned armed forces officers	0.600	0.093	0.000	0.294	0.089	0.001
Non-commissioned armed forces officers	0.859	0.015	0.000	0.920	0.020	0.000
Armed forces occupations, other ranks	0.210	0.029	0.000	0.355	0.012	0.000
Chief executives, senior officials and legislators	0.999	0.007	0.000	0.994	0.011	0.000
Administrative and commercial managers	0.887	0.005	0.000	0.855	0.005	0.000
Production and specialised services managers	0.702	0.005	0.000	0.772	0.006	0.000
Hospitality, retail and other services managers	0.486	0.007	0.000	0.417	0.007	0.000
Science and engineering professionals	0.533	0.003	0.000	0.599	0.005	0.000
Health professionals	0.765	0.008	0.000	0.632	0.004	0.000
Teaching professionals	0.590	0.005	0.000	0.658	0.004	0.000
Business and administration professionals	0.632	0.004	0.000	0.634	0.004	0.000
Information and communications technology professionals	0.599	0.004	0.000	0.684	0.006	0.000
Legal, social and cultural professionals	0.514	0.006	0.000	0.563	0.004	0.000
Science and engineering associate professionals	0.334	0.003	0.000	0.352	0.004	0.000
Health associate professionals	0.303	0.005	0.000	0.390	0.003	0.000
Business and administration associate professionals	0.424	0.003	0.000	0.419	0.004	0.000
Legal, social, cultural and related associate professionals	0.274	0.005	0.000	0.385	0.004	0.000
Information and communications technicians	0.355	0.004	0.000	0.442	0.007	0.000
General and keyboard clerks	0.187	0.004	0.000	0.255	0.003	0.000
Customer services clerks	0.193	0.004	0.000	0.227	0.003	0.000
Numerical and material recording clerks	0.174	0.003	0.000	0.286	0.003	0.000
Other clerical support workers	0.115	0.005	0.000	0.245	0.004	0.000
Personal service workers	0.101	0.004	0.000	0.113	0.003	0.000
Sales workers	0.098	0.003	0.000	0.115	0.003	0.000
Personal care workers	0.106	0.005	0.000	0.184	0.003	0.000
Protective services workers	-0.078	0.004	0.000	0.069	0.009	0.000
Market-oriented skilled agricultural workers	0.037	0.006	0.000	0.129	0.015	0.000

Market-oriented skilled forestry, fishery and hunting workers	0.062	0.028	0.026	0.123	0.077	0.108
Subsistence farmers, fishers, hunters and gatherers	-0.160	0.053	0.003	0.077	0.051	0.133
Building and related trades workers, excluding electricians	0.152	0.003	0.000	0.159	0.010	0.000
Metal, machinery and related trades workers	0.185	0.003	0.000	0.171	0.007	0.000
Handicraft and printing workers	0.144	0.007	0.000	0.085	0.007	0.000
Electrical and electronic trades workers	0.209	0.003	0.000	0.201	0.009	0.000
Food processing, wood working, garment and other craft and related trades workers	0.054	0.003	0.000	0.053	0.004	0.000
Stationary plant and machine operators	0.151	0.003	0.000	0.096	0.003	0.000
Assemblers	0.124	0.004	0.000	0.096	0.004	0.000
Drivers and mobile plant operators	0.085	0.002	0.000	0.147	0.006	0.000
Cleaners and helpers	-0.056	0.004	0.000	0.004	0.003	0.222
Agricultural, forestry and fishery labourers	-0.070	0.006	0.000	-0.022	0.008	0.005
Food preparation assistants	0.021	0.007	0.001	0.035	0.004	0.000
Street and related sales and service workers	-0.155	0.014	0.000	-0.096	0.014	0.000
Refuse workers and other elementary workers	-0.062	0.003	0.000	-0.027	0.004	0.000
Sector (reference: sector P)						
Nace 10_to_13 + 14_15	0.052	0.004	0.000	-0.013	0.003	0.000
Nace 16_to_18 + 58_to_60	0.091	0.004	0.000	0.080	0.004	0.000
Nace 26_to_27_33 + 19_to_22 + 23 + 29_30 + 31_32	0.167	0.004	0.000	0.129	0.003	0.000
Nace 24_25 + 28	0.135	0.004	0.000	0.105	0.004	0.000
Nace 45_46	0.088	0.004	0.000	0.075	0.003	0.000
Nace 47	0.061	0.004	0.000	0.009	0.003	0.002
Nace 49_to_52	0.050	0.004	0.000	0.081	0.004	0.000
Nace 70_71_78_81_82 + 64_to_66_69_80 +53_61_to_63_79	0.132	0.004	0.000	0.087	0.002	0.000
Nace 75_86_to_88	-0.014	0.004	0.001	-0.014	0.002	0.000
Nace 68_72_to_74_77_95 + 90_to_93_96	0.051	0.004	0.000	0.010	0.002	0.000
Nace 94	0.042	0.006	0.000	0.080	0.004	0.000
Nace B + 35_36 + 37_to_39	0.226	0.004	0.000	0.176	0.004	0.000
Nace F	0.126	0.004	0.000	0.035	0.004	0.000
Nace I	-0.016	0.004	0.000	-0.014	0.003	0.000
Country (reference: France)						
Belgium	0.160	0.002	0.000	0.292	0.002	0.000
Bulgaria	-2.009	0.003	0.000	-2.023	0.003	0.000
Cyprus	-0.431	0.007	0.000	-0.441	0.006	0.000
Czech Republic	-1.142	0.002	0.000	-1.185	0.003	0.000
Germany	0.111	0.002	0.000	0.085	0.002	0.000
Estonia	-1.031	0.004	0.000	-1.180	0.003	0.000
Spain	-0.288	0.003	0.000	-0.322	0.003	0.000
Finland	0.207	0.002	0.000	0.171	0.002	0.000
Greece	-0.567	0.004	0.000	-0.581	0.004	0.000
Croatia	-1.106	0.003	0.000	-1.103	0.003	0.000
Hungary	-1.283	0.002	0.000	-1.307	0.003	0.000
Italy	-0.078	0.003	0.000	-0.048	0.003	0.000
Lithuania	-1.546	0.006	0.000	-1.561	0.005	0.000
Luxembourg	0.262	0.004	0.000	0.362	0.005	0.000
Latvia	-1.378	0.005	0.000	-1.468	0.005	0.000
Malta	-0.486	0.005	0.000	-0.446	0.006	0.000
Netherlands	0.082	0.002	0.000	0.098	0.003	0.000
Norway	0.637	0.002	0.000	0.643	0.002	0.000
Poland	-1.196	0.002	0.000	-1.189	0.002	0.000
Portugal	-0.802	0.004	0.000	-0.818	0.005	0.000
Romania	-1.917	0.003	0.000	-1.855	0.003	0.000
Sweden	0.252	0.002	0.000	0.223	0.003	0.000
Slovenia	-0.689	0.004	0.000	-0.671	0.004	0.000

Slovakia	-1.151	0.003	0.000	-1.203	0.003	0.000
United Kingdom	0.058	0.002	0.000	0.039	0.003	0.000
Constant	2.469	0.004	0.000	2.315	0.004	0.000
No. of observations	4,338,055			4,547,414		
F-Statistic	95699.93			.		
Prob>F	0.000			0.000		
R^2	0.789			0.808		
Root MSE	0.366			0.323		

Sources: SES (2014); HWWI (2017).

Table A3: Oaxaca-Blinder-decomposition: cross-country sample

	Coefficient	SE	P>|t|
Overall			
Men	2.495	0.001	0.000
Women	2.354	0.001	0.000
Difference	0.142	0.001	0.000
Explained part	0.048	0.001	0.000
Unexplained part	0.094	0.001	0.000
Explained part			
0-59 % of a full-timer's normal hours (in the local unit)	0.018	0.000	0.000
60-99 % of a full-timer's normal hours (in the local unit)	0.010	0.000	0.000
Public control (>50 %)	-0.006	0.000	0.000
Temporary contract	0.001	0.000	0.000
Size of the enterprise 1-49	-0.004	0.000	0.000
Age (reference: 40-49 years)			
14-19	0.001	0.000	0.000
20-29	0.000	0.000	0.062
30-39	-0.001	0.000	0.000
50-59	0.000	0.000	0.527
60+	0.000	0.000	0.000
Tenure (reference: 5-14 years)			
0-1 years	0.000	0.000	0.800
2-4 years	0.000	0.000	0.303
15+ years	0.001	0.000	0.000
Qualification (reference: ISCED 3-4)			
ISCED 0-2	-0.001	0.000	0.000
ISCED 5-8	-0.005	0.000	0.000
Occupation (reference: labourers in mining, construction, manufactoring and transport)			
Commissioned armed forces officers	0.000	0.000	0.018
Non-commissioned armed forces officers	0.000	0.000	0.000
Armed forces occupations, other ranks	0.000	0.000	0.000
Chief executives, senior officials and legislators	0.007	0.000	0.000
Administrative and commercial managers	0.006	0.000	0.000
Production and specialised services managers	0.011	0.000	0.000
Hospitality, retail and other services managers	0.001	0.000	0.000
Science and engineering professionals	0.015	0.000	0.000
Health professionals	-0.026	0.000	0.000
Teaching professionals	-0.031	0.000	0.000

Business and administration professionals	0.001	0.000	0.000
Information and communications technology professionals	0.013	0.000	0.000
Legal, social and cultural professionals	-0.005	0.000	0.000
Science and engineering associate professionals	0.015	0.000	0.000
Health associate professionals	-0.012	0.000	0.000
Business and administration associate professionals	-0.008	0.000	0.000
Legal, social, cultural and related associate professionals	-0.003	0.000	0.000
Information and communications technicians	0.004	0.000	0.000
General and keyboard clerks	-0.007	0.000	0.000
Customer services clerks	-0.004	0.000	0.000
Numerical and material recording clerks	0.000	0.000	0.000
Other clerical support workers	-0.002	0.000	0.000
Personal service workers	-0.001	0.000	0.000
Sales workers	-0.006	0.000	0.000
Personal care workers	-0.007	0.000	0.000
Protective services workers	-0.001	0.000	0.000
Market-oriented skilled agricultural workers	0.000	0.000	0.000
Market-oriented skilled forestry, fishery and hunting workers	0.000	0.000	0.030
Subsistence farmers, fishers, hunters and gatherers	0.000	0.000	0.378
Building and related trades workers, excluding electricians	0.007	0.000	0.000
Metal, machinery and related trades workers	0.013	0.000	0.000
Handicraft and printing workers	0.000	0.000	0.000
Electrical and electronic trades workers	0.005	0.000	0.000
Food processing, wood working, garment and other craft and related trades workers	0.000	0.000	0.000
Stationary plant and machine operators	0.003	0.000	0.000
Assemblers	0.001	0.000	0.000
Drivers and mobile plant operators	0.006	0.000	0.000
Cleaners and helpers	0.003	0.000	0.000
Agricultural, forestry and fishery labourers	0.000	0.000	0.000
Food preparation assistants	0.000	0.000	0.001
Street and related sales and service workers	0.000	0.000	0.000
Refuse workers and other elementary workers	0.000	0.000	0.000
Sector (reference: sector P)			
Nace 10_to_13 + 14_15	0.000	0.000	0.000
Nace 16_to_18 + 58_to_60	0.001	0.000	0.000
Nace 26_to_27_33 + 19_to_22 + 23 + 29_30 + 31_32	0.011	0.000	0.000
Nace 24_25 + 28	0.007	0.000	0.000
Nace 45_46	0.004	0.000	0.000
Nace 47	-0.001	0.000	0.000
Nace 49_to_52	0.001	0.000	0.000
Nace 70_71_78_81_82 + 64_to_66_69_80 +53_61_ to_63_79	0.002	0.000	0.000
Nace 75_86_to_88	0.002	0.001	0.001
Nace 68_72_to_74_77_95 + 90_to_93_96	0.000	0.000	0.000
Nace 94	0.000	0.000	0.000
Nace B + 35_36 + 37_to_39	0.006	0.000	0.000
Nace F	0.009	0.000	0.000
Nace I	0.000	0.000	0.000

Country (reference: France)			
Belgium	0.000	0.000	0.000
Bulgaria	0.006	0.000	0.000
Cyprus	0.000	0.000	0.029
Czech Republic	-0.005	0.000	0.000
Germany	-0.002	0.000	0.000
Estonia	0.001	0.000	0.000
Spain	-0.002	0.000	0.000
Finland	0.000	0.000	0.000
Greece	0.000	0.000	0.000
Croatia	0.000	0.000	0.142
Hungary	-0.001	0.000	0.000
Italy	-0.001	0.000	0.000
Lithuania	0.002	0.000	0.000
Luxembourg	0.000	0.000	0.000
Latvia	0.002	0.000	0.000
Malta	0.000	0.000	0.000
Netherlands	0.000	0.000	0.000
Norway	0.001	0.000	0.000
Poland	-0.003	0.000	0.000
Portugal	0.002	0.000	0.000
Romania	-0.006	0.000	0.000
Sweden	-0.001	0.000	0.000
Slovenia	-0.001	0.000	0.000
Slovakia	0.000	0.000	0.315
United Kingdom	0.000	0.000	0.000
Unexplained part			
0-59 % of a full-timer's normal hours (in the local unit)	-0.018	0.001	0.000
60-99 % of a full-timer's normal hours (in the local unit)	-0.008	0.000	0.000
Public control (>50 %)	0.002	0.001	0.002
Temporary contract	-0.002	0.000	0.000
Size of the enterprise 1-49	-0.011	0.000	0.000
Age (reference: 40-49 years)			
14-19	-0.001	0.000	0.000
20-29	-0.009	0.000	0.000
30-39	-0.007	0.000	0.000
50-59	0.000	0.000	0.866
60+	-0.001	0.000	0.008
Tenure (reference: 5-14 years)			
0-1 years	-0.007	0.000	0.000
2-4 years	-0.003	0.000	0.000
15+ years	0.002	0.000	0.000
Qualification (reference: ISCED 3-4)			
ISCED 0-2	-0.003	0.000	0.000
ISCED 5-8	0.007	0.001	0.000
Occupation (reference: labourers in mining, construction, manufactoring and transport)			
Commissioned armed forces officers	0.000	0.000	0.074
Non-commissioned armed forces officers	0.000	0.000	0.014
Armed forces occupations, other ranks	0.000	0.000	0.000

Chief executives, senior officials and legislators	0.000	0.000	0.678
Administrative and commercial managers	0.001	0.000	0.000
Production and specialised services managers	-0.001	0.000	0.000
Hospitality, retail and other services managers	0.001	0.000	0.000
Science and engineering professionals	-0.001	0.000	0.000
Health professionals	0.006	0.000	0.000
Teaching professionals	-0.006	0.001	0.000
Business and administration professionals	0.000	0.000	0.690
Information and communications technology professionals	-0.001	0.000	0.000
Legal, social and cultural professionals	-0.001	0.000	0.000
Science and engineering associate professionals	0.000	0.000	0.001
Health associate professionals	-0.005	0.000	0.000
Business and administration associate professionals	0.000	0.000	0.329
Legal, social, cultural and related associate professionals	-0.003	0.000	0.000
Information and communications technicians	0.000	0.000	0.000
General and keyboard clerks	-0.004	0.000	0.000
Customer services clerks	-0.001	0.000	0.000
Numerical and material recording clerks	-0.004	0.000	0.000
Other clerical support workers	-0.004	0.000	0.000
Personal service workers	-0.001	0.000	0.014
Sales workers	-0.002	0.000	0.000
Personal care workers	-0.006	0.000	0.000
Protective services workers	0.000	0.000	0.000
Market-oriented skilled agricultural workers	0.000	0.000	0.000
Market-oriented skilled forestry, fishery and hunting workers	0.000	0.000	0.460
Subsistence farmers, fishers, hunters and gatherers	0.000	0.000	0.010
Building and related trades workers, excluding electricians	0.000	0.000	0.510
Metal, machinery and related trades workers	0.000	0.000	0.052
Handicraft and printing workers	0.000	0.000	0.000
Electrical and electronic trades workers	0.000	0.000	0.462
Food processing, wood working, garment and other craft and related trades workers	0.000	0.000	0.761
Stationary plant and machine operators	0.001	0.000	0.000
Assemblers	0.000	0.000	0.000
Drivers and mobile plant operators	0.000	0.000	0.000
Cleaners and helpers	-0.004	0.000	0.000
Agricultural, forestry and fishery labourers	0.000	0.000	0.000
Food preparation assistants	0.000	0.000	0.093
Street and related sales and service workers	0.000	0.000	0.004
Refuse workers and other elementary workers	0.000	0.000	0.000
Sector (reference: sector P)			
Nace 10_to_13 + 14_15	0.002	0.000	0.000
Nace 16_to_18 + 58_to_60	0.000	0.000	0.067
Nace 26_to_27_33 + 19_to_22 + 23 + 29_30 + 31_32	0.002	0.000	0.000
Nace 24_25 + 28	0.000	0.000	0.000
Nace 45_46	0.001	0.000	0.005
Nace 47	0.007	0.001	0.000
Nace 49_to_52	0.000	0.000	0.000

Nace 70_71_78_81_82 + 64_to_66_69_80 +53_61_ to_63_79	0.008	0.001	0.000
Nace 75_86_to_88	0.000	0.001	0.961
Nace 68_72_to_74_77_95 + 90_to_93_96	0.002	0.000	0.000
Nace 94	-0.001	0.000	0.000
Nace B + 35_36 + 37_to_39	0.000	0.000	0.000
Nace F	0.001	0.000	0.000
Nace I	0.000	0.000	0.613
Country (reference: France)			
Belgium	-0.002	0.000	0.000
Bulgaria	0.000	0.000	0.000
Cyprus	0.000	0.000	0.291
Czech Republic	0.001	0.000	0.000
Germany	0.006	0.001	0.000
Estonia	0.001	0.000	0.000
Spain	0.002	0.000	0.000
Finland	0.000	0.000	0.000
Greece	0.000	0.000	0.011
Croatia	0.000	0.000	0.434
Hungary	0.000	0.000	0.000
Italy	-0.002	0.000	0.000
Lithuania	0.000	0.000	0.057
Luxembourg	0.000	0.000	0.000
Latvia	0.001	0.000	0.000
Malta	0.000	0.000	0.000
Netherlands	-0.001	0.000	0.000
Norway	0.000	0.000	0.057
Poland	0.000	0.000	0.023
Portugal	0.000	0.000	0.009
Romania	-0.002	0.000	0.000
Sweden	0.001	0.000	0.000
Slovenia	0.000	0.000	0.000
Slovakia	0.001	0.000	0.000
United Kingdom	0.004	0.001	0.000
Constant	0.154	0.006	0.000
No. of observations	8,885,469		

Sources: SES (2014); HWWI (2017).

Table A4: Composition of the explained gender pay gaps at country level (in %), 2014

	Belgium	Bulgaria	Cyprus	Czech Rep.	Germany	Estonia
Hours of work	1.42	0.06	0.29	0.25	7.20	1.03
Public control (>50 %)	0.02	-0.09	-0.69	-0.25	-0.14	1.12
Temporary contract	0.13	-1.01	-0.90	0.04	0.10	-0.64
Firm size	-0.78	-1.72	-0.73	-0.15	1.19	-1.75
Age	-0.09	2.24	-0.80	0.55	0.48	-2.73
Tenure	-0.13	0.11	-0.22	-1.38	-0.22	0.33
Education	0.00	0.01	0.02	0.22	0.21	-0.02
Occupation	-0.08	-1.76	2.95	0.57	1.03	-0.63
Industry	1.68	3.25	2.03	5.26	5.05	10.12
Total explained gap	*2.17*	*1.09*	*1.96*	*5.10*	*14.89*	*6.83*
	Spain	**Finland**	**France**	**Greece**	**Croatia**	**Hungary**
Hours of work	1.16	-0.09	-0.10	1.10	-0.27	-1.28
Public control (>50 %)	0.46	-0.40	0.25	1.16	-0.58	-0.32
Temporary contract	0.69	0.06	0.23	-0.36	-0.54	-0.67
Firm size	-1.18	-1.03	-1.27	-1.62	-4.87	-3.39
Age	-1.02	-0.69	-0.13	0.20	-0.19	-1.75
Tenure	-0.50	1.04	-1.05	-0.48	-1.52	1.98
Education	0.02	0.15	0.40	0.01	-0.08	0.05
Occupation	1.00	3.25	-0.87	-1.30	-2.09	-3.18
Industry	3.55	4.69	6.98	4.86	5.47	8.54
Total explained gap	*4.18*	*6.98*	*4.45*	*3.58*	*-4.67*	*-0.01*
	Italy	**Lithuania**	**Luxem-bourg**	**Latvia**	**Malta**	**Nether-lands**
Hours of work	3.19	0.46	0.73	-0.03	0.54	3.79
Public control (>50 %)	-0.55	-0.01	1.31	0.84	0.96	1.64
Temporary contract	0.27	-1.86	0.39	-1.52	0.74	0.29
Firm size	-2.65	-1.79	-0.71	-3.04	-1.30	-0.45
Age	-0.75	-2.57	-0.28	-5.04	-0.74	-0.42
Tenure	-1.17	-0.85	-1.89	0.59	-0.32	3.48
Education	0.09	0.00	-0.14	0.08	-0.03	0.16
Occupation	-7.28	-6.70	-1.85	-0.89	0.04	1.94
Industry	4.88	5.16	0.41	10.31	0.10	-2.48
Total explained gap	*-3.96*	*-8.16*	*-2.04*	*1.30*	*-0.01*	*7.96*
	Norway	**Poland**	**Portugal**	**Romania**	**Sweden**	**Slovenia**
Hours of work	1.88	0.05	-0.26	0.16	0.22	0.39
Public control (>50 %)	0.34	-0.58	0.15	0.06	-0.23	-0.29
Temporary contract	0.28	-0.66	0.20	-1.20	-0.11	-1.83
Firm size	-1.61	-4.17	-4.65	-3.10	-1.39	-4.01
Age	-0.67	1.32	-1.13	-1.63	-0.77	-1.51
Tenure	0.33	-1.26	-0.78	-1.17	1.72	-2.15
Education	0.03	-0.12	-0.20	0.00	0.00	-0.31
Occupation	-1.43	-5.60	1.41	-5.51	-0.80	-5.51
Industry	5.99	5.56	7.44	7.47	6.92	7.03
Total explained gap	*5.14*	*-5.45*	*2.16*	*-4.91*	*5.57*	*-8.18*

	Slovak Rep.	United Kingdom
Hours of work	0.67	2.37
Public control (>50 %)	-0.23	0.16
Temporary contract	-0.38	0.29
Firm size	-1.23	-0.07
Age	0.14	-0.48
Tenure	0.45	-1.64
Education	0.01	0.13
Occupation	-2.01	4.46
Industry	5.34	3.36
Total explained gap	*2.75*	*8.57*

Sources: SES (2014), HWWI (2017).

Table A5: Composition of the unexplained gender pay gaps at country level (in %), 2014

	Belgium	Bulgaria	Cyprus	Czech Rep.	Germany	Estonia
Hours of work	-0.92	-0.20	-0.79	-0.27	-6.49	-2.21
Public control (>50 %)	0.00	2.32	-1.90	1.42	-0.32	4.15
Temporary contract	-0.03	0.13	0.03	-0.40	-0.41	0.23
Firm size	0.09	-2.70	0.42	-3.87	-0.75	-4.54
Age	-1.15	-2.40	-2.91	-2.74	-0.61	-3.20
Tenure	-0.61	-1.41	-2.00	-0.80	-0.58	-1.19
Education	0.25	0.94	-1.92	-0.32	-0.15	0.50
Occupation	-4.78	3.50	-6.47	2.25	-6.72	7.41
Industry	-1.98	8.08	1.02	9.05	6.70	8.62
Constant	11.13	0.47	24.81	8.75	15.14	6.90
Total unexplained gap	*1.98*	*8.73*	*10.28*	*13.07*	*5.80*	*16.67*
	Spain	**Finland**	**France**	**Greece**	**Croatia**	**Hungary**
Hours of work	-0.82	-0.06	0.28	-0.57	0.28	-0.96
Public control (>50 %)	-0.18	0.39	2.31	0.31	1.30	1.24
Temporary contract	-0.48	-0.63	0.18	-0.54	-0.55	-0.11
Firm size	-1.92	-0.42	-0.18	-2.46	-1.53	-2.51
Age	-1.02	-2.20	-1.48	-1.62	-2.66	-1.26
Tenure	-0.69	-0.05	-1.40	0.61	-1.87	-0.93
Education	-1.83	0.33	0.60	0.88	0.29	1.45
Occupation	-2.87	-1.90	-4.99	3.24	-5.77	4.44
Industry	5.24	7.96	-0.05	2.98	2.38	9.37
Constant	14.91	7.16	13.93	3.61	18.61	-1.47
Total unexplained gap	*10.34*	*10.57*	*9.20*	*6.45*	*10.49*	*9.25*

	Italy	Lithuania	Luxem-bourg	Latvia	Malta	Nether-lands
Hours of work	-2.28	-3.92	-2.38	-0.93	-3.50	-1.78
Public control (>50 %)	-2.17	4.95	0.37	4.51	-1.05	-4.83
Temporary contract	-0.29	0.18	-0.01	0.01	0.86	-1.03
Firm size	-0.22	-2.64	-0.18	-4.63	-1.09	0.32
Age	-0.87	-1.22	-0.76	0.83	-4.08	-4.46
Tenure	0.25	-0.82	-0.39	-2.02	0.17	-0.03
Education	0.06	-2.55	0.14	-0.29	0.09	1.32
Occupation	0.47	7.55	4.90	5.30	-7.23	-3.29
Industry	1.96	16.35	9.63	10.30	4.13	-0.65
Constant	11.90	-3.69	-5.20	-2.58	19.14	21.06
Total unexplained gap	*8.82*	*14.20*	*6.13*	*10.51*	*7.44*	*6.63*
	Norway	**Poland**	**Portugal**	**Romania**	**Sweden**	**Slovenia**
Hours of work	-2.20	-0.63	0.57	-0.34	0.24	-0.51
Public control (>50 %)	-2.42	0.25	0.08	1.42	-0.38	2.20
Temporary contract	-0.05	-0.63	-0.79	0.15	0.00	0.08
Firm size	-0.14	-4.38	-1.43	-0.37	-0.28	-1.32
Age	-1.26	-0.95	-2.77	-0.69	-1.49	0.23
Tenure	0.33	0.22	-0.80	-0.34	-0.69	-0.78
Education	-0.06	0.26	0.53	0.87	0.73	0.01
Occupation	2.49	-2.52	-6.24	0.76	-6.03	-4.80
Industry	2.99	2.83	0.06	6.05	-1.25	5.75
Constant	7.29	17.26	22.01	-1.64	16.11	9.45
Total unexplained gap	*6.97*	*11.70*	*11.23*	*5.87*	*6.96*	*10.29*
	Slovak Rep.	**United Kingdom**				
Hours of work	-0.71	-0.69				
Public control (>50 %)	-0.79	0.75				
Temporary contract	0.43	-0.55				
Firm size	-3.52	-1.49				
Age	-2.33	-3.42				
Tenure	-0.68	-1.53				
Education	-1.42	-0.19				
Occupation	2.59	-0.90				
Industry	4.70	0.49				
Constant	15.30	17.98				
Total unexplained gap	*13.56*	*10.46*				

Sources: SES (2014), HWWI (2017).

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