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Gender Wage Gaps and Gender Norms: Evidence from Recent Graduates

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Abstract

While there is plenty of evidence showing persistent gender wage gaps in the general population, we know relatively little about these differentials among recent graduates. This paper provides evidence on the extent of gender wage gaps five to six years after graduation across 19 countries and on the impact of gender norms on wage gaps. To address the potential endogeneity of gender norms we exploit two different instruments: i) gender norms of older cohorts and ii) and the ratio of labor supply of potential mothers and fathers of current graduates. Although men and women work almost the same number of hours per week, on average men earn more than women across all countries in the sample. At the mean, the total gender wage gap varies from 7 log points in Belgium to 21 log points in Estonia. Even though we have controlled for a large set of characteristics, these gaps are mostly left unexplained across countries. Using the unconditional quantile decomposition we find that men earn more than women at selected quantiles of the wage distribution and in addition we find considerable heterogeneity in the size of the wage gap across countries. As the distributions of various characteristics do not differ much across gender, the wage gap along the distribution is mostly driven by the wage structure effect. We find that the wage gap is either widening at the top of the distribution (the glass ceiling effect) and/or it is widening at the bottom of the distribution (the sticky floor effect) for half of the countries in our sample. Our IV estimates indicate that cultivating non-egalitarian attitudes and holding a traditional view on the role of women in the family play an important role in explaining higher wage gaps.

Keywords: gender wage gap, decompositions, university graduates
JEL codes: J16, J31, J71

1. Introduction

A voluminous economic literature focuses on the causes and consequences of gender differences in various labor market outcomes (see Altonji and Blank, 1999; Ponthieux and Meurs, 2015). Since the 1950s, women in developed countries have started to catch up with men concerning human capital accumulation, they have increased the labor force participation rates and they have gained access to a wide variety of different jobs (Goldin, 2006). Despite this breakthrough, women still hold unequal economic positions when comparing them to men (see OECD, 2012; Goldin, 2014; Blau and Kahn, 2017).

Although the gender wage gap declined after the 1950s in developed countries, the convergence process differed greatly across countries. Using the data from 1994 to 2001, Olivetti and Petrongolo (2008) show that the gender wage gap amounts to around 30 log points in the US and the UK, between 10 and 25 log points in central and northern European countries while the gap is around 10 log points in southern European counties. In a comprehensive empirical analysis of gender inequality, Ponthieux and Meurs (2015) report that the average gender wage gap in the OECD countries in 2010 amounts to 16% (in favour of men) with significant wage gap differentiation across countries that ranges from 10% to 25%.

Female labor force participation increased significantly in developed countries after the 1950s first as a result of technological change on the demand and supply side and then as a result of the introduction of work-family policies. Irrespective of the increase in women's employment rates, they are nonetheless still below the current employment rates of men. Using a large sample of countries for the period 1994-2001, Olivetti and Petrongolo (2008) show that the variation in gender employment gaps across countries varies from 10 percentage points in the US, the UK and Scandinavian countries, to 15-25 points difference in central and northern Europe up until 20-40 points difference in Ireland and southern Europe. They have shown that these gender employment gaps are

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negatively correlated with the gender wage gaps arguing that this negative correlation happens as a result of a more pronounced positive selection of women into employment.[1]

Since the 1970s the main explanations for the existence of the gender wage gaps were based on differences in human capital accumulation and labor market discrimination. As women have reached (or even in some countries surpassed) the amount of human capital of men, human capital-based explanations[2] become less relevant today (Goldin, Katz and Kuziemko, 2006). Thus, current literature has focused on other explanations of the gender wage gaps, which are based on gender segregation across occupations, industries and firms but also on the constraints that do not allow women to climb the ladder and to appear in the top jobs[3]. It has been shown that a lack of women in top jobs, can be either due to the glass ceiling effect (see Albrecht, Björklund and Vroman, 2003; Christofides, Polycarpou and Vrachimis, 2013) or due to the sticky floor effect (see Booth, Francesconi and Frank, 2003). Datta Gupta and Villeval (2006) show that between 1983 and 1995, the conditional gender wage gap was getting wider at the top of the distribution in Denmark while in the US the gap was narrowing at the top of the distribution.

Although, numerous studies estimate the gender wage gaps for the general population, the literature on the gender wage gaps among recent graduates remained relatively scarce. To fill this gap in the existing empirical literature, in this paper we study the gender wage gaps of recent college graduates across many countries. We make use of two unique datasets that permit us to study the labor market outcomes of university graduates across all fields of higher education 5-6 years after graduation. Focusing on recent graduates has significant importance since many differences in labor market outcomes come as a result of choices and constraints that individuals face mostly after graduation (Chevalier, 2007; Bertrand, Goldin and Katz, 2010; Azmat and Ferrer, 2017). As the wage gaps tend to deepen over the life course, it is quite important for the policy makers to have a picture of the actual wage inequality among the young and education sub-population of college graduates.

The second contribution of this paper is related to contemporary economic literature that has broadened its scope on the social norms and psychological factors as the important features which explain the choices individuals have made in the labor market (see Bertrand, 2011). Taking social norms and psychological factors seriously are not diminishing the role of important factors like family constraints, unequal distribution of unpaid work between men and women, and the role of motherhood, but on the contrary, it complements or it sometimes gives a new twist to their roles[4]. The main theoretical contribution concerning the role of social norms in economics has been made by Akerlof and Kranton (2000) who introduced the gender identity model, borrowing from the broader concept of identity that has been developed in social psychology. According to their model, men and women represent two social categories for which we have an ex-ante expectation about how they should behave. When the behaviour of men and women is not following the behaviour prescribed by social norms, this will lead to reduced utility since the utility function is dependent on the person's view of socially defined gender roles[5].

[1] The existence of the gender wage gaps is also due to the fact that part-time employment is mostly performed by women. In 2010 the percentage of male part-time workers is around 10% on average among OECD countries while for women the percentage of part-time workers is around 25% on average with much variation across counties which ranges from 5% to 60% (OECD, 2012). As one of the important factors that explain the gender wage gaps is certainly the wage structure. Blau and Kahn (1992), and Blau and Kahn (2003) show that the gender wage gap will be smaller in countries which have less dispersed wage distribution than in countries which have more widespread wage distribution.

[2] Although the evidence shows that women are catching up with men in terms of attained years of education but there could still exist gender differences in the quality of human capital that is attained. It is also possible that women are not catching up with men in terms of years of education in highly paid fields so this can be the reason why we still observe the unexplained part of the wage gap although the explained part gets smaller.

[3] For instance, occupational gender segregation has been found across all OECD countries, with women being concentrated in a smaller number of sectors (i.e. mostly service and education) than men (OECD, 2012).

[4] In an increasing number of studies economists are borrowing the framework from psychology in order to put forward the arguments which can explain the occupational segregation by gender in many countries as well as to laid out the reasons why women do not appear in the top positions. The experimental studies show that women are more risk averse and they are less inclined to compete (Gneezy et al., 2003; Niederle and Vesterlund, 2007) and these psychological factors may influence the gender wage gaps and can shape differential labor market outcomes across gender (Dohmen and Falk, 2011; Niederle and Vesterlund, 2011; Datta Gupta and Villeval, 2013). The psychological traits as self-esteem and risk aversion are found to be important for the choice regarding the field of study, sector and occupation (Antecol and Cobb-Clark, 2013).

[5] Note that the impact of gender role attitudes on the labor market outcomes is not restricted just to single mothers or married women but they will have an impact on the outcomes of single women as well.

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In this paper we have used cross-country variations to examine whether the various social norms regarding gender and working values have an impact on the total and unexplained part of the wage gap among recent graduates. To do so we have linked our data on recent graduates with the European Value Survey (EVS) and World Value Survey (WVS) where the variables on gender role attitudes and working values were available. To overcome the potential problem of endogeneity of gender norms, we exploited two different instruments to have an exogenous source of variation in gender norms. These include gender norms of older cohorts and lagged female-to-male participation rate. Apart from the standard variables which enter the wage equation model, in this paper we also control for the personal assessments of job characteristics which include various working characteristics such as autonomy, security, opportunity to learn new things, challenges, career prospects, social status, a chance of doing something useful for society and a chance to combine work with family tasks. The latter variables are usually left out in the estimation since they are either not captured in the data or they are intentionally left out but nevertheless, they can have an important role in determining an individual's choice of a particular job (OECD, 2017). For instance, women may have lower wages than men because they have chosen (either freely or such choice is imposed on them) lower paid jobs but still these jobs may have other characteristics that are important to them (i.e. job autonomy, work-life balance, etc.). Therefore, not controlling for the later characteristics will provide us with biased estimates of the gender wage gap.

Our empirical strategy consists of two steps. We first estimate the wage equations using the OLS to obtain the wage gaps at the mean and then we run the unconditional quantile regressions to obtain the wage gaps across the wage distribution. We first use a standard Oaxaca-Blinder decomposition method (Oaxaca, 1973 and Blinder, 1973) to decompose gender wage gaps at the mean and then we decompose wage gaps at various percentiles of the wage distribution using the unconditional quantile regression method proposed by Firpo et al., 2007 and Firpo et al., 2009. After computing the gender wage gaps we investigate to what extent are these gaps attributed to differences in characteristics and to what extent to different returns to the same characteristics. To the best of our knowledge, this is the first study that estimates the gender wage gap along the wage distribution among recent graduates in many countries.

Assuming that men and women have the same return to observable characteristics, we find that on average women earn less than men across all countries, even after we have controlled for a rich set of individual and job characteristics.[6] There is a considerable variation in the gender wage differentials across countries, ranging from 3.9% in the Netherlands to 21% in Portugal. After dropping the assumption that men and women have the same returns to observable characteristics, we have assessed to what extent the wage differentials are ascribed to gender differences in characteristics and different returns to the same characteristics. The results from the Oaxaca-Blinder decomposition at the mean reveal that women have significantly lower wages than men in all countries. The mean wage gap ranges from 7 log points in Belgium to 21 log points in Estonia. These results remained almost unchanged when we estimated the wage differential on a sub-sample of childless graduates. Thus, the gender gap in earnings cannot be attributed to children.

Going beyond the mean reveals that in each country and at every point in the distribution, men earn more than women. Our results show heterogeneous patterns of the gender wage gap across countries. These patterns include countries where the gap is more pronounced at the bottom of the distribution (Spain, Austria, the Netherlands, Portugal and Lithuania), the gap is more pronounced at the top of the distribution (Germany, the United Kingdom, Norway, Czech Republic, Estonia and Slovenia), U-shaped gender wage gap (France, Finland and Turkey) and the countries where the gap is uniformly distributed (Japan and Poland). Nevertheless, the striking finding is that for a great majority of countries, the wage gap along the distribution is mostly driven by the unexplained

[6] Since our population of interest is relatively homogeneous, a large percentage of them being employed and most of them are working full-time, we are less concerned about the participation issues. Nevertheless, we have checked whether non-random sample selection is present in our sample and we have only found statistically significant sample selection in four countries for females and in one country for males. Given that recent graduates represent a group of people that is more homogeneous at least in terms of age and education, we assume that the estimated gender wage gaps that we found can serve as the lower bound of the gender wage gaps present in the population.

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component. Examining the magnitude of the gender wage gap at different parts of the wage distribution, we have found the presence of sticky floor and glass ceiling effects among half of the countries in our sample.

Finally, analyzing the impact of gender norms on wage differentials, our results indicate that abandoning the traditional role of women in a family and taking an egalitarian standpoint is associated with lower wage gaps. Our results provide evidence that more traditional gender identity norms lead to a higher total and unexplained gender wage gap. Although there are numerous public policies (i.e. anti-discrimination policies, family-work policies and in-work benefit policies) that are implemented to equalize the position and treatment between men and women, we still observe gender differences in earnings across various countries. It is even more striking that a relatively large part of this gap is left unexplained even among a quite homogeneous part of the sub-population as the recent graduates.

The remainder of the paper is organized as follows. The next section provides a short overview of the empirical literature on gender norms. In section 3 we present the methodology and the data and we report the descriptive statistics. Section 4 contains the results while section 5 summarizes our main findings and concludes.

2. Literature Review

In the last two decades, the empirical literature has shown that social norms have significant effects on labor market outcomes. In one of the first empirical studies, Fortin (2005) examined the role of gender norms and work values on the labor market participation of women and the gender wage gap across the OECD countries. Using the answers to the statements on the role of men and women from the World Values Survey, she has found that supporting social norms according to which women are viewed as the homemakers while men are viewed as the breadwinners is in a fact associated with women's labor market outcomes. Taking an anti-egalitarian attitude towards women's role in the labor market is negatively correlated with women's employment rates and relative earnings. Furthermore, the inherent conflict that women have between motherhood and market work (called mother's guilt) negatively interferes with women's employment rates. In a similar study, Fortin (2008) shows that gender differences in attitudes toward work among young adults in the US have an important role in explaining the gender wage gap.

Existing evidence points out that gender role attitudes are formed already in childhood by passing on the gender norms from parents to their children. Vella (1994) investigated the association between young women's attitudes toward traditional gender norms and the labor market behaviour of females. He found that traditional gender norms are formed early in childhood and these views are influenced by religious associations and parents' education. Another channel through which we can explain the increase in labor participation of women over time is suggested by Fernandez et al. (2004) who showed that there has been an increasing number of men who grew up in a family where their mother worked and as a result, men's preferences for working mother has changed. Taking a more progressive attitude towards family values had an effect on the next generation through the intergenerational transmission of gender role attitudes from parents to their children.

Fernandez (2007) studied the effect of culture on the female labor supply of the second generation of immigrants in the US. Using both the labor force participation rates and attitudes in the women's country of ancestry as factors that approximate culture, the author shows that these factors have an important effect on the female labor supply. Fernandez and Fogli (2009) examined the importance of culture on labor market outcomes and fertility among second generation of immigrant women in the US. They showed that cultural proxies - past female labor force participation rates and total fertility rates from the country of the ancestry of these women - have a significant effect on working hours and the number of children they have. Farre and Vella (2013) have examined the link between women's attitudes concerning the role of females in the labor market and family and whether these women's views affect the attitude of their children. They have confirmed the existence of the intergenerational transmission of gender role attitudes from mothers to their children as mothers who hold more progressive roles towards the role of women in the labor market and family have a higher probability to have working daughters.

In a more recent paper, Fortin (2015) investigated the effect of changing gender role attitudes on the labor force participation of women in the US over the period 1977-2006. She shows that the trend in gender role attitudes follows closely the trend of female labor force participation. While gender norms have become more progressive and more egalitarian until the mid-1990s, the following trend reversed afterward. This paper demonstrates that the occurrence of the AIDS crisis explains a substantial part of the change toward acquiring more traditional gender norms. Bertrand et al. (2015) document that gender identity norms impact women's labor supply, the distribution

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of relative income within households, marriage formation and division of home production. They showed that a higher probability that the wife's income exceeds the husband's income would make the wife less likely to participate in the labor market. They also found that wife spends more time doing housework if she earns more than her husband which comes as a consequence of transgressing gender identity norms. Steinhauer (2018) shows that the intensity of beliefs regarding the harm children suffer when their mothers' work has a significant effect on labor market outcomes and fertility. Although the gender wage gaps are not considered in this study, the author finds that in Switzerland due to different norms regarding working mothers, German-born women are 15-25% less likely to participate in the labor market compared to their French-born counterparts.

The role of institutions also plays an important part in shaping gender roles which subsequently influences gender (in)equality. Using the division of Germany as a natural experiment, Lippmann et al. (2019) showed that gender-equal institutions in East Germany created a culture that did not follow a male breadwinner norm, while the traditional gender norms were prevalent in West Germany. After the reunification, East German women are allowed to earn more than their husbands without having to increase the number of housework hours, without risking their marriage or exiting the labor market, as is the case in West Germany.

3. Methodology, data and descriptive statistics

3.1. Wage Equation

Our empirical strategy builds on the linear wage regression model which we estimate separately for each gender-country case:

$$Y_{gc} = \mathrm{X_{gc}}\beta_{gc} + \mathrm{Z_{gc}}\gamma_{gc} + \mathrm{W_{gc}}\delta_{gc} + \varepsilon_{gc} \quad (1)$$

Y_{gc} denotes the natural logarithm of an hourly wage, X_{gc} represents a vector of demographic characteristics (age, age squared/1000, dummy for living with a partner and dummy for living with the parents), Z_{gc} represents a vector of human capital variables (number of years of education currently attained and dummies for the field of studies[7], W_{gc} represents a set of personal assessments of job characteristics[8], ε_{gc} denotes the error term, the index c denotes country and the indices $g = m, f$ denote males and females, respectively.

We have decided to keep in the sample not only those individuals who work but also individuals who are not working. Since we do not observe wages for individuals who are not working, we had to estimate their potential wages. This raises the issue of selection bias since the labor market participation may not be random. For instance, if some unobserved variables are correlated with the decision to participate in the labor market and correlated with wages then our results will be biased. Nevertheless, we can expect that the problem of non-random participation is less pronounced in the case of university graduates than for the population in general as the former group of individuals is less concerned with family issues.

To obtain the gross hourly wages for non-working individuals we have estimated the wage equation with selection correction using the Heckman model. The wage equation is estimated separately for each country-gender case. We have constructed the gross hourly wages for non-working individuals using the unconditional Heckman prediction if the selected term in a particular country were to be significant, otherwise, we have set their wages missing and excluded those individuals from the analysis[9]. We have used the actual gross hourly wages for individuals whose wages are observed in the data.

3.2 Decomposition methods

As the starting point we use the Oaxaca-Blinder (OB) decomposition (see Oaxaca, 1973 and Blinder, 1973) which is a well-known approach for decomposing changes or differences across groups in the means of an outcome variable of interest. Since we want to analyse the distributional effects of the gender wage gap as well, we use the

[7]These include the following fields: Education, Humanities and Arts, Social Science, Business and Law, Science, Mathematics and Computing, Engineering, Manufacturing and Construction, Agriculture, Veterinary and Services and Health and Welfare.

[8]These assessments were constructed using the answers on the following question: *Please indicate how important the following job characteristics are to you personally?* These have included *i)* work autonomy (Autonomy), *ii)* job security (Security), *iii)* opportunity to learn new things (Learn), *iv)* new challenges (Challenge), *v)* good career prospects (Career), *vi)* enough time for leisure activities (Leisure), *vii)* social status (Social Status), *viii)* chance of doing something useful for society (Valuable) and *ix)* good chance to combine work with family tasks (Family Work). The individuals were offered a discrete-categorical scale of possible answers which ranged from 1 (not at all) to 5 (to a very high extent). We have dichotomized these variables into binary variables which equal 1 if individuals have answered either 4 or 5, otherwise the variables equal 0.

[9] We describe the specification of the wage and selection equations in the appendix. Given that we have in total 28 estimates of the wage and selection equations, we have decided only to show the estimates of lambda. The full set of results are available upon request.

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decomposition method that applies to other distributional parameters besides the mean. These distributional methods that go beyond the mean are important for identifying the factors behind changes or differences across the entire distribution (see Fortin, Lemieux and Firpo, 2011, for review). Although there are now many distributional decomposition methods one can use (Juhn, 1993; Donald, 2000; Machado, 2005; DiNardo, Fortin and Lemieux, 1996; Firpo, Fortin and Lemieux, 2007), we outline the RIF regression decomposition method proposed by Firpo, Fortin and Lemieux (2007), which we have applied in our analysis. The RIF regression decomposition method allows us to estimate the composition and wage structure effects over the entire wage distribution and it has the advantage that it can perform a detailed OB decomposition for various distributional parameters.

3.3 The Recentered Influence Function Regressions

The decomposition based on RIF regressions allows us to compute the detailed decomposition of the composition and wage structure effects for a set of distributional statistics so we can derive an influence function[10]. RIF evaluated at the observed wage y for some distributional statistic ψ can be defined as:

$$RIF(y;\ \psi) = \psi\ (f_Y) + IF(y;\ \psi\ ) \tag{2}$$

where $IF(y;\ \psi\ )$ represents the influence function. Assuming that the outcome variable (Y) is linearly separable in observables (X) and unobservables (ε), we can express the conditional expectation of the $RIF(y;\ \psi)$ as follows:

$$\mathbb{E}[RIF(y;\ \psi)|X] = \mathbb{E}[X\ \beta|X] + \mathbb{E}[\varepsilon|\mathrm{X}] = X\beta \tag{3}$$

since it is assumed that ε is independent of X, the last term in equation (3) disappears. The parameter β represents the effect of X on the unconditional τ-th quantile of Y[11]. The influence function for quantiles $IF(y; Q_\tau)$ is defined as follows:

$$IF(y;\ Q_\tau\ ) = \frac{\tau - 1\{y \le Q_\tau\}}{f_Y(Q_\tau)} \tag{4}$$

where $1\{\cdot\}$ is an indicator function and Q_τ is the τ-th quantile of the unconditional distribution of Y. Using the above definition for the influence function $IF(y; Q_\tau)$ we can define the RIF in the case of quantiles as follows:

$$\begin{aligned} RIF(y;\ Q_\tau\ ) &= Q_\tau + IF(y;\ Q_\tau\ ) \\ &= Q_\tau + \frac{\tau - 1\{y \le Q_\tau\}}{f_Y(Q_\tau)} \\ &= \theta_\tau 1\{y > Q_\tau\} + \pi_\tau \end{aligned} \tag{5}$$

where $\theta_\tau = 1/f_Y(Q_\tau)$ and $\pi_\tau = Q_\tau - \theta_\tau(1-\tau)$ are constants[12]. To compute the conditional expectation of the RIF for quantiles, we first estimate the τ-th quantile function on the sample $\widehat{Q_\tau}$ and estimate the density function evaluated at $\widehat{Q_\tau}$, $\hat{f}_Y(\widehat{Q_\tau})$ and then insert these estimates in the RIF equation:

$$\widehat{RIF}\left(y; \widehat{Q_\tau}\right) = \widehat{Q_\tau} + \frac{\tau - 1\{y \le \widehat{Q_\tau}\}}{\hat{f}_Y(\widehat{Q_\tau})} \tag{6}$$

In the second step, we estimate equation (6) by regressing $\widehat{RIF}\left(y; \widehat{Q_\tau}\right)$ on X and as a result, we obtain the estimated parameters of the τ-th unconditional quantile regressions:

$$\hat{\beta}_{g,\tau} = \left(\sum_{i\in N} X_i X_i'\right)^{-1} \sum_{i\in N} \widehat{RIF}\left(Y_{gi}; \widehat{Q_{g,\tau}}\right) X_i \tag{7}$$

The estimated parameters $\hat{\beta}_{g,\tau}$ has the unconditional (mean) interpretation, which is important since the standard OB decomposition uses this interpretation as well[13]. After computing the coefficients of the unconditional quantile

[10] The influence function $IF(y;\ \psi)$ is defined as directional derivative of a distributional statistic evaluated at the outcome distribution, $\psi(f_Y)$, where f_Y is the probability density function of Y. For formal definition and derivation of the influence function (see Wilcox, 2012).

[11] These parameters can be estimated either by OLS or with more flexible estimation techniques (Firpo, Fortin and Lemieux, 2009).

[12] Using the link function of the linear probability model (LPM), we can estimate the RIF for a given quantile τ , with the linear regression by regressing $1\{y \le Q_\tau\}$ on X, evaluated at y = Q_τ.

[13] Using the law of iterated expectations we can derive the unconditional expectation of the RIF as follows: E(RIF(y; Q_τ)) = Ex[E(RIF(y; Q_τ))|X] = E(X)β_τ . The coefficients β_τ measures the infinitesimal change in the distribution of X on the τth unconditional quantile of Y . Note that this interpretation is in contrast with the conditional mean interpretation which is valid in case of conditional quantile regression.

regressions we can simply estimate the equivalent of the OB decomposition at any τ-th unconditional quantile using the assumption of the conditional expectation of the RIF function:

$$\widehat{\Delta_O^\tau} = \mathbb{E}\left[\widehat{RIF}\left(Y_m; \widehat{Q_\tau}\right)|X_m\right] - \mathbb{E}\left[\widehat{RIF}\left(Y_f; \widehat{Q_\tau}\right)|X_f\right]$$

$$= \underbrace{\overline{X_f}\left(\hat{\beta}_{m,\tau} - \hat{\beta}_{f,\tau}\right)}_{\widehat{\Delta_S^\tau}} + \underbrace{\left(\overline{X_m} - \overline{X_f}\right)\hat{\beta}_{m,\tau}}_{\widehat{\Delta_X^\tau}} \quad (8)$$

where $\widehat{\Delta_S^\tau}$ and $\widehat{\Delta_X^\tau}$ represent the wage structure and the composition effect, respectively, computed at the τ-th quantile[14].

3.4. Data and descriptive statistics

We analyse the gender wage gaps of graduates using the Reflex (Research into Employment and professional flexibility) and Hegesco (Higher Education as a Generator of Strategic Competencies) data. These are two large-scale surveys providing information on graduates in higher education (i.e. bachelor, master and doctoral graduates). Both surveys are harmonized in the sense that they contain the same variables with the only difference being that the Reflex data sampled university graduates who finished their study programs in 1999/2000, while the Hegesco data sampled university graduates who have finished their study programs in 2002/2003. Thus, although these are not the same cohorts, the data have been collected comprehensively across cohorts.

The data enabled us to exploit the earnings of university graduates on the labor market once they leave the education phase. An important feature of the data concerns its coverage with 19 nationally representative surveys of individuals who complete their university education across various fields of study[15]. The data contains comprehensive information on graduates' employment status, earnings, working hours, personal and family characteristics, job characteristics and the field of study that has been completed.

The estimation sample comprises individuals aged between 23 and 55 years, we keep employees and self-employed while individuals in military service are excluded. We have excluded the lowest and highest percentile of the actual hourly wage[16] and we have also excluded missing observations for variables that we use in the wage estimation. There is no restriction concerning the working hours, so our estimation sample is comprised of individuals who are working part-time and full-time.

In table 1 and table 2 we present the descriptive statistics of variables for men and women, respectively. Although there are no noticeable differences in the socio-demographic variables between men and women within countries, we can notice that individuals differ in the socio-demographic characteristics between countries. For instance, the average age of recent graduates (both men and women) in Belgium is 28 while in Slovenia it is 34. Concerning the number of years of higher education that have been obtained, men and women in Slovenia obtained 2 more years of education than their counterparts in the UK. While more than 70% of individuals live with their partners in Finland and Norway, only 30% of Japanese live with their partners. If we look at whether people are having children (0-17), we can see that significant differences between countries are present. While in Spain only around 10% of individuals are having a child, in Norway almost every woman has a child. We can see that across countries there are some differences in the share of men and women by field of study. We observe a larger share of women in Education, Humanities and Arts, and Health and Welfare, which are fields of study that have been traditionally dominated by females. On the contrary, other fields such as Science, Mathematics and Computing and Engineering, Manufacturing and Construction are traditionally male-dominated fields. Notice that the share of men and female graduates in the Social Sciences, Agriculture and Veterinary and Services tend to be very similar.

Before we assess the magnitude of gender differentials, we start by looking at the unconditional mean differences in wages, earnings and working hours (see table 3). Across all countries (except Turkey), the mean hourly wage is higher for men. The last row in the table 3 shows that on average (taken across the countries), the mean hourly wage is around 13 euros for men and 11 euros for women. The unconditional mean wage gap is highest in Estonia where men earn on average 25% more than women while the gap is lowest in Turkey where men earn on average 5% less than women. We see that the mean working hours is higher for men in all countries. On average, men

[14] Note that it is possible to estimate the detailed decomposition of the wage structure and composition effects represented in terms of sums of the contribution of each covariate to these two effects at each τ, exactly as we have applied the OB decomposition instead.
[15] The data include the observations from the following countries: Austria (AT), Finland (FI), France (FR), Germany (DE), Italy (IT), the Netherlands (NL), Norway (NO), Spain (ES), the UK (UK), Belgium (Flanders) (BE), Czech Republic (CZ), Portugal (PT), Estonia (EE), Japan (JP), Slovenia (SI), Turkey (TR), Lithuania (LT), Hungary (HU) and Poland (PL).
[16] These percentiles are calculated on the sample of each country separately.

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work around 3 hours per week more than women. As men are having higher wages and since they are working longer hours these contribute to their higher gross monthly earnings. The mean difference in earnings is on average 24% in favour of men, with the largest difference in Estonia (35%) and Austria (34%) and the smallest difference in Turkey (8%).

Table 1. Descriptive statistics, Men

	IT	ES	FR	AT	DE	NL	UK	FI	NO	CZ	JP	PT	BE	EE	SI	TR	LT	PL	HU
Age	32.67	30.35	29.61	33.35	33.33	30.70	30.04	32.01	33.30	29.54	28.64	30.94	28.23	30.93	34.13	29.24	29.02	30.07	29.73
Education (y)	5.01	4.53	4.46	5.18	4.97	3.44	3.25	4.12	4.50	4.69	4.55	3.99	4.54	4.75	5.29	4.48	5.05	4.91	4.57
Partner	0.40	0.41	0.58	0.65	0.66	0.64	0.48	0.74	0.76	0.58	0.31	0.56	0.58	0.71	0.70	0.40	0.72	0.65	0.57
Family	0.42	0.41	0.05	0.05	0.03	0.08	0.29	0.02	0.02	0.26	0.31	0.27	0.24	0.10	0.17	0.41	0.12	0.17	0.25
Child 0-17	0.16	0.11	0.28	0.50	0.35	0.30	0.24	0.65	0.85	0.27	0.16	0.27	0.21	0.68	0.65	0.18	0.35	0.42	0.14
Field of Study																			
Education	0.01	0.06	0.02	0.06	0.04	0.07	0.01	0.02	0.12	0.06	0.03	0.10	0.02	0.05	0.05	0.38	0.11	0.03	0.09
Human/Arts	0.04	0.05	0.06	0.05	0.08	0.04	0.14	0.07	0.04	0.05	0.09	0.08	0.13	0.07	0.03	0.05	0.09	0.06	0.08
Soc/Bus/Law	0.39	0.32	0.25	0.41	0.26	0.42	0.29	0.19	0.25	0.30	0.46	0.35	0.32	0.35	0.37	0.22	0.34	0.44	0.47
Sci/Math/Comp	0.10	0.15	0.19	0.13	0.12	0.10	0.27	0.09	0.15	0.08	0.04	0.08	0.11	0.14	0.10	0.08	0.12	0.06	0.05
Eng/Manu/Cons	0.35	0.27	0.29	0.23	0.36	0.23	0.18	0.51	0.21	0.38	0.35	0.27	0.34	0.25	0.23	0.17	0.30	0.29	0.18
Agri/Vete/Serv	0.03	0.08	0.05	0.04	0.04	0.06	0.07	0.06	0.08	0.08	0.03	0.04	0.02	0.11	0.18	0.05	0.01	0.10	0.08
Health/Welfare	0.07	0.08	0.14	0.09	0.10	0.07	0.05	0.05	0.15	0.05	0.01	0.08	0.06	0.04	0.04	0.04	0.03	0.02	0.05
Job Character.																			
Autonomy	0.86	0.88	0.85	0.98	0.94	0.73	0.66	0.86	0.84	0.83	0.76	0.88	0.85	0.69	0.87	0.77	0.98	0.91	0.68
Security	0.80	0.92	0.66	0.75	0.80	0.71	0.79	0.84	0.76	0.78	0.74	0.87	0.71	0.80	0.76	0.87	0.75	0.79	0.74
Learn	0.92	0.93	0.93	0.93	0.84	0.90	0.90	0.88	0.89	0.87	0.81	0.93	0.92	0.85	0.89	0.89	0.93	0.87	0.76
Challenge	0.75	0.81	0.73	0.87	0.76	0.87	0.87	0.81	0.87	0.69	0.67	0.83	0.82	0.81	0.85	0.73	0.80	0.82	0.78
Career	0.79	0.88	0.69	0.64	0.54	0.71	0.82	0.63	0.58	0.86	0.60	0.75	0.72	0.63	0.73	0.81	0.80	0.79	0.55
Leisure	0.72	0.89	0.65	0.70	0.64	0.78	0.84	0.86	0.76	0.73	0.79	0.80	0.75	0.78	0.73	0.71	0.81	0.77	0.71
Social Status	0.45	0.53	0.44	0.46	0.41	0.39	0.36	0.37	0.27	0.59	0.42	0.49	0.40	0.64	0.41	0.81	0.65	0.62	0.42
Valuable	0.63	0.70	0.67	0.57	0.47	0.45	0.53	0.37	0.51	0.56	0.66	0.75	0.45	0.58	0.64	0.81	0.57	0.62	0.51
Family Work	0.77	0.87	0.76	0.60	0.57	0.60	0.32	0.80	0.70	0.71	0.63	0.73	0.72	0.57	0.66	0.78	0.79	0.63	0.52
Observations	705	982	346	567	611	1041	429	694	654	2115	923	159	451	217	722	605	227	372	244

Source: Own calculations.

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Table 2. Descriptive statistics, Women

	IT	ES	FR	AT	DE	NL	UK	FI	NO	CZ	JP	PT	BE	EE	SI	TR	LT	PL	HU
Age	31.94	29.42	29.02	32.63	32.89	30.14	30.29	31.89	33.25	29.28	28.26	30.30	28.26	31.24	33.80	28.92	29.21	29.93	29.17
Education (y)	5.08	4.42	4.05	5.17	5.07	3.42	3.18	4.18	3.83	4.60	4.23	4.07	4.67	4.63	5.16	4.74	4.99	4.87	4.40
Partner	0.51	0.46	0.66	0.63	0.65	0.70	0.59	0.76	0.76	0.66	0.29	0.55	0.68	0.68	0.72	0.40	0.67	0.66	0.65
Family	0.33	0.41	0.04	0.05	0.04	0.04	0.20	0.02	0.01	0.20	0.50	0.31	0.12	0.09	0.14	0.43	0.14	0.21	0.23
Child 0-17	0.20	0.09	0.30	0.30	0.30	0.29	0.22	0.54	0.95	0.34	0.15	0.30	0.23	0.80	0.68	0.12	0.39	0.39	0.20
Field of Study																			
Education	0.05	0.18	0.08	0.18	0.12	0.19	0.06	0.08	0.30	0.20	0.10	0.19	0.03	0.15	0.17	0.28	0.10	0.19	0.24
Human/Arts	0.18	0.09	0.11	0.11	0.20	0.08	0.27	0.14	0.04	0.08	0.38	0.10	0.25	0.14	0.06	0.13	0.10	0.14	0.12
Soc/Bus/Law	0.40	0.38	0.27	0.40	0.26	0.32	0.30	0.32	0.15	0.41	0.31	0.44	0.39	0.45	0.46	0.20	0.46	0.48	0.38
Sci/Math/Comp	0.09	0.08	0.12	0.06	0.09	0.03	0.19	0.06	0.04	0.04	0.03	0.05	0.07	0.05	0.05	0.09	0.12	0.04	0.02
Eng/Manu/Cons	0.10	0.07	0.12	0.07	0.10	0.05	0.02	0.08	0.05	0.11	0.05	0.06	0.10	0.06	0.04	0.09	0.11	0.05	0.06
Agri/Vete/Serv	0.02	0.04	0.03	0.04	0.06	0.06	0.04	0.05	0.03	0.05	0.03	0.07	0.03	0.07	0.07	0.03	0.03	0.06	0.04
Health/Welfare	0.16	0.15	0.27	0.14	0.17	0.26	0.12	0.26	0.40	0.10	0.11	0.10	0.13	0.08	0.15	0.17	0.08	0.04	0.14
Job Character.																			
Autonomy	0.83	0.86	0.87	0.96	0.93	0.71	0.73	0.90	0.85	0.86	0.73	0.94	0.89	0.68	0.87	0.81	0.95	0.88	0.73
Security	0.87	0.96	0.78	0.81	0.84	0.78	0.84	0.89	0.88	0.84	0.84	0.91	0.80	0.90	0.88	0.89	0.86	0.92	0.88
Learn	0.95	0.96	0.94	0.95	0.87	0.93	0.90	0.95	0.94	0.90	0.82	0.92	0.91	0.95	0.93	0.85	0.96	0.93	0.86
Challenge	0.70	0.82	0.64	0.86	0.78	0.89	0.84	0.85	0.88	0.68	0.64	0.88	0.81	0.86	0.85	0.75	0.77	0.78	0.75
Career	0.69	0.91	0.67	0.57	0.40	0.59	0.81	0.58	0.49	0.84	0.59	0.83	0.57	0.65	0.71	0.87	0.85	0.76	0.59
Leisure	0.73	0.90	0.79	0.77	0.64	0.84	0.80	0.90	0.81	0.71	0.83	0.79	0.78	0.82	0.79	0.74	0.82	0.80	0.71
Social Status	0.41	0.55	0.51	0.51	0.37	0.33	0.31	0.38	0.28	0.66	0.39	0.44	0.28	0.70	0.51	0.83	0.75	0.70	0.42
Valuable	0.74	0.78	0.73	0.68	0.58	0.65	0.67	0.55	0.67	0.65	0.68	0.79	0.58	0.68	0.72	0.88	0.58	0.68	0.59
Family Work	0.85	0.91	0.89	0.68	0.71	0.70	0.49	0.85	0.81	0.82	0.75	0.78	0.81	0.69	0.81	0.87	0.87	0.79	0.73
Observations	822	1792	742	604	684	1520	675	1181	1028	3112	1032	282	573	528	1420	328	434	558	465

Source: Own calculations

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4. Results

4.1. Results from the OLS and RIF regressions

Table 4 presents the results of the wage estimation using the OLS and RIF-regressions at the 10th, 50th and 90th percentiles. The specification of these regressions differs from the one described before only in so far as we have now added a female dummy variable which gives us the estimate of the gender wage gap that is left unexplained after controlling for our covariates[17].

The results of the OLS regression show that across all countries women earn (per hour) on average less than men. As we can see, there is a large variation in wage differentials across countries. While in the Netherlands women earn 3.9% less than men, in Portugal women earn almost 21% less than men. Our results are in line with the findings from other studies on recent graduates. Using the data on graduates from 1995 in 11 developed European countries, Garcia-Aracil (2007) showed that four years after their graduation, women earn less than men in all countries with the highest annual income gap in Germany, Sweden and the Netherlands. In a similar study, Triventi (2013) examined the gender wage gaps of European graduates five years after their graduation in 2000. According to his results, men's monthly earnings are on average higher than women's across all countries and while the unexplained gender wage gap is found to be highest in Czech Republic, Austria and Germany, the Scandinavian countries have the lowest gap.

Besides the mean effect, we are interested to quantify the effect of being a woman along the wage distribution. Although we are still assuming that the rewards to (observable) labor market characteristics are the same across men and women, we are now allowing for the possibility that the conditional wage differential varies across the wage distribution. The RIF regression results show that the unconditional effect of being a woman on wages is negative at the bottom, the middle and top part of the distribution across all countries[18]. Thus, women not only earn less than men on average, but they also earn less than men across the (unconditional) wage distribution.

Our evidence shows that even if the distribution of characteristics were the same over gender, nevertheless women would still receive lower returns across the wage distribution. The following evidence holds for all countries except Turkey where the results are not statistically significant. In addition, we have seen that in some countries the magnitude of lower returns for women is more pronounced either at the bottom or at the top of the distribution.

4.2. Decomposition results

In the following section, we present the results of the Oaxaca-Blinder decomposition and the decomposition based on unconditional quantile regressions. The advantage of using these decomposition methods over the previously used wage regression is that we can drop the assumption that men and women have the same returns to observable characteristics. We have taken male coefficients as the reference returns to characteristics so that the counterfactual female wage is computed as if females were rewarded as males. Wage regressions are estimated separately for men and women which means that the returns to labor market characteristics may differ across gender. The specification of the wage regressions has remained the same as in the previous section except for the female dummy which is now left out[19].

4.2.1. Results at the mean

The results of the Oaxaca-Blinder decomposition at the mean are presented in figure 1. The following figure shows that the mean gender wage gap varies significantly across countries with the largest wage gaps occurring in Estonia, Portugal, Japan and France while the countries with the smallest wage gaps are Belgium, the United Kingdom, the Netherlands and Turkey (although the latter result is not significant). A direct comparison of our estimates with the results found in other studies is unfortunately hampered since other studies can use a different methodology, have different sample selections and the choice of covariates may not be the same. Nevertheless, our results are somewhat similar to the estimates of the gender wage gaps among recent graduates found in other countries. Weinberger (1998) examined the gender wage gaps among college graduates in the US who have

[17] We only report the estimates on a female dummy variable. The full set of estimated coefficients are available upon request.
[18] The only exception is Turkey where we have found a positive effect but the result is not significant.
[19] We have grouped the covariates into the following categories: i) Demographic controls (age, dummy variable for living with a partner and a dummy variable for living with parents), ii) Education (number of years of higher education currently attained), iii) Field of Study (Education, Humanities and Arts, Social Sciences, Business and Law, Science, Mathematics and Computing, Engineering, Manufacturing and Constructing, Agriculture, Veterinary and Services and Health and Welfare) and iv) Job Characteristics (Autonomy, Security, Learn, Challenges, Career, Social Status, Valuable and Family Work). The coefficients on categorical variables are normalized so that the decomposition results are invariant to the choice of the omitted category.

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completed a four-year bachelor's degree. Using the hourly earnings in 1985 which is one to two years after the graduation date and controlling for very detailed information on college majors, college grade point.

Table 3. Average Wages, Working Hours and Monthly Gross Earnings

	Males			Females			Diff.	
	Wage	Hours	Earn	Wage	Hours	Earn	Wage	Earn
IT	10.68	39.29	1774	9.82	34.70	1406	8.73	26.20
ES	11.13	38.05	1786	9.99	35.49	1484	11.43	20.36
FR	15.54	35.50	2319	12.70	33.13	1755	22.37	32.18
AT	15.95	40.60	2775	13.69	35.54	2066	16.52	34.31
DE	19.31	39.52	3262	17.63	35.28	2539	9.53	28.46
NL	15.50	38.08	2551	14.38	33.45	2082	7.77	22.55
UK	15.92	38.87	2648	14.49	36.84	2289	9.84	15.67
FI	15.38	37.64	2488	12.96	35.96	1981	18.66	25.59
NO	18.30	38.09	3018	15.62	35.37	2388	17.20	26.40
CZ	8.66	39.30	1454	7.97	37.28	1235	8.75	17.72
JP	19.33	36.94	2404	16.41	34.91	1863	17.82	29.05
PT	13.18	37.21	2056	11.14	35.17	1570	18.29	30.98
BE	16.36	39.10	2727	15.34	36.40	2370	6.63	15.05
EE	10.31	39.14	1758	8.26	36.99	1302	24.77	34.97
SI	10.83	40.01	1819	9.82	38.60	1562	10.30	16.46
TR	2.60	44.47	447	2.76	41.16	412	-5.52	8.44
LT	8.18	39.31	1378	6.99	39.07	1182	17.06	16.61
PL	8.23	39.46	1399	7.18	35.69	1088	14.55	28.55
HU	6.31	39.36	1064	5.30	38.54	865	18.98	23.04
Average	12.72	38.94	2059	11.18	36.29	1655	13.35	23.82

Notes: Wages and earnings are given in euros. Weekly working hours pertain only to those individuals for whom we observe working hours (i.e. employed individuals). Earnings refer to gross monthly earnings based on contract hours in main employment.

Source: Own calculations

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Table 4. OLS and RIF regressions: Female Coefficients

	OLS		10th		50th		90th	
	Coef.	s.e	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.
IT	-0.100***	(0.024)	-0.080+	(0.046)	-0.120***	(0.030)	-0.106*	(0.046)
ES	-0.098***	(0.017)	-0.110***	(0.026)	-0.115***	(0.026)	-0.085**	(0.027)
FR	-0.155***	(0.027)	-0.046	(0.032)	-0.170***	(0.037)	-0.172***	(0.051)
AT	-0.114***	(0.020)	-0.109**	(0.040)	-0.150***	(0.027)	-0.100**	(0.036)
DE	-0.057**	(0.022)	-0.003	(0.049)	-0.054*	(0.023)	-0.098***	(0.028)
NL	-0.039***	(0.010)	-0.071**	(0.022)	-0.044***	(0.013)	-0.009	(0.018)
UK	-0.058*	(0.026)	0.007	(0.042)	-0.092**	(0.034)	-0.103*	(0.045)
FI	-0.125***	(0.015)	-0.082***	(0.021)	-0.145***	(0.023)	-0.162***	(0.034)
NO	-0.097***	(0.013)	-0.073**	(0.025)	-0.101***	(0.014)	-0.128***	(0.035)
CZ	-0.089***	(0.010)	-0.039*	(0.016)	-0.065***	(0.012)	-0.124***	(0.025)
JP	-0.104**	(0.037)	-0.156*	(0.068)	-0.096***	(0.025)	-0.267	(0.369)
PT	-0.208***	(0.044)	-0.179**	(0.068)	-0.268***	(0.072)	-0.149	(0.091)
BE	-0.042*	(0.019)	-0.017	(0.049)	-0.047*	(0.020)	-0.030	(0.037)
EE	-0.174***	(0.036)	0.009	(0.050)	-0.158**	(0.058)	-0.473***	(0.089)
SI	-0.090***	(0.020)	-0.106**	(0.035)	-0.083***	(0.024)	-0.050	(0.048)
TR	0.030	(0.042)	0.022	(0.073)	0.031	(0.049)	0.115	(0.084)
LT	-0.180**	(0.062)	-0.253*	(0.124)	-0.224**	(0.084)	-0.083	(0.077)
PL	-0.136***	(0.036)	-0.118*	(0.049)	-0.153***	(0.045)	-0.107	(0.088)
HU	-0.089	(0.092)	-0.172+	(0.098)	-0.117+	(0.068)	-0.114	(0.108)

Notes: Bootstrapped standard errors with 500 replications for the 10th, 50th and 90th percentiles and robust standard errors for OLS. +, *, ** and *** indicate statistical significance at the 10% level, 5% level, 1% and 0.1% level respectively.

Source: Own calculations.

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averages and the institution where the degree was obtained, she found that on average white men earn 10% (15%) more than white (black) women.

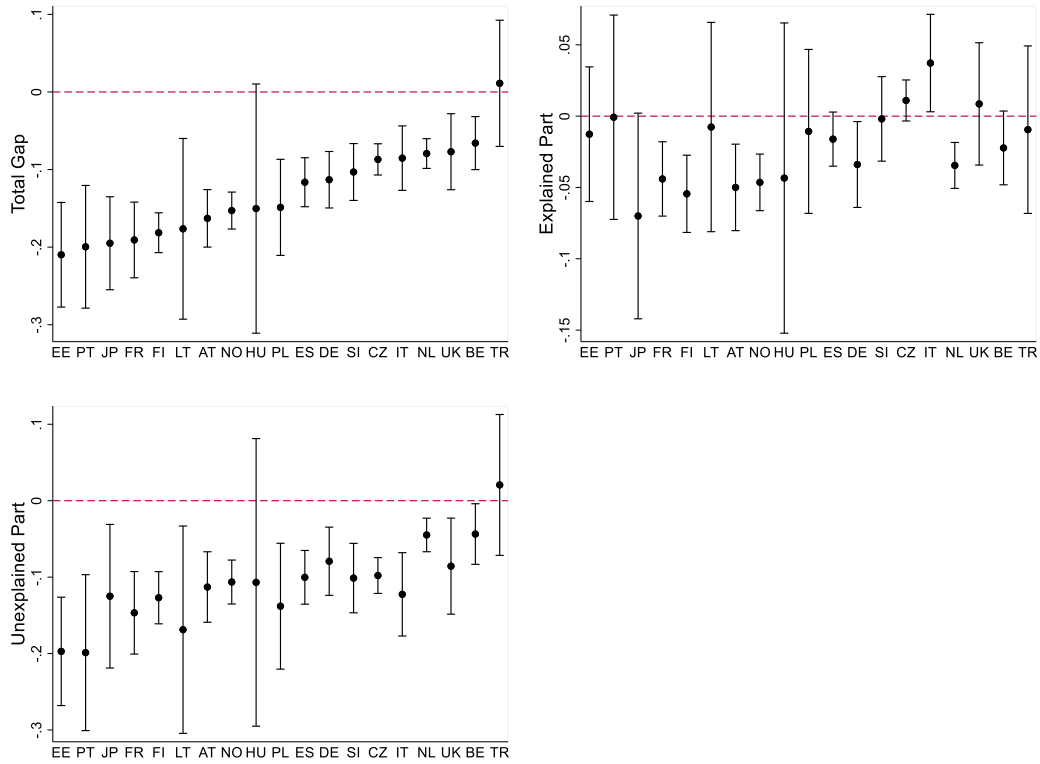

Figure 1. Oaxaca-Blinder Decomposition at the mean

Source: Own calculation.

Machin and Puhani (2003) study whether the choice of study can explain the gender wage gap among university graduates in Germany and the UK. Using the Labor Force Survey from 1996, they found that the unconditional gender wage gap in Germany is 28 log points and in the UK 21 log points, and they show that around 40% of the gender wage gap in both countries can be explained by the field of study.

In another study for the UK, Chevalier (2007) examined the role of education, choice of college majors, occupations and character traits on the gender pay gap of UK graduates who have been on the labor market up to 42 months after they have graduated in 1995. He shows that adding these choice variables and character traits to the model, significantly increases the explained gap to 80% which is an increase of 60 percentage points relative to the specification when these variables are not considered. Looking at the professionals in the financial and corporate sectors (MBAs) who graduated between 1990 and 2006 from a top US business school (the Booth School of Business), Bertrand et al. (2010) find that although at the beginning of their careers, male and females have similar annual earnings, however, five years after the graduation, male earnings were 30 log points higher while 10 to 16 years after the graduation, male earnings were almost 60 log points higher. They have shown that these differences in earnings can be explained in large part by gender differences in business school courses and grades, career interruptions and weekly working hours. Azmat and Ferrer (2017) examined the gender gap in career outcomes, performance gaps and earnings among young lawyers in the US. The authors show that half of the raw gender wage gap of 18 log points can be explained by individual and firm characteristics while approximately half of the remaining gap can be explained by two measures of performance they used.

In figure 2 we also present the explained and unexplained components of the total gap across countries. We can see that for a majority of the countries, the explained and unexplained parts contribute to increasing the wage differential, although the importance of the unexplained part is more pronounced and it is essentially driving the wage gap (see figure 3, top-left panel). Although the mean wage gap is almost entirely due to the wage structure effect we see that in Japan, France, Finland, Austria, Norway, Hungary, Germany, Italy and the Netherlands, a

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relatively smaller part of the total wage gap comes from the differences in characteristics between men and women. In these countries, the differences in characteristics between men and women work in the direction of increasing the wage gap with the exception of Italy where the composition effect contributes to the reduction of the wage gap. While the presence of the unexplained component of the wage gap can denote discrimination against women, one should be careful in interpreting these results since it may be the case that some unobserved factors confound our estimates.

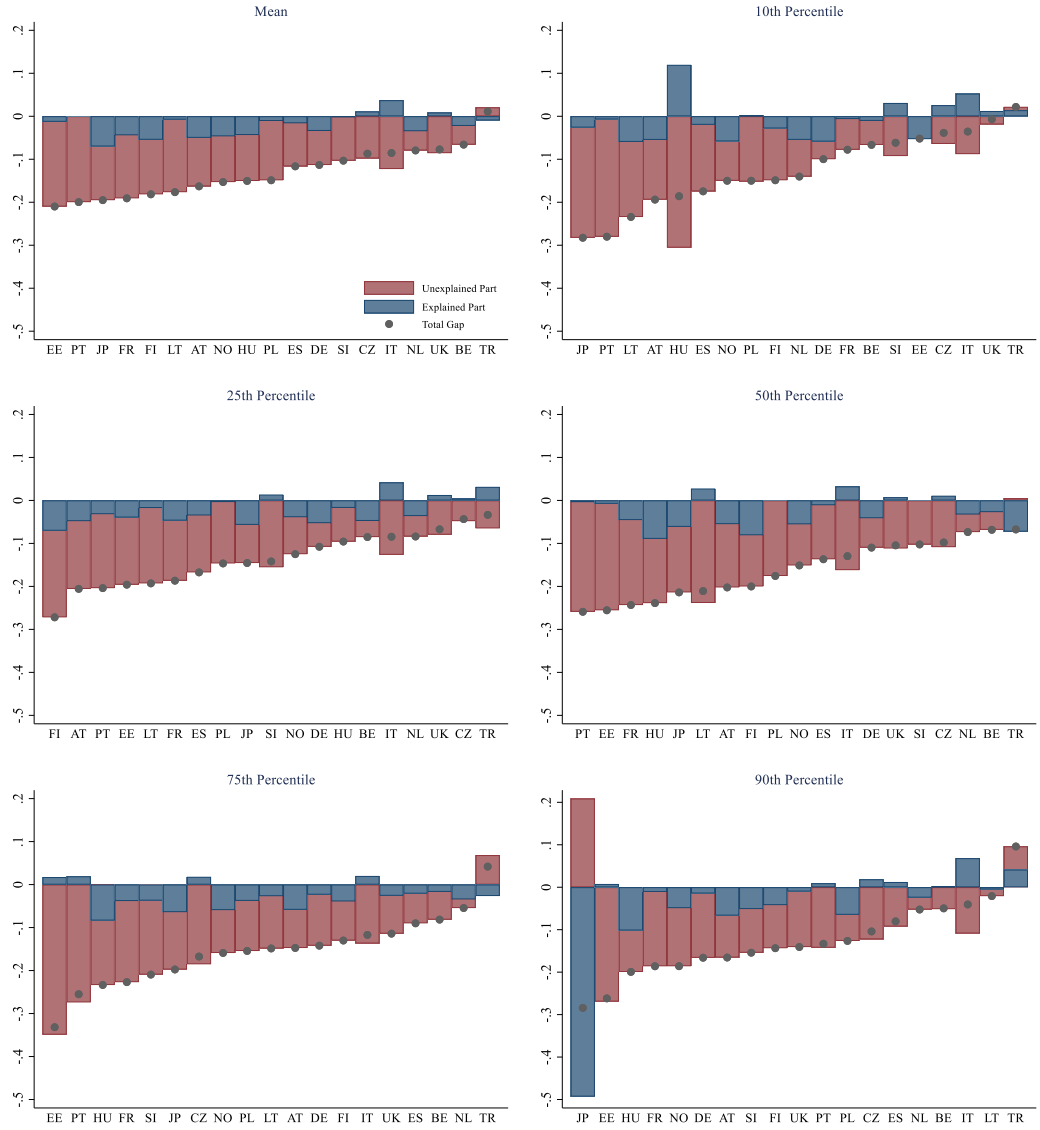

Figure 3. Oaxaca-Blinder Decomposition: Mean and Distributional Wage Gaps

Source: Own calculation.

Even though we cannot exclude the possibility that the unexplained part of the gap is influenced by some unobserved factors, still the later results seem interesting since we are comparing similar men and women and therefore we could expect that the effect of unobservables should be of somewhat lesser importance than it is the case for the population in general. Thus, it is quite striking that the gender wage gap is already pronounced for such individuals who have only recently entered the labor market. Similar findings have been shown by Boudarbat and Connolly (2013) who examined the gender wage gap among post-secondary graduates in Canada from 1988 to 2007. They have found that at the mean women earn 6% to 14% less than men during two to five years after graduation while the wage gap in the upper half of the distribution is notably wider. Nevertheless, the unexplained wage gaps we have found are smaller by 10 to 15 log points for most of the countries in our sample than the gaps

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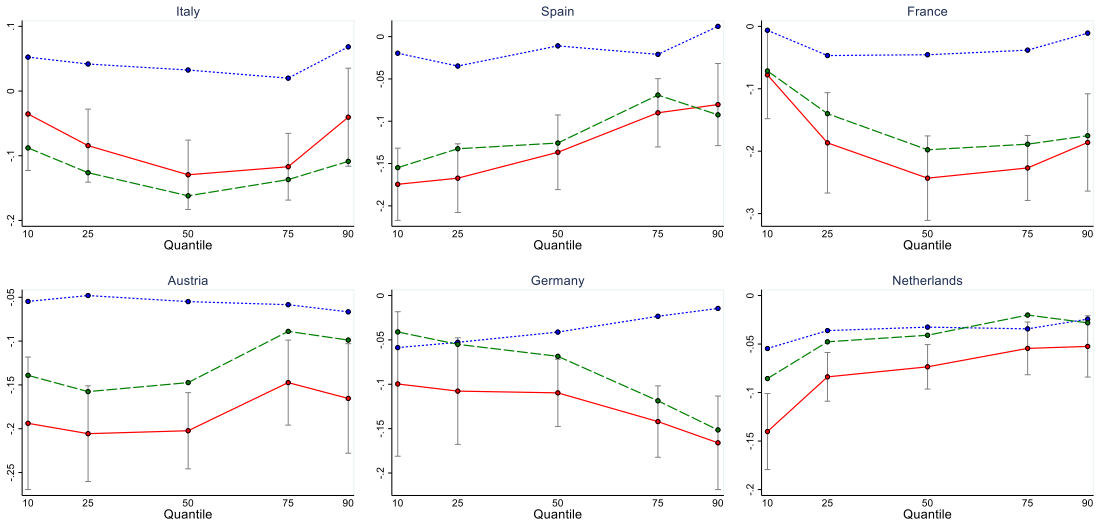
among young graduates from the US. For instance, controlling for the pre-MBA characteristics of highly educated individuals six years after graduation, Bertrand et al. (2010) estimated the gender wage gap of 25 log points. We see that Portugal and Estonia are the closest to these results, although we cannot directly compare the two findings. Equally important, it is worrying that a large fraction of the wage differentials we have found cannot be explained by the observable characteristics which go in line with some findings for the population in general (see Christofides et al., 2013).

4.2.2. Results across the distribution

Knowing the gender wage gap across the distribution gives us important information about the wage inequality between men and women as the wage inequality will be relatively lower (higher) in the wage distribution which is relatively less (more) dispersed. We are focusing only on the gender wage gap at the 10th, 25th, 50th, 75th and 90th percentile to ease the presentation of our results.

Figure 4 shows that the distributional wage gaps across countries follow heterogeneous patterns. Based on these observed patterns we can group countries into four general categories: i) the gender wage gap is decreasing as we move from the bottom to the top of the distribution (Spain, Finland, the Netherlands and Lithuania), ii) the gender wage gap is increasing as we move from the bottom to the top of the distribution (Germany, the United Kingdom, France, Czech Republic, Estonia and Slovenia), iii) the gender wage gap is U-shaped (Italy) and iv) the gender wage gap is uniformly distributed (Japan, Belgium and Poland). Such patterns of gender wage gaps are also found on a representative sample of working individuals across various European countries (see Albrecht et al., 2003; Arulampalam et al., 2007; Christofides et al., 2013).

After obtaining the estimates of the distributional wage gaps, we can inspect the degree to which the gender wage gaps differ at different points of the distribution in each country. Arulampalam et al. (2007) define two effects: i) a glass ceiling effect which happens when the wage gap is increases at the top of the wage distribution and ii) a sticky floor effect which happens when the wage gap is widening at the bottom of the distribution. Following these definitions, we will refer to the glass ceiling when the 90th percentile wage gap is higher than the estimated wage gap at the 50th and 75th percentile by at least two percentage points while we refer to the sticky floor when the 10th percentile wage gap is higher than the estimates wage gap at the 25th and 50th percentile by at least two percentage points. We have found the presence of a glass ceiling in Germany, the United Kingdom, Norway, Japan and Turkey[20] while the sticky floor effect is found in the Netherlands, Japan, Portugal and Lithuania (see table 5). One can notice that somewhat weaker evidence of the sticky floor and glass ceiling effects are found for countries where only one difference between different percentiles exceeds the two percentage points threshold. The detection of both of these effects is found in the study by Christofides et al. (2013) who show that either the glass ceiling or sticky floor is present in a non-negligible number of European countries.



[20] Note that the glass ceiling in Turkey does not work in favour of men but women.

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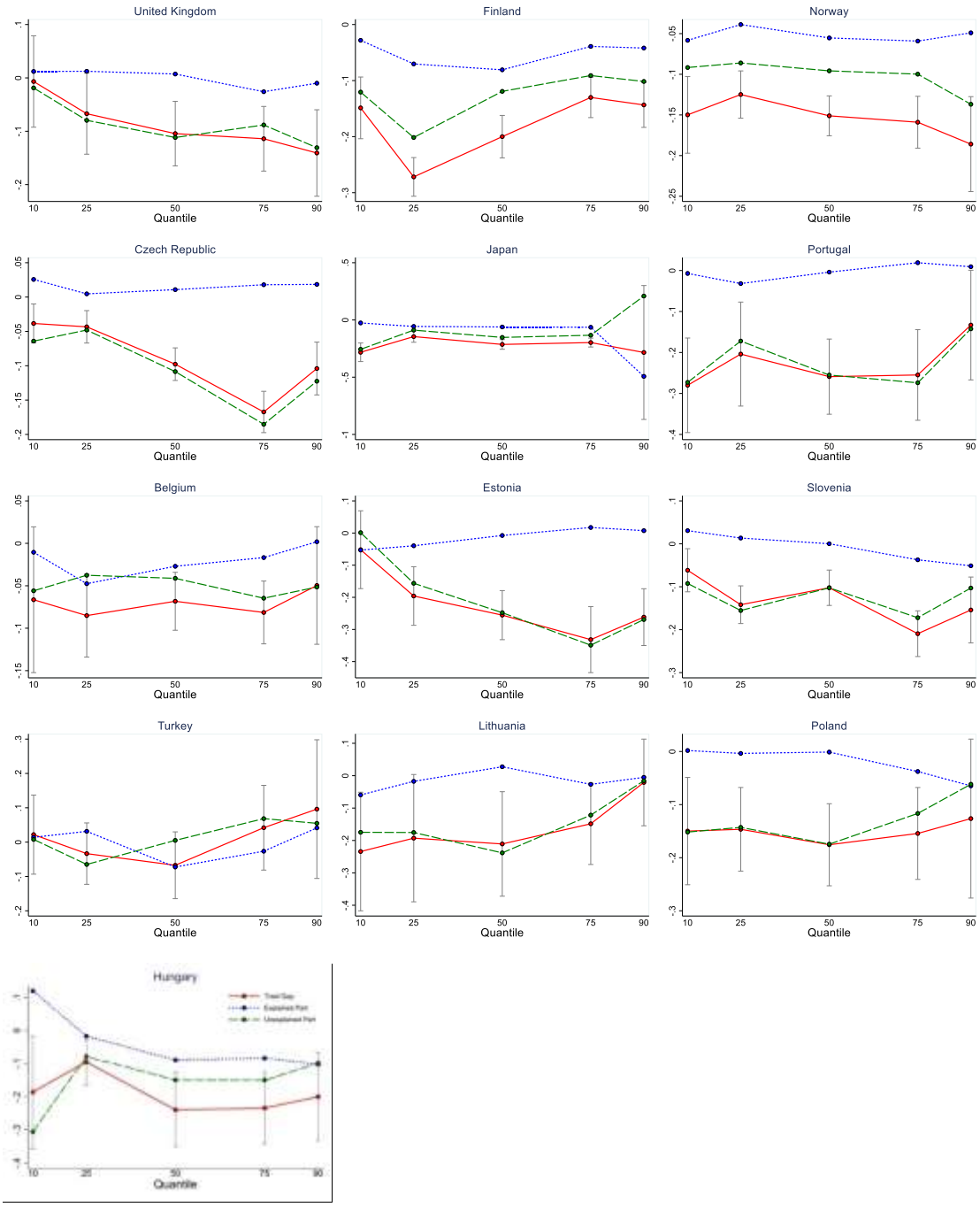

Figure 4. RIF Regression Decomposition: Distributional wage gap

Source: Own calculation.

We can notice that the explained part of the gap has a relatively negligible contribution to the total wage gap and it stays quite uniform across the percentiles of the wage distribution (see figure 4). This implies that the differences in individual characteristics between men and women are quite similar along the wage distribution which should not be surprising as we are comparing relatively homogeneous individuals. The relatively negligible contribution of the explained part to the total wage gap holds for all countries in the sample with only a few exceptions[21]. On the other hand, we see that the unexplained part accounts for most of the gender wage gap along the wage

[21] These exceptions pertain to Hungary at the 10th percentile, Turkey at the 50th percentile and for Italy and Japan for Italy and Japan at the 90th percentile.

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distribution. In other words, the (negative) differences in returns to individual characteristics follow very closely the pattern of the total wage gap. We have also checked whether the evidence of the sticky floor and glass ceiling effects holds when instead of the total gap we use the unexplained part of the gap. These results correspond to a great degree with our previous results when we used the total wage gap (see table 5).

Finally, we present the aggregate decomposition of the gender wage gap at the mean and across the distribution (see figure 3). At the 10th percentile, the largest wage inequality of around 30 log points is found in Hungary, while the lowest wage inequality is found in Estonia and Turkey. Recent graduates at the median of the wage distribution are relatively the worst off in Portugal where the wage inequalities are the most pronounced (i.e. the gap of 25 log points which translates to 28% higher wage) while in Turkey the wage inequalities completely vanish. At the 90th percent of the wage distribution, Estonians face the highest wage inequality of 27 log points while we see that in Turkey and Japan the returns to characteristics have switched the sign so that they become positive for females although the effect is not significant at the 5 % level.

4.2.3. Gender Wage Gaps and Gender Norms

As proposed in the literature, the existence of gender gaps in various labor market outcomes can be attributed to social norms as the informal comprehensions that drive the behaviour of men and women (see Fortin, 2005, 2008, 2015; Bertrand, 2011, Bertrand et al., 2015; Ponthieux and Meurs, 2015; Lippmann et al., 2019). These may trigger different gender choices regarding the decision of whether to enter the labor market, which occupation to choose from and how to distribute the housework between men and women in couples. Thus, we turn to investigate the link between the total and unexplained gap and gender norms. We run the country-level OLS regression where the total and unexplained gaps obtained from the Oaxaca-Blinder decomposition is regressed on each gender norm variable.

As the information on gender norms was not present in our data, we have linked the data on recent graduates with the European Value Survey (EVS) and World Value Survey (WVS) where the data on gender norms are available[22]. We have considered only individuals aged 25-55 to match the same age cohorts of individuals from the wage data. Since the country samples in EVS data are relatively small we have decided to use two waves of data (wave 3 and 4) but to retain the same cohort of individuals. Therefore, we have used individuals aged 25-55 from the EVS data for 1999-2001 (wave 3) which roughly corresponds to the same years when the wage data is collected and we have used individuals aged 35-65 from the EVS data for 2008-2010 (wave 4). The data for Japan comes from WVS since Japan is not sampled in EVS. Fortunately, the WVS data has the same set of questions as the EVS data so these two data sets are comparable although the years in which the data were collected slightly differ between these two sources. We have used the WVS data for 1999-2004 (wave 4) and 2005-2009 (wave 5) which pretty much corresponds to the same period of the EVS data that we use.

An agreement with the statement *when jobs are scarce, men have more right to a job than women (Scarce Jobs)*, confirms the traditional perception of the family in which the man is seen as the breadwinner but also consent with this statement makes an unjust treatment of women's rights to participate on the labor market. In Becker's (1971) model of employer discrimination, the taste of the employer for a certain social group will determine his willingness to pay for each group. According to his theory, if men have prejudices against women[23] then the larger difference in attitudes toward scarce jobs between men and women will lead to a higher wage gap.

Agreeing with the statements *a job is alright but what women really wants is home and children (Home and Child)* and *a pre-school child is likely to suffer if his or her mother work (Child Suffers)* identifies the traditional gender

[22] The EVS and WVS contain a set of question on gender norms where the individuals were asked to state their opinion on the following statements: *i) A working mother can establish just as warm and secure relationship with her children as a mother who does not work (Working Mother), ii) Both the husband and wife should contribute to household income (Contribute Income), iii) A pre-school child is likely to suffer if his or her mother work (Child Suffer), (iv) A job is alright but what women really wants is home and children (Home and Child), v) Having a job is the best way for women to be independent person (Independence Job), vi) Important for successful marriage to share the household chores(Household Chores) and vii) When jobs are scarce, men have more right to a job than women (Scarce Jobs).* On the first five questions, the respondents could state whether they *strongly agree, agree, disagree* or *strongly disagree* with the particular statement. These variables were recoded as 1 if an individual strongly agrees or agrees with the statement and 0 otherwise. Finally, for each of these five variables we have computed the differences in the shares between men and women who either strongly agree or agree on the statement, which then represent our independent variables. On the sixth question, the respondents could choose the following categories: very important, rather important and not very important. In this case we construct the variable that represents the difference in the shares between men and women who find sharing household chores very important. On the last question, the respondents could choose the following categories: *agree, disagree* and *neither agree nor disagree*. Using these responses, we have constructed a variable that represents the difference in shares between men and women who agree with that statement.

[23] It is also assumed that the employers are men.

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norms according to which a woman is seeing as a person who manages both her home and children. According to Becker's (1985) model, housewives will tend to choose less challenging jobs which pay lower wages while on the opposite men will choose higher-paid jobs. If women decide to have similar preferences concerning their role of looking after the home and children as these preferences are defined by the social norms which are defined by men, then we expect that women will be less discriminated by having such preferences. Hence, relatively fewer women than men prefer home and children is associated with the lower gender gap. On the other hand, an agreement with the following statements *i) both the husband and wife should contribute to household income (Contribute Income), ii) important for successful marriage to share the household chores (Household Chores), iii) a working mother can establish just as warm and secure relationship with her children as a mother who does not work (Working Mother) and iv) having a job is the best way for women to be independent person (Independence Job)* are capturing the progressive attitudes towards family where the man's role as the breadwinner and women's role as a homemaker breaks down but it also captures an equal treatment of working women.

Table 5. Total and Unexplained Wage Gaps: Glass Ceilings and Sticky Floors

	Total Wage Gap				Unexplained Wage Gap			
	Sticky Floor		Glass Ceiling		Sticky Floor		Glass Ceiling	
	10th-25th	10th-50th	90th-75th	90th-50th	10th-25th	10th-50th	90th-75th	90th-50th
IT								
ES	X				X	X	X	
FR								
AT								
DE			X	X			X	X
NL	X	X			X	X		
UK			X	X			X	
FI			X	X			X	X
NO								
CZ								
JP	X	X	X	X	X	X	X	X
PT	X	X			X			
BE								
EE			X				X	
SI				X				
TR			X*	x*				X*
LT	X	X						
PL								
HU	X				X	X		

Notes: We mark the symbols in blue (black) when both (just one) differences within the glass ceiling/sticky floor effects exceed the two percentage points threshold. ∗ represents cases when the ceiling/sticky floor effects work in favor of women

Source: Own calculations.

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Table 6 presents the regression results. Using the questions on *Household Chores and Working Mother*, we could capture both the traditional family view about the man as a breadwinner and the anti-egalitarian view toward women. We have found that if there are 1% more men than women who prefer to share the household chores, this will reduce the total and unexplained wage gaps by about a half log point. The size of this effect is quite substantial.

Table 6. Gender Wage Gaps and Gender Norms: OLS Estimates

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)
Total Gender Wage Gap							
Household Chores	0.490*						
	(0.250)						
Working Mother		0.734*					
		(0.404)					
Child Suffer			0.016				
			(0.287)				
Home and Child				-0.290			
				(0.313)			
Contribute Income					-0.711*		
					(0.373)		
Scarce Jobs						-0.301	
						(0.219)	
Independence Job							1.156*
							(0.586)
Constant	-0.103***	-0.089***	-0.128***	-0.110***	-0.150***	-0.116***	-0.059
	(0.018)	(0.026)	(0.026)	(0.023)	(0.016)	(0.017)	(0.037)
R-squared	0.193	0.163	0.000	0.051	0.176	0.100	0.196
Number of Observations	18	19	18	18	19	19	18
Unexplained Gender Wage Gap							
Household Chores	0.537**						
	(0.223)						
Working Mother		0.872**					
		(0.337)					
Child Suffer			0.232				
			(0.262)				
Home and Child				-0.187			
				(0.296)			
Contribute Income					-0.569		
					(0.344)		
Scarce Jobs						-0.360*	
						(0.189)	
Independence Job							1.108*
							(0.543)
Constant	-0.082***	-0.060**	-0.127***	-0.098***	-0.125***	-0.091***	-0.044
	(0.016)	(0.022)	(0.024)	(0.022)	(0.015)	(0.015)	(0.034)
R-squared	0.267	0.283	0.047	0.024	0.139	0.176	0.206
Number of Observations	18	19	18	18	19	19	18

Notes: In the upper panel the dependent variable is the total gender wage gap, while in the bottom panel the dependent variable is the unexplained gender wage gap, both computed from the Oaxaca-Blinder decomposition at the mean. The independent variables represent the differences in proportions of men and women who agree or find very important the statement related to gender norm variables, computed from the European Value Survey (EVS) and the World Value Survey (WVS). We use two waves of data (wave 3 and 4) as the country samples are relatively small although we retain the same cohorts of individuals across the waves. Thus, we use individuals aged 25-55 from the EVS data for 1999-2001 (wave 3) which roughly corresponds to the same years when the wage data is collected and we use individuals aged 35-65 from the EVS data for 2008-2010 (wave 4). The data for Japan comes from WVS since Japan is not sampled in EVS. Fortunately, the WVS data has the same set of questions as the EVS data so these two data sets are comparable although the years in which the data were collected slightly differ between these two sources. To be as close as possible to EVS data we have used the WVS data for 1999-2004 (wave 4) and 2005-2009 (wave 5) which pretty much corresponds to the waves of EVS we use. The following questions on gender norms have been used: *i*) *A working mother can establish just as warm and secure relationship with her children as a mother who does not work* (*Working Mother*), *ii*) *Both the husband and wife should contribute to household income* (*Contribute Income*), *iii*) *A pre-school child is likely to suffer if his or her mother work* (*Child Suffer*), *(iv) A job is alright but what women really wants is home and children* (*Home and Child*), *v*) *Having a job is the best way for women to be independent person* (*Independence Job*), *vi*) *Important for successful marriage to share the household chores*(*Household Chores*) and *vii*) *When jobs are scarce, men have more right to a job than women* (*Scarce Jobs*). The sample is restricted to individuals aged 20-55.

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Source: Own calculation.

For instance, the difference in proportions between men and women who prefer to share the household chores is 0.04 in Belgium while -0.13 in Norway. Ceteris paribus this mean that if Norway had the same difference in preferences on *Household Chores* as in Belgium, then the total and unexplained wage gap in these countries would be reduced by 0.085 log points. This seems as a large effect since the average total (unexplained) wage gap at the mean across 19 countries is -0.13 (-0.11) log points. Both the total and unexplained wage gaps are lower when relatively more men than women think that a working mother can have a warm relationship with her child as a mother who does not work. Under the assumption that the social norms about the role of women are either imposed by men or is a common belief held in a society, it is expected that this harm the women's labor market outcomes, although it is crucial how the women's behaviour will respond to the traditional gender role attitudes. Having fewer women who agree with the social norm which defines them as housewives, it is more likely that women's wages in that society are going to be higher as these women will be less discriminated for having such preferences. Thus, our results point out that breaking down the traditional family roles and taking an egalitarian standpoint in society are associated with lower wage gaps. Our evidence is in line with a couple of recent papers in which the authors have shown that holding less egalitarian attitudes and having the traditional view on the role of women is associated with a higher gender wage gap (Fortin, 2005; Fortin, 2008; Piazzalunga, 2018).

Moreover, our results point out that when more men than women agree with the statement on *Scarce Jobs*, this will correlate with a higher unexplained gap as employers can design their policies to discriminate against women. We have found that an increase of 1% in the proportion of men who believes that they should be employed if there is a shortage of jobs, increases the unexplained wage gap by more than a third of log points. The strength of this effect almost matches with the result found by Fortin (2005) on the sample of working individuals in 25 OECD countries. Having a relatively higher share of men who thinks that possessing a job is the best way for women to gain independence is associated with lower total and unexplained wage gaps. Concerning the remaining variables (*Child Suffer and Home and Child*) which are meant to capture breaking down with the traditional family breadwinner-homemaker model and converging to the gender egalitarian values we have not found any significant associations with the wage gaps.

4.2.4. Two-Stage Least-Squares Results

The results presented in the previous section are indicative of the correlation between gender norms and gender wage gaps. However, the OLS estimator is likely to be biased due to problems of omitted variables and reverse causality. Thus, to identify a causal relationship between wage gaps and gender norms we need an exogenous source of variation in gender norms. Gender norms may affect the wage gaps but also gender norms may have been influenced by the wage gaps.

Addressing the potential problem of endogeneity of gender norms we exploit two different instrumental variables as an exogenous source of variation in gender norms[24]. The first instrumental variable that we use is the lagged gender norms computed for the cohorts aged 55 to 90 (individuals coming from wave 3) and cohorts aged 65 to 95 (individuals coming from wave 4). Since there is a span of ten years between these two waves, in such a way we retain the same cohort of individuals for our instrumental variable. Thus, to overcome the potential problem of endogeneity of gender norms, we rely on the time variation of gender norms of individuals from different cohorts[25]. The rationale for using these instruments is based on the findings from the gender norm literature which have pointed out that the attitudes regarding the differential roles of men and women in the family and the labor market can be transmitted across generations which can affect the wage gaps of the current generation (see Giuliano, 2017). For instance, Farre and Vella (2013) found a positive association between mothers' gender role attitudes and their children's gender role attitudes and labor force participation while Fernandez et al. (2004) presented evidence of transmission of gender role attitudes between mothers and daughters-in-law. A note of caution is in order here. The following reasoning can be justified only if the gender norms are slowly evolving under the period

[24] In order to identify the parameter of interest, the instrumental variable must satisfy two conditions: i) the relevance condition which states that the instrumental variable has to be correlated with the endogenous variable and ii) the exclusion restriction which states that the instrumental variable affects the gender wage gap only through gender norms. Imbens and Angrist (1994) argues that when assumptions of independence and monotonicity are satisfied then the IV estimator represent the local average treatment effect (LATE). Thus, the IV estimates can be interpreted as the average effect of gender norms on wage gap for those countries whose gender norms have been affected by the instrumental variable.

[25] Exploiting the variation across space is also an option. Giavazzi et al. (2013) show that gender role attitudes in European countries have varied across time in the period 1980-2000.

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of our consideration. If that would not be the case, then the gender norms transmitted from older to younger cohorts would not satisfy a good candidate for our instrumental variable.

As a second instrumental variable, we use the ratio of female to male labor force participation (LFP) rate computed for each country in 1980 using the individuals aged 15-64. The following data comes from the World Development Indicators Database collected by the International Labour Organization. The ratio of female to male LFP rate more than 20 years ago should roughly correspond to the ratio of labor supply of mothers to fathers of the current recent graduates. Fernandez et al. (2004) presented evidence that the gradual transformation of the family

Table 7. Gender Wage Gaps and Gender Norms: 2SLS Estimates (Lagged Gender Norms)

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)
Total Gender Wage Gap							
Household Chores	0.576*						
	(0.294)						
Working Mother		1.319*					
		(0.819)					
Child Suffer			-0.123				
			(0.316)				
Home and Child				-1.352			
				(1.565)			
Contribute Income					1.502		
					(2.030)		
Scarce Jobs						-0.481*	
						(0.285)	
Independence Job							1.412
							(1.689)
Constant	-0.098***	-0.056	-0.118***	-0.047	-0.091	-0.107***	-0.044
	(0.019)	(0.048)	(0.028)	(0.095)	(0.058)	(0.019)	(0.100)
Number of Observations	18	19	18	18	19	19	18
Unexplained Gender Wage Gap							
Household Chores	0.621**						
	(0.262)						
Working Mother		0.932					
		(0.645)					
Child Suffer			0.080				
			(0.289)				
Home and Child				-0.993			
				(1.366)			
Contribute Income					0.134		
					(1.192)		
Scarce Jobs						-0.395*	
						(0.242)	
Independence Job							1.175
							(1.557)
Constant	-0.078***	-0.057	-0.115***	-0.050	-0.106***	-0.090***	-0.040
	(0.017)	(0.038)	(0.026)	(0.083)	(0.034)	(0.016)	(0.092)
Number of Observations	18	19	18	18	19	19	18

Notes: In the upper panel the dependent variable is the total gender wage gap, while in the bottom panel the dependent variable isthe unexplained gender wage gap, both computed from the Oaxaca-Blinder decomposition at the mean. The independent variables represent the differences in proportions of men and women who agree or find very important the statement related to gender norm variables, computed from the European Value Survey (EVS) and the World Value Survey (WVS). We use two waves of data (wave 3and 4) as the country samples are relatively small although we retain the same cohorts of individuals across the waves. Thus, we use individuals aged 25-55 from the EVS data for 1999-2001 (wave 3) which roughly corresponds to the same years when the wage data is collected and we use individuals aged 35-65 from the EVS data for 2008-2010 (wave 4). The data for Japan comes from WVS since Japan is not sampled in EVS. Fortunately, the WVS data has the same set of questions as the EVS data so these two data sets are comparable although the years in which the data were collected slightly differ between these two sources. To be as close as possible to EVS data we have used the WVS data for 1999-2004 (wave 4) and 2005-2009 (wave 5) which pretty much corresponds to thewaves of EVS we use. For our instrumental variable, we use lagged gender norms computed for the cohorts aged 55 to 90 (individuals coming from wave 3) and cohorts 65 to 95 (individuals coming from wave 4). The following questions on gender norms havebeen used: *i*) *A working mother can establish just as warm and secure relationship with her children as a mother who does not work* (*Working Mother*), *ii*) *Both the*

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husband and wife should contribute to household income (*Contribute Income*), *iii*) *A pre-school child is likely to suffer if his or her mother work* (*Child Suffer*), *(iv) A job is alright but what women really wants is home and children* (*Homeand Child*), *v*) *Having a job is the best way for women to be independent person* (*Independence Job*), *vi*) *Important for successful marriage to share the household chores*(*Household Chores*) and *vii*) *When jobs are scarce, men have more right to a job than women*(*Scarce Jobs*).

Source: Own calculation.

the model itself served as a propagation mechanism for the changed economic role of women which also led to different gender roles.

Table 8. Gender Wage Gaps and Gender Norms: 2SLS Estimates (Ratio Female-to-Male LFP Rate)

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)
Total Gender Wage Gap							
Household Chores	0.868*						
	(0.510)						
Working Mother		-9.950					
		(27.705)					
Child Suffer			2.269				
			(2.869)				
Home and Child				21.281			
				(253.767)			
Contribute Income					-1.243*		
					(0.732)		
Scarce Jobs						-0.721*	
						(0.450)	
Independence Job							3.238
							(2.409)
Constant	-0.091***	-0.769	-0.322	-1.437	-0.168***	-0.097***	0.055
	(0.029)	(1.766)	(0.237)	(15.518)	(0.023)	(0.027)	(0.142)
Number of Observations	17	17	17	17	17	17	17
Unexplained Gender Wage Gap							
Household Chores	0.906**						
	(0.456)						
Working Mother		-10.382					
		(29.504)					
Child Suffer			2.368				
			(2.604)				
Home and Child				22.205			
				(263.472)			
Contribute Income					-1.297*		
					(0.757)		
Scarce Jobs						-0.752*	
						(0.413)	
Independence Job							3.379
							(2.468)
Constant	-0.070***	-0.778	-0.311	-1.474	-0.151***	-0.076***	0.082
	(0.026)	(1.880)	(0.215)	(16.112)	(0.023)	(0.025)	(0.146)
Number of Observations	17	17	17	17	17	17	17

Notes: In the upper panel the dependent variable is the total gender wage gap, while in the bottom panel the dependent variable isthe unexplained gender wage gap, both computed from the Oaxaca-Blinder decomposition at the mean. The independent variables represent the differences in proportions of men and women who agree or find very important the statement related to gender norm variables, computed from the European Value Survey (EVS) and the World Value Survey (WVS). We use two waves of data (wave3 and 4) as the country samples are relatively small although we retain the same cohorts of individuals across the waves. Thus, weuse individuals aged 25-55 from the EVS data for 1999-2001 (wave 3) which roughly corresponds to the same years when the wagedata is collected and we use individuals aged 35-65 from the EVS data for 2008-2010 (wave 4). The data for Japan comes from WVS since Japan is not sampled in EVS. Fortunately, the WVS data has the same set of questions as the EVS data so these two data setsare comparable although the years in which the data were collected slightly differ between these two sources. To be as close as possible to EVS data we have used the WVS data for 1999-2004 (wave 4) and 2005-2009 (wave 5) which pretty much corresponds to the waves of EVS we use. For our instrumental variable, we use the ratio of female to male labor force participation rate of the population aged 15-64 in 1980. The data for this variable is taken from the World Development Indicators Database collected by the International Labour Organization. The following questions on gender norms have been used: *i*) *A working mother can establish justas warm and secure relationship with her children as a mother who does not work* (*Working Mother*), *ii*) *Both the husband and wifeshould contribute to*

household income (*Contribute Income*), *iii*) *A pre-school child is likely to suffer if his or her mother work* (*Child Suffer*), *(iv) A job is alright but what women really wants is home and children* (*Home and Child*), *v*) *Having a job is the best way for women to be independent person* (*Independence Job*), *vi*) *Important for successful marriage to share the household chores*(*Household Chores*) and *vii*) *When jobs are scarce, men have more right to a job than women* (*Scarce Jobs*). The sample is restricted to individuals aged 20-55.

Source: Own calculation.

They show that growing up with a working mother either affected men's preferences for a working wife or it has made them more cooperative partners regarding the division of housework chores. This transformation increased the proportion of men with less traditional preferences over women's working behavior which assist to increase the participation of women in the labor market of the upcoming generations. Following this argument, we use the female-to-male LFP rate in 1980 which approximately fits the period when the parents of recent graduates participated at the labor market. Having a higher ratio of female to male LFP rate would make it more likely that male (and female) graduates were raised by working mothers which possibly served as a transmission mechanism toward more egalitarian attitudes these men hold for the role of women in the family and labor market.

Table 7 reports 2SLS estimates using as instrument lagged gender norms. We see that in comparison to the IV estimates, the magnitude of the OLS estimates is biased downwards. Although the magnitude of the IV estimates (relative to OLS estimates) has increased, the only coefficient that has changed its sign is on *Contribute Income*. This result speaks in favor of progressive gender norms as a higher share of men who think that both spouses should contribute to the household income would reduce the gender wage gap. Nevertheless, the following coefficient is not statistically significant. When using the lagged gender norms as an instrument for gender norms, the IV estimates for *Household Chores* and *Working Mother* confirm that holding less traditional family views and having egalitarian values lowers the gender wage gaps. In addition to these two variables, the statistically significant impact of gender norms on the gender wage gap is confirmed by *Scarce Jobs*. An increase of 1% in the proportion of men from the older cohorts who thinks that they should have more right to a job than women from their cohorts increases the total (unexplained) wage gap by around one-half (one-third) of the log point.

Table 8 shows the IV estimates based on the ratio of LFP rates. We can see that these IV estimates are larger in magnitude than the OLS estimates which again confirms that the later estimates are downwardly biased. We see that the effects of *Household Chores* and *Scarce Jobs* are in accordance with the results found using the lagged gender norms as the instrument. Nevertheless, the effect using the ratio of LFP rate is larger (in absolute value) than the effect from the lagged gender norms. Although the results we have found so far show that progressive gender norms reduce the gender wage gap, the negative effect on *Contribute Income* works in the opposite direction. More specifically, when using the ratio of the LFP rate in 1980 as the instrument, increasing the proportion of men who thinks that both men and women should contribute to the household income would increase the gender wage gap.

5. Conclusion

In this paper we have examined gender differences in earnings among recent college graduates across 19 countries. We use harmonized data which allows us to analyse the gender wage gaps of graduates from a broad field of studies, surveyed 5-6 years after graduation. Although we know much today about the gender differentials in the labor market outcomes of the population in general, we know much less about the early labor market performance of highly educated men and women.

We argue that studying recent graduates is a path that is worthwhile taking for several reasons. As we are focusing on a relatively homogeneous part of the population we have fewer worries that our results are biased due to sample selection. Given that on average across countries around 90% of individuals in the sample are employed and given the fact that only a small fraction of individuals is working part-time, permits us to leave aside the potential factors which can differentially affect decisions between men and women to enter the labor market. Secondly, since gender differences in various labor market outcomes increase as a result of decisions and constraints which are occurring predominantly later in life, it is interesting to consider if we would find less inequality between men and women at the very beginning of their careers. Principally we would also expect that the wage gaps estimated on the sample of recent graduates are more compressed than among the general population. Thus, we can consider the estimated wage gap among recent graduates as the approximation of the lower bound of the wage gap. Knowing this information would be of major importance to policy makers who are interested in finding a way to reduce wage inequality among young and educated individuals. Lastly, even though women have caught up with men in obtaining university degrees and they have even surpassed men in some countries, still women are relatively under-represented in the field of science, technology, engineering and mathematics (STEM) which are the fields that

provide the highest earnings. Accordingly, it is often argued that the existence of the gender wage gap arises since we are usually not controlling for the field of study as this information is often hidden from the researcher.

Our results point out that 5 to 6 years after graduation, the mean gender gap in earnings is positive and significant in all countries. This holds even though on average men and women work similar hours. The mean wage gap varies from 7 log points in Belgium to 21 log points in Estonia. Consistently with a number of studies, we find that the composition effect can explain a relatively small part of the wage gap in the majority of countries, although we have controlled for a large set of variables including socio-demographics, human capital, personal assessment of job characteristics and a field of study. We have shown that these results remain nearly the same when we estimate the wage differentials among graduates who have not had children yet. Going beyond the mean and focusing on the entire wage distribution, we find that men earn more than women at every point of the distribution across all countries. In line with other studies that examined the distributional gender wage gap among the representative sample of workers in various European countries (Albrecht et al., 2003; Arulampalam et al., 2007; Christofides et al., 2013), we have also found the heterogeneous patterns of gender wage gaps across countries.

Using the unconditional quantile decomposition approach proposed by Firpo et al. (2007) we examined to what extent the total wage gap across the wage distribution can be ascribed to the explained and unexplained characteristics. We have found relatively small differences in individual characteristics between men and women along the distribution which means that the gender wage gap is predominantly accounted for by the wage structure effect. These findings have prompted us to inspect the degree to which the gender wage gaps differ at different points of the distribution. Our results indicate a somewhat worrying fact of sticky floor and glass ceiling effects among half of the countries in our sample. Finally, we examined the possible impact that gender norms can have on the total and unexplained wage gaps. We show that fostering anti-egalitarian values or taking a traditional view on the role of women in the family can explain the presence of higher gender wage gaps.

We believe that our results should be taken with a bit of concern since they are pointing out that at such an early stage of their lives, women earn less than men in each country we have considered. This is especially worrying given the fact that most of these differences cannot be accounted for by the observed characteristics. Looking from the point of view of the policy makers it is utterly important to pay attention to what causes gender differences in labor market outcomes among young and educated individuals as recent university graduates. We leave the following question for some further research.

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Appendix

Wage estimation for the non-working individuals

In this section, we present the specification of the wage and selection equations. The wage equation uses the same specification as already described in equation (1). We have estimated it by Heckman's (1979) two-step estimator. The selection equation includes in addition to all variables included in the wage equation, the number of children aged 0-17 which serves as the exclusion restriction. The rationale for including the number of children as the exclusion restriction is based on the assumption that women who have children are less likely to participate in the labor market due to child-rearing constraints.

Unfortunately, we could not use other job-related variables (i.e. occupation, industry and company size) in the prediction of wages (or for computing the gender wage gaps) since the latter variables are only available for those individuals who took paid employment. Not controlling for occupation, industry and company size is recommended when these controls are endogenous or highly correlated with other regressors which might affect wages. On the other hand, our results might suffer from the omitted variable bias if we decide not to include the mentioned control variables and it turns out that they are important factors to determine wage.

Table A1 shows the estimates of Heckman's lambda for each gender-country sample. We can see that the lambda term is only significant for males in the Netherlands and for females in Germany, Czech Republic, Japan and Estonia. For all those cases the sample selection is negative which means that the error terms in the wage and selection equations are negatively correlated. In other words, the unobserved factors that increase the probability of participation in the labor market are associated with lower wages.

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Table A1. Wage Equation: Estimates and standard errors of lambda

	Males		Females	
	Lambda	s.e	Lambda	s.e.
IT	0.5462	(0.4431)	0.2444	(0.1642)
ES	0.0196	(0.2500)	-0.2300	(0.2235)
FR	-0.3105	(0.3152)	-0.1448	(0.2166)
AT	0.0819	(0.3060)	-0.0790	(0.0844)
DE	-0.3590	(0.2885)	-0.5654**	(0.2888)
NL	-0.2551*	(0.1517)	0.0520	(0.0965)
UK	0.2648	(0.3990)	-0.0407	(0.2168)
FI	-0.4555	(0.3664)	-0.0435	(0.0465)
NO	0.3454	(0.3277)	-0.14510	(0.1894)
CZ	0.0465	(0.2879)	-0.0762**	(0.0330)
JP	0.5037	(0.4333)	-0.3017*	(0.1616)
PT	-0.2265	(0.2501)	-0.4000	(0.2577)
BE	-0.2635	(0.2049)	0.1706	(0.2143)
EE	-0.4063	(0.3114)	-0.3541*	(0.2027)
SI	-0.3312	(0.2871)	0.2965	(0.3633)
TR	-0.0300	(0.5841)	-0.7853	(0.9031)
LT	0.3477	(0.5064)	0.0632	(0.4242)
PL	-0.7936	(0.9220)	0.2887	(0.2896)
HU	-0.2323	(0.6288)	0.3402	(0.6720)

Notes: Wage equation estimated by Heckman two-step procedure. *, ** and *** indicate statistical significance at the 5% level, 1% and 0.1% level respectively.

Source: Own calculation.