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PART-TIME WAGE PENALTIES FOR WOMEN IN PRIME AGE: A MATTER OF SELECTION OR SEGREGATION? EVIDENCE FROM FOUR EUROPEAN COUNTRIES

ELEONORA MATTEAZZI, ARIANE PAILHÉ, AND ANNE SOLAZ*

Using the European Union Statistics on Income and Living Conditions data for the year 2009, the authors evaluate how vertical and horizontal job segregation explains the differential between full-time and part-time pay for prime-age women in four European countries: Austria, Italy, Poland, and the United Kingdom. The selected countries are representative of different welfare state regimes, labor market regulations, and extents and forms of part-time employment. Full-time hourly wages exceed part-time hourly wages, especially in market-oriented economies, such as Poland and the United Kingdom. Results using the Neuman-Oaxaca decomposition methods show that most of the full-time–part-time wage gap is driven by job segregation, especially its vertical dimension. Vertical segregation explains an especially large part of the pay gap in Poland and the United Kingdom, where, more than elsewhere, part-timers are concentrated in low-skilled occupations and the wage disparities across occupations are quite large.

Part-time (PT) work is by far the most widespread form of nonstandard work in Europe, and it is one of the most gendered—most part-timers are women. It is also a type of work with low wage prospects. Several recent studies have shown that female part-timers have lower hourly earnings than female full-timers (McGinnity and McManus 2007; Bardasi and Gornick 2009) and that a sizable part of this wage penalty is explained by worker characteristics such as low levels of education and more dependent children.

In addition, horizontal segregation, that is, the concentration of part-timers in certain types of firms or economic sectors, is also a key factor in explaining the full-time (FT)–PT wage gap. The role of vertical segregation, that is

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the concentration of part-timers at the lowest levels of the occupational ladder, on the female FT-PT pay gap has been less fully explored, however. Within a given sector, PT workers often face barriers that prevent them from reaching the highest-status jobs. Such vertical segregation may make it difficult to implement the 1997 European Union Council directive (97/81/EC) that guarantees pay equity between part-timers and full-timers because the directive relies on the existence of a comparable FT worker in the same company doing comparable work.

In this study, we evaluate how both horizontal and vertical segregation explain the FT-PT pay differential for prime-age women in Europe. Because the extent and distribution of PT employment across sectors and occupations differ greatly among countries, we run a comparative analysis to investigate whether institutional differences can be linked to different PT penalties. We selected four countries that are representative of different welfare state regimes, labor market regulations, and extents and forms of PT employment—Austria, Italy, Poland, and the United Kingdom—and used the 2009 data from the European Union Statistics on Income and Living Conditions (EU-SILC) for women ages 25 to 59. Using Neuman-Oaxaca decomposition methods, we test for the existence of the female PT wage penalty, and we estimate its magnitude and the extent to which the FT-PT pay gap is driven by individual characteristics, horizontal and vertical job segregation, and selection into FT or PT employment.

Background and Context

PT female workers often receive unfair treatment compared to their colleagues who do equivalent work FT; their career prospects are more limited (Tilly 1990), and their hourly wages are lower (Gornick and Jacobs 1996; Fagan and O'Reilly 1998; McGinnity and McManus 2007). Major explanations for the FT-PT wage differential are differences in human capital investments or other qualifications (Blank 1998), in unionization (Belous 1989; Riley 1997), and in preferences for work and leisure. Women, especially those with young children, are probably more inclined to work PT for lower wages, making a trade-off between their job and personal life (Robertson 1989; Sadler and Aungles 1990), particularly in countries with few childcare facilities. But these factors do not explain the entire wage gap. Hence, even after controlling for these individual characteristics, many recent studies have shown that female part-timers still usually have lower hourly earnings than female full-timers (Manning and Petrongolo 2008; Bardasi and Gornick 2009). In contrast, controlling for occupation and sector of activity makes the wage penalty very small (Jepsen, O'Dorchai, Plasman, and Rycx 2005). Thus, the concentration of PT workers in the least-regulated and lowest-paid sectors and occupations (i.e., job segregation) also explains a significant part of the pay gap (Meulders and Plasman 1993; Smith, Fagan, and Rubery 1998; Fagan 2009). The concentration of female workers in such occupations and sectors is not only the consequence of a personal

choice concerning a trade-off between work and family. It may also result from the flexible working arrangements imposed by employers in these occupations or sectors to reduce their labor costs (Kalleberg 2000).

An important dimension of job segregation is the vertical one. Despite their broad access to education and their increasing access over time to positions of responsibility, women are less likely to be recruited for jobs at more senior levels (Fortin and Huberman 2002), especially women who are part-timers. In the literature, little attention has been paid to the specific role of vertical segregation in the female FT-PT gap. So, the objective of this study is to evaluate how both horizontal and vertical segregation explain the FT-PT pay differential for prime-age women.

Moreover, the presence of children in the family, particularly preschool children, raises the reservation wage significantly more for women than for men, leading to differences in labor market participation rates between men and women (Brown, Roberts, and Taylor 2011). Unobserved characteristics other than earnings, such as family values, norms, and motivation, may also cause women to opt for PT work, creating a selection bias that must be controlled for.

We compared four countries representative of different welfare state regimes and industrial and labor relations across Europe. Indeed, comparative research (Fagan and O'Reilly 1998) has pointed out that structural factors, such as country-specific social policies, industrial relations, and type of welfare regime, matter in explaining female participation in the labor market, the development of PT employment, and the degree of segregation. So, a second objective of this study is to analyze how PT penalties can be linked to these institutional differences among the countries. Table 1 summarizes the cross-national heterogeneity.

Under Esping-Andersen's (1990) typology of modern welfare states,¹ the United Kingdom is a liberal welfare state regime, characterized by minimal means-tested assistance, modest universal transfers, low redistribution, and a strong reliance on market mechanisms. In Austria, a typical conservative welfare state, redistribution is higher but remains limited because, in this type of welfare regime, universal social insurance schemes tend to maintain class and status differences. In Esping-Andersen's original classification, Italy also is a conservative welfare regime; however, several authors (Leibfried 1992; Ferrera 1996; Ebbinghaus 1998) consider Italy, as well as the other European Mediterranean countries,² to be a subtype of the conservative welfare state because it is characterized by a more limited social insurance coverage, a strong familialist tradition, and larger regional disparities in

¹According to Esping-Andersen (1990), the three regime types vary in the degree of de-commodification (the degree to which an individual or a family can maintain a socially acceptable standard of living without relying on the market) and social stratification (the clustering of people into groups sharing similar socioeconomic conditions), which are indicators of the comprehensiveness and redistributiveness of the welfare state.

²These authors used indicators or dimensions other than degree of de-commodification and social stratification in classifying types of welfare states. See Arts and Gelissen (2002) for an overview.

Table 1. Employment, Family Policies, and Part-Time Patterns

Country	Employment		Family-related public spending (% GDP)				Enrollment in formal care (%)		Labor relations system			Wage inequality			
	Female employment rate (25–49 age cohort)	Maternal employment rate (child younger than 15)	All	Men	Women	Cash	Services	Tax breaks for families	Total 3 years	Under 3 years	Statutory minimum wage adjusted (%)	Bargaining coverage	Dominant level at which wage bargaining takes place	Low-wage earners as percentage of all employees	
Austria	79.5	66.8	24.6	8.7	43.0	2.1	0.5	0.0	2.6	12.1	77.6	No	99.0	Sectoral or industry level	15.02
Italy	61.1	50.0	14.3	5.1	28.0	0.6	0.7	0.0	1.4	29.2	97.4	No	80.0	Sectoral or industry level, with additional local or company level	12.36
Poland	73.4	56.6	8.4	5.8	12.0	0.8	0.3	0.5	1.6	7.9	47.3	Since 1990	38.0	Local or company level	24.16
United Kingdom	75.2	61.4	26.1	11.8	43.0	2.1	1.1	0.3	3.6	40.8	92.7	Since 1999	34.6	Local or company level	22.05

Sources: For employment and part-time employment, European Labour Force Surveys (Eurostat 2008). For family-related public spending and enrollment in formal care, European System of Integrated Social Protection Statistics (ESSPROS) (European Commission – Eurostat 2007) and Social Expenditure Database (OECD 2007). For labor relations system, Visser (2009, 2011). For wage inequality, Structure of Earnings Survey (European Commission – Eurostat 2010). Notes: Low-wage earners are employees earning two-thirds or less of the national median gross hourly earnings.

industrial development. Poland, in our analysis, is considered representative of the post-communist welfare state³ that slowly emerged in Europe from the 1990s; it has lower levels of government programs and social well-being than do Western European countries. Regrettably, because of data-quality issues, no countries of the social democratic model (which includes the Scandinavian countries) were included in our comparative analysis.⁴

Our four selected countries also have different national political economies and industrial and labor relations. According to Hall and Soskice (2001),⁵ the United Kingdom is a typical example of a liberal market economy. Firms rely on competitive markets to coordinate with other economic actors. Trade unions are rather weak, employment protection is low, labor turnover is high, and wage setting is highly decentralized and primarily a contractual arrangement between employers and employees. In this country, where company-level bargaining dominates and coverage of collective agreements is low, wage inequalities are high (European Commission 2011). Nevertheless, the introduction of a national hourly minimum wage in 1999, which was raised several times in the following years, benefited low-paid workers, especially PT workers.

Austria provides an example of highly coordinated economy. Firms rely primarily on strategic modes of coordination, trade unions are strong, work councils are powerful, employment protection is high, and job tenures are longer. The very high levels of bargaining coverage and union density, together with more coordinated bargaining between trade unions and employers' associations, tend to compress the wage distribution and reduce earnings inequality (European Commission 2009, 2011).

Italy and Poland are between these two ideal types. Italy is closer to the coordinated model, even though strategic cooperation tends to be lower than in Austria and union movements remain divided (Hall and Gingerich 2009). Wage bargaining takes place primarily at the sector or industry level. As in Austria, no statutory minimum wage is imposed; however, minimum wages are collectively agreed on by social partners. Poland more closely resembles the Anglo-Saxon model (Funk and Lesch 2004), given the predominance of decentralized wage bargaining and the low trade union density. Further, as in the United Kingdom, there is a statutory minimum wage.

³Esping-Andersen (1996) rejected the idea of a "new" welfare model in Central and Eastern Europe, stating that the differences between these countries and the welfare regimes currently existing elsewhere are only transitional in nature. Other authors considered that these countries form a distinct welfare state regime, arguing that the differences between the Western and Eastern European welfare states have not vanished after two decades of transition and that a half century of communist rule has left institutional legacies that set Central and Eastern European countries apart from other welfare regimes (Fenger 2007).

⁴We do not consider Northern European countries in our analysis because the available labor income data for these countries referred to the gross annual earnings during the income reference period (the previous year). This time lag could weaken the match between labor income and the number of hours usually worked per week. Furthermore, for some variables, such as firm and job characteristics, the non-response rate was extremely high.

⁵Hall and Soskice (2001) distinguished two ideal types of political economies: liberal and coordinated. The categories are based on the way firms coordinate problems involving other economic actors, such as employees, trade unions, firms, producer groups, and governments.

The first objective of this study is to estimate the existence and the magnitude of the female PT wage penalty and the extent to which the FT–PT pay gap is driven by individual characteristics and by horizontal and vertical segregation. We also consider the importance of selection into FT or PT employment. The second objective is to assess whether the PT penalty is related to the observed structural cross-country differences in welfare state regimes and industrial and labor relations.

Data and Descriptive Statistics

The data used in this study come from the EU-SILC (Eurostat) for 2009; this survey collects extensive comparable cross-sectional and longitudinal micro-data both at the household and individual levels for all 27 (in 2009) EU member states. Hourly wages were determined as the ratio between employees' gross monthly earnings and the number of hours usually worked per month, obtained by multiplying the number of hours usually worked per week and the average number of weeks in a month (52/12 weeks).⁶ The employees' gross monthly earnings in their main job, before taxes and social contributions were deducted, included usual paid overtime, tips, and commissions. Any other payments, such as 13th- or 14th-month payments, holiday pay, profit sharing, and bonuses, were taken into account on a monthly basis. The number of hours usually worked per week included extra hours, either paid or unpaid, that the person normally worked. These two variables were recorded at the time of interview. FT and PT employment were distinguished on the basis of respondents' spontaneous answers rather than on the number of hours worked, following 2010 Eurostat guidelines. Experience was measured by workers' self-reports of actual experience in the labor market—excluding periods in which respondents were out of the labor force—with no possibility of disentangling PT from FT work experience. Because the information on actual work experience was not available for the United Kingdom, we computed, for this country only, the potential experience (defined as Age – Number of years spent in education – 6).

Our sample comprises women ages 25 to 59 living in Austria, Italy, Poland, and the United Kingdom. We focused on women only because of the very limited number of men in PT jobs. We focused on prime-age women because, for full-timers, wage progress and promotion mainly occur at this stage of their career, generating possible wage penalties for part-timers. We excluded students, retirees, people who were permanently disabled or unfit to work, family workers, the self-employed, and observations with data missing. The final country sample totals 2,724 observations for Austria, 8,064 for Italy, 5,964 for Poland, and 3,194 for the United Kingdom.

Broad disparities occur in terms of women's labor market participation and wages across the selected European countries. The female participation rate was around 75% in the United Kingdom and Poland, reached almost 80% in

⁶We excluded workers who reported working fewer than 5 hours per week or more than 60 hours per week. We also dropped the top and the bottom 1% of the wage distribution to limit the influence of extreme values.

Austria, but was only around 60% in Italy (see Table 1). PT employment was not equally prevalent across the selected countries but women always represented a very high proportion of PT workers. Poland exhibited the lowest female PT rate, with only 12% of working women in PT jobs, followed by Italy at 28%. In Poland, PT employment is quite rare,⁷ mainly because it does not provide a sustainable income for families and because there is a long tradition of FT work for both men and women. In Italy, working PT has become more common in recent years,⁸ but it is still quite atypical because of trade union opposition and some disincentives for employers, such as a fixed cost per employee whether the employee works FT or PT (Del Boca 2002). Austria and the United Kingdom, on the other hand, have relatively high female PT employment rates: 43% in both cases. The nature of PT employment, however, differs between the two countries. In Austria, PT employment is more frequently used to reconcile employment and family. Austria has the highest maternal employment rate; two-thirds of women with a child younger than 15 work outside the home. In the United Kingdom, the high prevalence of PT employment is driven both by employees' demand for short hours to balance work and family and by employers' supply of reduced hours to reduce labor costs (Fagan 2009).

Women's sociodemographic characteristics vary according to their employment or activity status (see the Appendix). In the four countries considered, women who work FT have, on average, fewer children than those who work PT or are nonemployed (NE). In Poland and Italy, where it is not possible to take a parental leave when working PT and PT employment is not widespread, mothers of children younger than 5 are much more likely to work FT (45% and 54%, respectively) than in Austria and the United Kingdom (about 9% and 19%, respectively). On average, women part-timers are less educated everywhere. They are also less experienced than full-timers, except in United Kingdom.

Part-timers and full-timers are unevenly distributed across sectors and occupations. Part-timers are more likely than full-timers to work in sales and services, and in elementary occupations. Women who work PT are far less likely to hold a managerial position, to have a permanent contract, and to work in a large company. The type of occupation also differs. The most striking differences, however, are across countries, particularly regarding the percentage of PT women workers with supervisory responsibility. This percentage is very low in Poland and Italy, where less than 10% of PT women have supervisory responsibilities; in contrast, in Austria it is 30%. Austria also has the lowest index of occupational dissimilarity⁹ between full-timers

⁷In Poland, PT employment is less feminized than elsewhere, partly because part-timers cannot take parental leave. Part-timers are mainly pensioners; young people entering the labor market; and people, mainly welfare recipients, who need a secondary income.

⁸Since 2001, an agreement with the aim of developing PT work on a voluntary basis has been implemented (Buddelmeyer, Mourre, and Ward 2004).

⁹The index of occupational dissimilarity measures the spread in the occupational distributions of full-timers and part-timers. It ranges from 0 to 1. The index equals 0 for equal distributions of part-timers and full-timers across occupations and 1 for complete dissimilarity between distributions. The index can be interpreted as the proportion of employed individuals who would need to change jobs for employment segregation to disappear.

Table 2. Full-Time and Part-Time Average Hourly Wages and Full-Time–Part-Time Wage Gap

Variable	Austria	Italy	Poland	United Kingdom
FT average hourly wage (euros) (\bar{w}_{FT})	13.26	10.78	3.78	12.90
PT average hourly wage (euros) (\bar{w}_{PT})	12.04	9.97	3.16	10.56
FT-PT wage gap (%) $\left(\frac{\bar{w}_{FT} - \bar{w}_{PT}}{\bar{w}_{PT}} \right)$	10.13	8.12	18.99	22.04

Notes: FT, full-time; PT, part-time.

and part-timers (0.23) because in this country workers enter PT employment primarily to balance work and family. In the United Kingdom, Poland, and Italy, PT employment is much less distributed across occupations. In the United Kingdom, the dissimilarity index is very high (0.63), showing that PT work tends to be a tool used by employers to increase employment flexibility in certain types of occupations, especially low-skilled ones, rather than a means used by employees to reconcile work and family.

In the four countries, the average FT hourly wage exceeds the average PT hourly wage (Table 2); however, the magnitude of this gap differs widely. The largest differential is found in the United Kingdom and Poland, where the general level of wage inequality is also higher (see Table 1). In these two countries, a full-timer's hourly wage is about 20% higher, on average, than that of a part-timer; in contrast, the difference is 11% and 8% in Austria and Italy, respectively. Thus, overall wage inequality clearly influences the size of the FT-PT wage gap.

We can observe large differences in average hourly wages across sectors (Table 3). The financial, insurance, information, and communication sectors are the best-paid sectors in almost all the countries, whereas wholesale and retail trade, and accommodation and food services are among the lowest-paid sectors. Differences also occur in intrasector FT-PT wage gaps, especially in Poland and the United Kingdom; they are even negative in some sectors. In Austria and Italy, part-timers in the agriculture, forestry, fishing, mining, manufacturing, and electricity and the accommodation and food-service sectors earn slightly more, on average, than full-timers. In the United Kingdom, a negative FT-PT pay gap is observed in the accommodation and food-service sector. The FT-PT wage differential also varies across occupations. It is noteworthy that, in Austria and Poland, the hourly earnings of legislators, senior officials, managers, and professional workers with PT jobs are, on average, higher than those of their colleagues employed FT.

Thus, the distribution of PT employment over sectors and occupations appears to be a key determinant of the PT-FT wage gap. We expect that both

Table 3. Average Hourly Wages and Full-Time-Part-Time Wage Gap by Industrial Sectors and Occupations

Variable	Austria		Italy		Poland		United Kingdom	
	Mean hourly wage (euros)	FT-PT wage gap (%)	Mean hourly wage (euros)	FT-PT wage gap (%)	Mean hourly wage (euros)	FT-PT wage gap (%)	Mean hourly wage (euros)	FT-PT wage gap (%)
<i>Industrial sector</i>								
Agriculture, forestry and fishing; mining; manufacturing; electricity, etc.; construction; transport and storage	12.12	-3.4	9.76	-0.7	3.35	19.9	12.14	11.0
Wholesale and retail trade	11.18	15.8	9.50	-2.6	2.79	15.4	8.76	32.4
Accommodation and food service	8.14	-1.9	8.56	-3.9	2.67	6.9	7.51	-7.5
Information and communication; financial and insurance activities	15.14	15.0	12.59	0.6	4.80	34.7	14.91	14.9
Real estate; professional, scientific and technical; etc.	11.63	8.6	9.92	10.7	3.70	12.3	12.30	34.3
Public administration and social security	14.12	20.0	12.18	7.8	4.54	63.6	13.69	8.2
Education	16.28	-4.9	12.52	3.5	4.56	1.1	12.13	28.2
Human health and social work	13.14	2.1	11.53	4.5	3.89	15.7	12.74	7.8
Arts and entertainment; private households; etc.	12.36	10.6	8.40	5.0	3.25	14.4	10.71	24.4
<i>Occupation</i>								
Legislators, senior officials and managers; professionals	17.51	-9.9	13.56	11.9	5.11	-3.3	16.38	9.6
Technicians and associate professionals	13.89	3.2	11.75	1.4	4.27	13.0	14.30	1.2
Clerks	13.32	10.4	10.91	-1.1	3.54	11.3	10.55	6.0
Service, shop and market sales workers	10.30	4.1	8.84	-3.5	2.41	3.3	8.48	3.4
Skilled agricultural and fishery workers; craft and related trades workers; plant and machine operators and assemblers	9.18	-16.5	8.37	-4.5	2.85	14.9	8.29	16.4
Elementary occupations	8.66	1.4	7.91	-1.7	2.50	-3.8	8.28	5.2

Notes: FT, full-time; PT, part-time.

horizontal segregation and vertical segregation contribute to the FT-PT wage gap.

Estimation Methodology

To evaluate the contribution of observed characteristics (such as human capital indicators, individual and household characteristics, and job segregation) and sample selection¹⁰ to the FT-PT wage gap and to check for the existence of an hourly wage penalty for PT employees, we proceeded as follows.

First, we modeled the individual choice with respect to employment status (nonemployment,¹¹ PT employment, and FT employment) as an ordered probit model¹² (see also Ermish and Wright 1993). We can observe a variable z that takes the value 0 if the individual is NE, 1 if she is employed PT, and 2 if she is employed FT. Let us define z^* , the latent unobserved variable, as

$$(1) \quad z^* = w'\gamma + u$$

where w is a vector of exogenous variables (and w does not contain a constant¹³); γ is a parameter vector; and u is the error term, assumed to be normally distributed with mean 0 and variance 1. We have

$$(2) \quad z = \begin{cases} 0 & \text{if } z^* \leq \alpha_1 \\ 1 & \text{if } \alpha_1 < z^* \leq \alpha_2 \\ 2 & \text{if } z^* > \alpha_2 \end{cases}$$

where the unknown cut points α_1 and α_2 , with $\alpha_1 < \alpha_2$, are estimated together with γ . The individual is in category 0 (NE) if $u \leq \alpha_1 - w'\gamma$, in category 1 (employed PT) if $\alpha_1 - w'\gamma < u \leq \alpha_2 - w'\gamma$ and in category 2 (employed FT) if $u > \alpha_2 - w'\gamma$. It is straightforward to derive the response probability:

¹⁰We have reasons to believe that the selection of women into employment and, more specifically, into FT or PT work may be endogenous (Hardoy and Schöne 2006). Indeed, some unobserved characteristics, such as ability, motivation, and values about motherhood, affecting the decision to work might also explain individual earnings.

¹¹We do not distinguish between inactivity and unemployment because of lack of available data.

¹²An alternative method for modeling individual choice about work status is the multinomial logit model (Lee 1982, 1983). That model is based on the assumption of independence of irrelevant alternatives (IIA), which is violated in our samples.

¹³Suppose that vector w also includes a constant term γ_0 . Then γ_0 and the unknown cut points α_1 and α_2 are not individually identified. What we can identify is the difference $(\alpha_1 - \gamma_0)$ and $(\alpha_2 - \gamma_0)$. The model is usually identified by setting $\gamma_0 = 0$ or $\alpha_1 = 0$. w' refers to the transpose vector of w .

$$\begin{aligned}
 P(z = 1|w) &= P(z^* \leq \alpha_1 | w) = \Phi(\alpha_1 - w'\gamma) \\
 P(z = 2|w) &= P(\alpha_1 < z^* \leq \alpha_2 | w) = \Phi(\alpha_2 - w'\gamma) - \Phi(\alpha_1 - w'\gamma) \\
 P(z = 3|w) &= P(z^* > \alpha_2 | w) = 1 - \Phi(\alpha_2 - w'\gamma)
 \end{aligned}
 \tag{3}$$

The variables w included in the selection equations are 1) human capital indicators such as the level of education (for which three categories are defined: at most lower secondary education, at most upper secondary education, and tertiary education; the first was chosen as the reference category) and a second-order polynomial of experience (potential experience for the United Kingdom); 2) individual and household characteristics such as the country of birth (dummy variable equals to 1 if the country of birth is the country of residence), health status (three categories: good and very good health, fair health, bad and very bad health; the last was chosen as the reference category), the region of residence (information not available for the United Kingdom), and the degree of urbanization of area of residence (dummy variable equals 1 if a densely populated or intermediate area); 3) exclusion restrictions such as partner's annual labor income (variable equals 0 if there is no partner), other annual family nonlabor income (including income from rental property or land, interest, dividends, profits from capital investments in unincorporated business, housing allowances, and alimony), availability of unpaid childcare (dummy variable equals 1 if nonparental unpaid care is available), home ownership (dummy variable equals 1 if individual is a home-owner), and the number of children by age group (three groups: ages 0 to 5, ages 6 to 11, and ages 12 and older).¹⁴

Our second step was to estimate log wage equations for FT and PT workers using ordinary least squares (OLS):

$$(4) \quad y_j = x'\beta_j + \sigma_j \rho_j \lambda + \eta_j = x'\beta_j + \delta_j \lambda + \eta_j$$

where $j = \text{PT, FT}$. The outcome variable y_j is the logarithm of the hourly market wage of FT or PT workers, x ¹⁵ are exogenous independent variables, and β_j is the parameter vector associated with the independent variables for each alternative j . λ is the selection correction term computed from estimates obtained in the first step, more precisely:

¹⁴Partner's labor income, other family nonlabor income, availability of unpaid childcare, home ownership, and number of children by age group were excluded from the wage equations. They were used to identify the individual's decision to participate in employment. The only exception was for the United Kingdom, where the number of children by age group was included in log wage equations because we had a measure of potential experience instead of real labor market experience. Partner's labor income and other family nonlabor income correspond to the 12-month income reference period.

¹⁵ x' refers to the transpose vector of x .

$$(5) \quad \lambda = \begin{cases} \frac{\varphi(\hat{\alpha}_1 - w'\hat{\gamma}) - \varphi(\hat{\alpha}_2 - w'\hat{\gamma})}{\Phi(\hat{\alpha}_2 - w'\hat{\gamma}) - \Phi(\hat{\alpha}_1 - w'\hat{\gamma})} & \text{if } z = 1 \\ \frac{\varphi(\hat{\alpha}_2 - w'\hat{\gamma})}{1 - \Phi(\hat{\alpha}_2 - w'\hat{\gamma})} & \text{if } z = 2, \end{cases}$$

where φ denotes the normal density function and Φ is the normal cumulative distribution function, as shown in Equation (3). In Equation (4), ρ_j is the correlation between the error terms in the selection and the outcome equations, and η_j are errors terms assumed to be normally distributed with mean 0 and variance σ_j^2 . If the coefficient $\delta_j = \sigma_j \rho_j$ associated with the selection-correction term λ is significantly different from 0, this means that the selection of employment status is endogenous (i.e., the error terms in the selection and the wage equations are correlated). In other words, unobserved characteristics that affect participation are also correlated with individual wage. A positive and significant selection effect (i.e., $\delta_j \lambda > 0$) means that unobservable factors that increase the likelihood of FT or PT participation tend to be associated with a higher wage. A negative and significant selection effect (i.e., $\delta_j \lambda < 0$) indicates that a higher probability of participation in FT or PT employment is related to a below-average wage.

After estimating the log wage equations, we decomposed the FT-PT wage gap using the Neuman-Oaxaca procedure (Neuman and Oaxaca 2004). The procedure divides the FT-PT wage differential into three parts: 1) an “explained” part, which is the part of the raw wage explained by differences in observed characteristics (i.e., human capital indicators, individual and household characteristics, and job-related variables) between the two types of workers; 2) an “unexplained” part, which is the part of the raw wage gap not explained by observed characteristics; and 3) a selection part, which is the part of the raw pay differential due to the self-selection of women into FT or PT employment. The twofold decomposition, formulated from the viewpoint of PT workers, is expressed as:

$$(6) \quad \bar{y}_{FT} - \bar{y}_{PT} = (\bar{x}_{FT} - \bar{x}_{PT})\hat{\beta}_{FT} + \bar{x}_{PT}(\hat{\beta}_{FT} - \hat{\beta}_{PT}) + (\bar{\lambda}_{FT}\hat{\delta}_{FT} - \bar{\lambda}_{PT}\hat{\delta}_{PT})$$

where \bar{y}_{FT} and \bar{y}_{PT} are the predicted mean log hourly wage for FT and PT workers, respectively; \bar{x}_{FT} and \bar{x}_{PT} are the average values of workers’ characteristics; and $\hat{\beta}_{FT}$, $\hat{\beta}_{PT}$, $\hat{\delta}_{FT}$, and $\hat{\delta}_{PT}$ are estimated parameters. Given that discrimination is directed in our case against only one group, PT workers,¹⁶

¹⁶Positive discrimination was not found in any of the four countries for FT workers in our estimations when we used the FT reference group in our specification.

we follow Oaxaca (1973) and assume that nondiscriminatory parameters are the returns of FT workers' characteristics β_{FT} .¹⁷

The first term on the right-hand side of Equation (6) is the explained part of the wage differential. The second term represents the unexplained part. This part captures not only differences in the returns of the observed characteristics but also the effects due to differences in unobserved or omitted characteristics, and it might include possible discrimination, whatever its form. A positive value for the unexplained part entails a PT wage penalty; otherwise, a PT wage premium exists. The third term is the selection part; this part, like the unexplained part, is related to unobserved characteristics.

We estimated three specifications of Equation (4), and consequently, we applied three wage gap decompositions. In the first specification, we did not control for sample selection, and the vector of exogenous variables X includes only human capital indicators and individual and household characteristics. Human capital indicators comprise the level of education and a second-order polynomial of experience (potential experience for the United Kingdom). Individual and household characteristics comprise the country of birth, health status, region of residence (not available for the United Kingdom), and degree of urbanization of area of residence. For the United Kingdom, we also controlled for the number of children by age group (children ages 0 to 5, 6 to 11, and 12 and older) because we believed that labor market experience, measured for this country as potential experience, was likely to overestimate the real experience of women because it does not consider child-related career interruptions.

In the second specification, we added job-related variables among the regressors. These variables include some measures of job segregation, both horizontal and vertical indicators. In horizontal segregation, a type of worker is concentrated in certain sectors of economic activity, in certain types of firms, and in a particular type of contract. The firm size (dummy variable equals 1 if the local unit had more than 11 employees), the type of contract¹⁸ (dummy variable equals 1 for a permanent job), and the economic sector (nine dummies coded according the Nomenclature statistique des Activités économiques dans la Communauté Européenne [NACE; Statistical Classification of Economic Activities in the European Community], with agriculture, forestry, and fishing; mining and manufacturing; electricity, gas, etc.; construction; and transport and storage as the reference category) were used as indicators of horizontal segregation. In vertical segregation, a type of worker has better career opportunities (for advancement and wages) and better-rewarded positions. As a proxy of vertical segregation, we included the

¹⁷Other authors suggested using as an estimate of nondiscriminatory parameters the average coefficients over both groups (Reimers 1983) or a weighted sum of groups' coefficients, where the weights are given by group sizes (Cotton 1988). Alternatively, we could use the estimate of nondiscriminatory parameters obtained from a pooled regression over both groups (Neumark 1988).

¹⁸The nonresponse rate for this variable was relatively high in the United Kingdom. For the United Kingdom only, we added a dummy variable equal to 1 to the log wage equations if information on the type of contract was missing.

occupation (six dummies coded under the International Standard Classification of Occupations for the European Community [ISCO-88 (COM)], with legislators, senior officials, managers, and professionals as the reference category) and occupying a managerial position (dummy variable equals 1 if the woman has supervisory responsibility).

We expected to find evidence of a PT wage penalty everywhere when we had controlled only for human capital indicators and individual and household characteristics. When we also controlled for job-related variables, however, we expected to find a significant reduction in the PT wage penalty or even its disappearance, in line with other studies (Rodgers 2004; Jepsen et al. 2005; Hardoy and Schøne 2006; Bardasi and Gornick 2009).

In the third specification, we also controlled for selection. We expected to find a positive selection of women in employment, especially in FT jobs and in countries where female participation in employment was low, particularly for mothers of young children, because of the rigidity of the labor market or the shortage of childcare provision.

Estimation Results

Here we first present the estimation results for individual choice with respect to employment status. Then, we outline our main findings for log wage equations and wage gap decomposition.

Ordered Probit Model

For ease of interpretation, the marginal effects on the response probabilities are presented in Table 4.¹⁹ As expected, more educated women are more likely to work FT and less likely to work PT. The probability of working FT increases with the level of education in each country, but the magnitude is higher in Italy and Poland, countries where female labor market participation and PT employment are low (especially Italy). In other words, FT and PT workers exhibit far fewer differences in terms of educational level when PT employment is widespread in the country. Except for the United

¹⁹The marginal effect of a regressor on the probabilities is not equal to the estimated coefficient. For the three probabilities, the marginal effects of a change in the regressor are

$$\begin{aligned}\frac{\partial P(z=1|w)}{\partial w} &= -\varphi(\alpha_1 - w'\gamma)\gamma \\ \frac{\partial P(z=2|w)}{\partial w} &= [\varphi(\alpha_1 - w'\gamma) - \varphi(\alpha_2 - w'\gamma)]\gamma \\ \frac{\partial P(z=3|w)}{\partial w} &= \varphi(\alpha_2 - w'\gamma)\gamma\end{aligned}$$

The marginal effect of the regressor w on the probabilities of not working $P(z=1)$ has the opposite sign from the associated estimated coefficient γ . The marginal effect of the regressor w on the probabilities of working full-time $P(z=3)$ has the same sign as the associated estimated coefficient. The sign of the marginal effect of the regressor w on the probability of working part-time $P(z=2)$ is ambiguous.

Table 4. Estimation of the Marginal Effects for the Ordered Probit

Variable	Austria		Italy		Poland		United Kingdom	
	FT	PT	FT	PT	FT	PT	FT	PT
<i>Human capital indicators</i>								
At most secondary education ^a	0.135*** (0.023)	-0.031*** (0.005)	0.229*** (0.012)	-0.036*** (0.002)	0.176*** (0.023)	-0.023*** (0.003)	0.118*** (0.026)	-0.041*** (0.010)
Tertiary education ^a	0.335*** (0.030)	-0.156*** (0.020)	0.382*** (0.012)	-0.101*** (0.005)	0.394*** (0.015)	-0.073*** (0.004)	0.216*** (0.032)	-0.088*** (0.015)
Experience	0.024*** (0.004)	-0.007*** (0.001)	0.026*** (0.002)	-0.004*** (0.000)	0.023*** (0.002)	-0.003*** (0.000)	-0.001 (0.005)	0.001 (0.002)
Experience squared	-0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	-0.000 (0.000)	0.000 (0.000)
<i>Individual and household characteristics</i>								
Country of birth	-0.037 (0.025)	0.011*** (0.009)	0.066*** (0.019)	-0.009*** (0.002)	-0.099 (0.136)	0.018*** (0.029)	0.037 (0.026)	-0.012 (0.008)
Good health status ^b	0.274*** (0.035)	-0.006 (0.013)	0.169*** (0.030)	-0.018*** (0.002)	0.324*** (0.027)	-0.035*** (0.003)	0.289*** (0.050)	-0.031*** (0.013)
Fair health status ^b	0.155*** (0.053)	-0.060** (0.026)	0.063*** (0.031)	-0.011* (0.006)	0.147*** (0.022)	-0.025*** (0.004)	0.142*** (0.069)	-0.063*** (0.036)
Degree of urbanization of area of residence	0.074*** (0.019)	-0.019*** (0.005)	0.021 (0.013)	-0.003* (0.002)	0.023 (0.014)	-0.003 (0.002)	0.080* (0.041)	-0.023* (0.009)
Number of children in age group 0-5	-0.343*** (0.022)	0.097*** (0.010)	-0.113*** (0.013)	0.018*** (0.002)	-0.173*** (0.015)	0.026*** (0.003)	-0.393*** (0.019)	0.141*** (0.010)
Number of children in age group 6-11	-0.149*** (0.017)	0.042*** (0.006)	-0.098*** (0.012)	0.015*** (0.002)	0.002 (0.012)	-0.000 (0.002)	-0.216*** (0.016)	0.078*** (0.007)
Number of children in age group 12 and older	-0.053*** (0.011)	0.015*** (0.003)	-0.059*** (0.007)	0.009*** (0.001)	-0.017*** (0.006)	0.003*** (0.001)	-0.084*** (0.010)	0.030*** (0.004)
<i>Exclusion restrictions</i>								
Availability of unpaid childcare	0.084*** (0.030)	-0.029*** (0.013)	0.164*** (0.017)	-0.036*** (0.005)	0.178*** (0.015)	-0.034*** (0.004)	0.103*** (0.026)	-0.043*** (0.013)

(continued)

Table 4. Continued

Variable	Austria		Italy		Poland		United Kingdom	
	FT	PT	FT	PT	FT	PT	FT	PT
Home ownership	-0.041** (0.020)	0.012* (0.006)	0.000 (0.013)	0.000 (0.002)	0.021 (0.013)	-0.003 (0.002)	0.157*** (0.021)	-0.045*** (0.005)
Other household non-labor income/100 (euros)	-0.000* (0.000)	0.000* (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.001* (0.001)	0.000* (0.000)	-0.001*** (0.000)	0.000*** (0.000)
Partner's labor income/100 (euros)	-0.000*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)
Observations	1,103	978	4,351	1,276	4,006	395	1,528	974

Notes: The reference category for employment type is "nonemployed." Values in parentheses are standard errors. Regions are included with the exception of the United Kingdom. FT, full-time, PT, part-time.

*indicates statistically significant at 0.1; ** statistically significant at 0.05; *** statistically significant at 0.01.

^aThe reference category for education is "at most lower secondary education."

^bThe reference category for health status is "bad or very bad health status."

Kingdom, experience also positively affects the probability of working FT, whereas it negatively affects the likelihood of working PT, but with a small magnitude.

Employment status strongly depends on family situation and opportunities for childcare. Hence, having children has a negative effect on the probability of working FT and a positive effect on the probability of working PT. In general, the magnitude of the effect diminishes as the children grow older. PT employment clearly serves as a tool to balance work and family for mothers with young children. The effect is particularly strong in Austria and the United Kingdom, where levels of childcare provision are low, care enrollment time is limited, or childcare is expensive. In these two countries, mothers increasingly opt for PT work as a means to reconcile motherhood and a stronger desire to work. Indeed, in Austria 2004 parental leave legislation recognizes PT work as a statutory right for parents of young children (up to 7 years old). Similarly, in the United Kingdom a reform implemented in 2003 allows parents of children younger than 6 to switch from FT to PT work (Connolly and Gregory 2008), although sometimes at the cost of downgrading. In all countries, the availability of unpaid childcare has a positive effect on the probability of having a FT job and a negative impact on the probability of having a PT job, especially in Italy and Poland, where the reliance on the family network is strong.

The availability of other sources of income also affects the probability of working. As expected, nonlabor income and partner's labor income (with 0 values for singles) have a negative and significant effect on the probability of working FT and a positive and significant effect on the probability of working PT. For the exclusion restrictions we used to explain participation in employment but not wages (nonlabor income, partner's labor income, and the availability of unpaid childcare), we found that their effects go in the same direction, although the magnitude differs across countries. This makes us confident about the selection equation.

Wage Equations

In Table 5 we present the estimation results of log wage equations, for both FT and PT workers, for the most complete specification (Specification 3).²⁰

The results for the human capital indicators and individual and household characteristics are in line with those usually found in the literature. In all countries, the higher the level of education attained, the greater the impact on wages for both FT and PT workers. As expected, experience also has a positive effect on wages, but it is weaker for PT wages. When they are significant, the variables for living in a densely populated or intermediate

²⁰Results for Specifications 1 and 2 are available from authors upon request. The explanatory power of Specification 1 ranges from 0.16 to 0.29 for part-timers and from 0.29 to 0.38 for full-timers. The *R*-squared increases in Specification 2 and ranges from 0.29 to 0.45 for part-timers and from 0.43 to 0.53 for full-timers. The highest *R*-squared values are for Specification 3, reported in Table 5.

Table 5. Estimation of Wage Equations (Specification 3: Model with Human Capital Indicators, Individual and Household Characteristics, Job-Related Variables and Selection Term in Log Wage Equations)

Variable	Austria		Italy		Poland		United Kingdom	
	FT	PT	FT	PT	FT	PT	FT	PT
Constant	1.603*** (0.123)	1.603*** (0.123)	1.449*** (0.081)	1.920*** (0.115)	0.713*** (0.127)	1.311*** (0.180)	2.117*** (0.162)	2.119*** (0.214)
<i>Human capital indicators</i>								
At most secondary education ^a	0.149*** (0.029)	0.099*** (0.034)	0.180*** (0.018)	0.063*** (0.032)	0.067*** (0.023)	0.089 (0.067)	0.069* (0.038)	0.050 (0.045)
Tertiary education ^a	0.420*** (0.044)	0.364*** (0.061)	0.323*** (0.027)	0.133** (0.056)	0.277*** (0.036)	0.139 (0.123)	0.340*** (0.048)	0.272*** (0.064)
Experience	0.020*** (0.004)	0.014** (0.006)	0.023*** (0.002)	0.009* (0.004)	0.022*** (0.002)	-0.002 (0.008)	0.024*** (0.004)	0.007 (0.008)
Experience squared	-0.000** (0.000)	-0.000 (0.000)	-0.000*** (0.000)	-0.000 (0.000)	-0.000*** (0.000)	0.000 (0.000)	-0.000*** (0.000)	-0.000 (0.000)
<i>Individual and household characteristics</i>								
Country of birth	0.074*** (0.024)	0.104*** (0.035)	0.111*** (0.016)	-0.001 (0.030)	0.038 (0.102)	—	-0.025 (0.027)	0.016 (0.056)
Good and very good health status ^b	0.166*** (0.052)	0.108 (0.071)	0.103*** (0.032)	0.016 (0.052)	0.097*** (0.033)	-0.072 (0.106)	-0.014 (0.077)	0.049 (0.102)
Fair health status ^b	0.065 (0.052)	0.014 (0.070)	0.047 (0.032)	-0.040 (0.053)	0.053* (0.030)	-0.081 (0.098)	-0.082 (0.077)	0.095 (0.101)
Living in a densely populated or intermediate area	0.041** (0.020)	0.055*** (0.024)	-0.013 (0.010)	-0.026 (0.023)	0.034*** (0.010)	0.034 (0.045)	0.002 (0.041)	0.026 (0.062)
Number of children in age group 0–5	—	—	—	—	—	—	-0.022 (0.050)	0.048 (0.056)
Number of children in age group 6–11	—	—	—	—	—	—	-0.008 (0.030)	0.000 (0.034)
Number of children in age group 12 and older	—	—	—	—	—	—	-0.041*** (0.015)	-0.008 (0.018)

(continued)

Table 5. Continued

Variable	Austria		Italy		Poland		United Kingdom	
	FT	PT	FT	PT	FT	PT	FT	PT
<i>Horizontal segregation^c</i>								
Wholesale and retail trade	-0.032 (0.033)	-0.102** (0.039)	-0.034* (0.017)	0.008 (0.031)	-0.025 (0.022)	-0.133* (0.075)	-0.187*** (0.037)	-0.274*** (0.057)
Accommodation and food service	-0.188*** (0.037)	-0.231*** (0.048)	-0.042 (0.027)	-0.031 (0.039)	-0.054 (0.035)	-0.118 (0.114)	-0.382*** (0.072)	-0.197*** (0.076)
Information and communication; financial and insurance activities	0.126*** (0.041)	0.088 (0.055)	0.126*** (0.020)	0.157*** (0.045)	0.095*** (0.028)	0.122 (0.097)	0.104** (0.041)	0.146** (0.064)
Real estate; professional, scientific and technical; etc.	-0.010 (0.038)	-0.068 (0.041)	-0.026 (0.019)	-0.017 (0.032)	-0.009 (0.025)	0.029 (0.090)	-0.041 (0.038)	-0.148** (0.069)
Public administration and social security	0.047 (0.035)	-0.033 (0.049)	0.087*** (0.016)	0.035 (0.042)	0.051** (0.021)	-0.145 (0.098)	0.047 (0.033)	0.049 (0.066)
Education	-0.012 (0.037)	0.031 (0.053)	0.080*** (0.014)	0.118** (0.048)	-0.036 (0.019)	0.067 (0.087)	-0.101*** (0.033)	-0.137** (0.060)
Human health and social work	0.040 (0.033)	0.008 (0.042)	0.056*** (0.015)	0.046 (0.034)	-0.058*** (0.020)	-0.101 (0.076)	-0.043 (0.032)	-0.022 (0.057)
Arts and entertainment; private households; etc.	-0.033 (0.051)	-0.037 (0.083)	-0.037 (0.020)	-0.040 (0.038)	-0.010 (0.034)	-0.040 (0.098)	-0.080 (0.060)	-0.186** (0.078)
Work in a firm with more than 11 employees	0.077*** (0.022)	0.088* (0.023)	0.082*** (0.010)	0.103*** (0.024)	0.109*** (0.013)	0.068 (0.042)	0.132*** (0.028)	0.051 (0.032)
Permanent job	0.077* (0.041)	0.087* (0.051)	0.124*** (0.014)	0.008 (0.031)	0.088*** (0.013)	0.087** (0.042)	0.046 (0.078)	0.106 (0.128)
<i>Vertical segregation^d</i>								
Technicians and associate professionals	-0.065* (0.035)	-0.113** (0.055)	-0.097*** (0.014)	-0.049 (0.053)	-0.109*** (0.018)	-0.280*** (0.095)	-0.135*** (0.027)	-0.071 (0.056)
Clerks	-0.086** (0.035)	-0.149*** (0.058)	-0.142*** (0.017)	-0.089* (0.053)	-0.271*** (0.020)	-0.398*** (0.098)	-0.270*** (0.025)	-0.251*** (0.051)
Service, shop and market sales workers	-0.244*** (0.041)	-0.253*** (0.059)	-0.230*** (0.020)	-0.167*** (0.053)	-0.473*** (0.022)	-0.565*** (0.084)	-0.422*** (0.030)	-0.341*** (0.053)

(continued)

Table 5. Continued

Variable	Austria		Italy		Poland		United Kingdom	
	FT	PT	FT	PT	FT	PT	FT	PT
Skilled agricultural and fishery workers; craft and related trades workers; plant and machine operators and assemblers	-0.373*** (0.054)	-0.311*** (0.096)	-0.302*** (0.022)	-0.261*** (0.063)	-0.409*** (0.025)	-0.596*** (0.108)	-0.465*** (0.048)	-0.441*** (0.096)
Elementary occupations	-0.339*** (0.045)	-0.378*** (0.066)	-0.319*** (0.021)	-0.255*** (0.057)	-0.525*** (0.019)	-0.622*** (0.082)	-0.374*** (0.045)	-0.322*** (0.060)
Managerial position	0.111*** (0.019)	0.036 (0.025)	0.065*** (0.011)	0.035 (0.032)	0.091*** (0.015)	-0.011 (0.090)	0.089*** (0.019)	0.072*** (0.035)
<i>Sample selection</i>								
Lambda	0.137*** (0.037)	0.069** (0.034)	0.197*** (0.037)	0.036 (0.039)	0.104*** (0.037)	-0.026 (0.064)	0.046 (0.073)	0.005 (0.056)
Observations	1,043	893	275	1,238	3,908	370	1,489	915
R-squared	0.480	0.408	0.433	0.298	0.529	0.445	0.481	0.380

Notes: Values in parentheses are standard errors. Regions are included with the exception of the United Kingdom. d, dropped because of collinearity; FT, full-time; PT, part-time.

^aThe reference category for education is "at most lower secondary education."

^bThe reference category for health status is "bad or very bad health status."

^cThe reference category for economic activity is "agriculture, forestry and fishing; mining and quarrying; manufacturing; electricity, gas, etc.; construction; wholesale and retail trade, repair of motor vehicles and motorcycles."

^dThe reference category for occupation is "legislators, senior officials and managers, and professionals."

*indicates statistically significant at 0.1; ** statistically significant at 0.05; *** statistically significant at 0.01.

area, and being born in the country of residence have a positive effect on FT and PT wages. Being in good or very good health also has a positive effect but only on FT wages, perhaps due to a selection process of women in good health. For the United Kingdom (for which data on real experience is not available), the number of children ages 12 or older has a negative effect on full-timers' wage and no effect on part-timers' wages.

Concerning horizontal segregation, working in a firm with more than 11 employees has a positive effect on wages. In all countries, compared to the reference sector (agriculture, forestry, fishing, mining, electricity, etc.), working in finance, insurance, communication, and information has a positive and significant effect on wages. Conversely, working in the accommodation and food-service sector has a negative impact on both full-timers' and part-timers' log hourly wage. Having a permanent contract positively affects wages.

Concerning the vertical dimension of job segregation, compared to legislators, senior officials, managers, and professionals, holding other occupations almost always has a negative and significant effect on wages in all countries but with no clearly different effect between PT and FT working women. As expected, however, having a managerial position has a positive effect on wages, and the effect is much larger for full-timers. Therefore, vertical segregation is likely to explain the lower earnings of part-timers, both because part-timers are under-represented at the top of the occupational ladder and because such high-level occupations are better paid, especially for full-timers.

Finally, controlling for possible sample selection shows that women who work FT are positively selected in Austria, Italy, and Poland.²¹ Thus, unobserved characteristics affect the likelihood both of working FT and of having higher wages. Part-timers are positively selected only in Austria, but the coefficient associated with the selection-correction term is small. There is no significant selection effect in United Kingdom. One explanation for this might be that in this country the decision to work FT or PT is not driven only by individual characteristics and constraints regarding childcare but mainly by job-market opportunities.

Wage Gap Decomposition

A summary of the results for the decomposition of the FT-PT wage differential for the three specifications is presented in Table 6. When we control only for human capital indicators and for individual and household characteristics, as in Specification 1, in all four countries we find evidence of a PT

²¹With respect to estimates of Specification 2, the introduction of the correction term for selectivity in the log wage equations affects the value of the other coefficients, especially those associated with individual and human capital characteristics. The magnitude of coefficients associated with job-related variables decreases slightly once the selection-correction term is included in the log wage regressions, which means that part of the job-related wage heterogeneity is explained by the non-random allocation of women among nonemployment, FT work, and PT work.

wage penalty. In the United Kingdom, only 30% of the wage differential is explained by the differences in observable characteristics between FT and PT workers, that is, differences in educational level, potential experience, family composition, and so on. In other words, 70% of the wage gap remains unexplained after we control only for human capital indicators and for individual and household characteristics in the log wage equations. In the other countries, the percentage of the wage differential explained by observable characteristics is much higher, and observable characteristics explain more than half of the FT-PT wage differences: 55% in Austria, 57% in Poland, and 89% in Italy. Thus, except for Italy, the wage inequalities between part-timers and full-timers are only partly explained by individual characteristics. The percentage of the raw wage gap explained by the different observable characteristics between FT and PT workers could be related to the different industrial and labor relation systems that characterize the selected countries. Thus, in countries, such as Italy, that are characterized by a high degree of bargaining coverage, a high level of job protection, and a more centralized system of wage setting, employers and employees have little space for individual bargaining, in contrast to, for instance, the United Kingdom. As a result, the wage structure is more compressed and wage differences are explained mostly by observed characteristics in Italy.

When job-related variables are included in the log wage equations (Specification 2 in Table 6), the portion of the wage gap explained by differences in observable characteristics between PT and FT workers increases considerably in all four countries. The explained part now exceeds 100% in Austria, Italy, and Poland. This means that, in the absence of different returns between FT and PT workers with the same characteristics or unobserved heterogeneity and omitted relevant variables, women employed FT would earn even more than women employed PT. On average, the FT-PT wage gap computed using the estimated returns of the observable characteristics would be larger than the observed raw pay differential (0.119 instead of 0.111 in Austria, 0.131 instead of 0.084 in Italy, and 0.225 instead of 0.202 in Poland).

The most important finding that emerges from Table 6 is the disappearance of the previously observed wage penalty. In other words, we find no evidence of a PT wage penalty when we control for workplace variables. Moreover, we find evidence of a PT wage premium in Italy. The Italian legislation applies the principle of nondiscrimination by stipulating that PT workers must not be treated less favorably than comparable FT workers. In addition, the principle of *pro rata temporis*, which applies to PT workers, could be removed by some collective or individual agreements, providing improved conditions for part-timers' earnings.

The decomposition results also indicate the huge magnitude of the contribution of job-related variables to the explained part. As shown in Figure 1, panel A, in Austria about 67% of the explained part is due to job-related variables. In Italy and Poland, this percentage rises to around 76%. In the United Kingdom, it exceeds 83%.

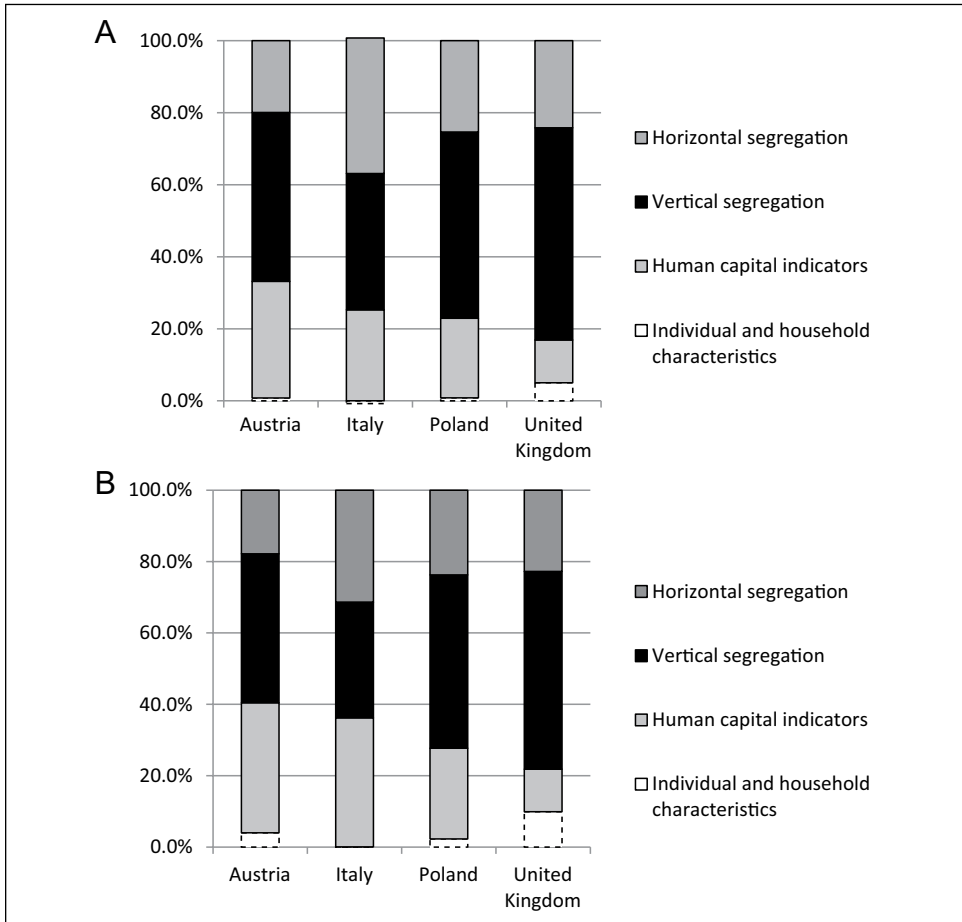
Table 6. Wage Gap Decomposition Results

Variable	Austria	Italy	Poland	United Kingdom
Prediction log wage for FT	2.509	2.319	1.229	2.460
Prediction log wage for PT	2.398	2.235	1.027	2.251
Difference	0.111***	0.084***	0.202***	0.209***
Specification 1: Model with human capital indicators and individual and household characteristics in log wage equations				
Explained part	0.061***	0.075***	0.116***	0.062***
Unexplained part	0.050***	0.009***	0.086***	0.147***
Specification 2: Model with human capital indicators, individual and household characteristics, and job-related variables in log wage equations				
Explained part	0.119***	0.131***	0.225***	0.186***
Unexplained part	-0.008	-0.047***	-0.023	0.023
Specification 3: Model with human capital indicators, individual and household characteristics, job-related variables, and selection-correction term in log wage equations				
Explained part	0.132***	0.151***	0.239***	0.199***
Unexplained part	-0.141***	-0.205***	-0.068	-0.021
Selection	108.11%	164.29%	15.35%	14.83%

Notes: FT, full-time; PT, part-time.

*indicates statistically significant at 0.1; ** statistically significant at 0.05; *** statistically significant at 0.01.

Figure 1. Oaxaca Decomposition: Detailed Explained Part



A. Specification 2: Model with human capital indicators, individual and household characteristics, and job-related variables in log wage equations

B. Specification 3: Model with human capital indicators, individual and household characteristics, job-related variables, and selection in log wage equations

Notes: Horizontal segregation includes activity sector, type of contract, and firm size. Vertical segregation includes occupational variables and managerial position. Human capital indicators include education and experience (potential experience, for the United Kingdom). Individual and household characteristics include nationality, health status, region of residence (with the exception of the United Kingdom), degree of urbanization of the area of residence, and number of children by age group (only for the United Kingdom).

Vertical segregation, horizontal segregation, and human capital indicators are statistically significant at 0.01 in all countries. Individual and household characteristics are statistically significant at 0.10 only in Poland for Specification 3.

Horizontal segregation matters in explaining the FT-PT pay differential representing between 24% and 38% of the explained wage gap. So, a significant share of the raw F-PT pay differential is explained by the segregation of PT workers in low-paid sectors. Furthermore, PT employees are more likely to hold a temporary job and work in small companies where wages are less collectively negotiated.

But vertical segregation also has a strong impact on the wage penalty, even greater than horizontal segregation. Vertical segregation represents between 38% and 59% of the explained part of the FT-PT wage gap. In other words, PT workers hold positions at the top of the occupational hierarchy less often and are less likely to be promoted to positions of responsibility. Vertical segregation has a particularly strong impact in the United Kingdom and Poland, where part-timers are much more concentrated in low-skilled employment; this is especially true in the United Kingdom, where mothers who want to work PT may be downgraded due to the lack of PT opportunities in their current occupations (Connolly and Gregory 2008).

We can assert that the FT-PT wage differential is explained much more by the concentration of part-timers in low-skilled and less-valued occupations than by their prevalence in specific sectors or firms. This result contrasts with previously published studies, which focused on horizontal segregation as the main explanation for the FT-PT gender wage gap (Bardasi and Gornick 2009). Clearly, job segregation, especially the vertical dimension, has a particularly strong impact in countries such as the United Kingdom and Poland, where trade unions are weak, bargaining coverage is low, and wage setting highly decentralized. The impact of job segregation is particularly strong in the United Kingdom, where segregation between FT and PT jobs across occupations is very high. Thus in the United Kingdom, part-timers, who represent a large proportion of employees, are much more concentrated in low-skilled employment (Table A.1).

As shown in Table 6, when we control for sample selection (Specification 3), the decomposition results of the FT-PT wage gap are remarkably different from those found when we did not correct for selection, especially the contribution of the unexplained part to the raw FT-PT pay gap. Now, we find evidence of a PT wage premium—that is, a negative and significant unexplained part—in Austria and Italy, where the selection part is also significant. In these two countries, the explained part is larger than the observed raw wage gap, suggesting that women employed FT would earn even more than women employed PT. Female full-timers have some observed characteristics, such as higher education levels and longer labor market experience, that make them employees with higher earnings potential. In addition, as suggested by the positive and significant selection effect, FT workers have also some unobserved characteristics, such as motivation, that positively affect both their work decision and the process determining their wages. As a result, if PT workers earn less than their FT colleagues but the raw pay gap is not large, this indicates that PT workers enjoy a pay premium. In other words, the returns of part-timers' characteristics are higher than the returns of full-timers' characteristics. This could be explained by the industrial and relation systems that characterize Austria and Italy, in which part-timers might benefit from the higher bargaining coverage than in Poland and the United Kingdom. Controlling for selection confirms and reinforces previous results about segregation. As we discussed previously, the raw FT-PT pay differential is largely due to employment segregation,

both horizontal and vertical (Figure 1, panel B). Again, compared to horizontal segregation, vertical segregation continues to play a major role in explaining the FT-PT wage gap, except in Italy where the two dimensions of segregation have a similar effect. In other words, part-timers tend to work in lower-paid occupations, face barriers to career advancement regardless of their skills or achievements, and occupy less-valued positions. Because we have controlled for selection into PT jobs of specific workers, this evidence might be the result of discriminatory behavior against PT workers based on stereotypes and prejudices. All other things being equal, PT workers are more likely to receive unfair treatment than their FT colleagues who do equivalent work.

Conclusion

FT hourly wages generally exceed PT hourly wages for women, with large cross-country differences in the magnitude of this wage gap. The aim of this paper is to evaluate whether the FT-PT pay differential for prime-age women is driven mainly by differences in individual and household characteristics between full-timers and part-timers, by horizontal and vertical job segregation, or by different institutional contexts. We have compared four countries that differ in their welfare regimes, industrial and labor relations, and the share of PT employment to investigate whether institutional differences can be linked to different sources of PT penalties.

The FT-PT wage gap is higher in the two market-oriented economies (Poland and the United Kingdom), where bargaining coverage is low, wage setting is highly decentralized, and income inequality is quite large. In the two coordinated market economies (Austria and Italy), the lower raw FT-PT wage gap may be explained by the higher bargaining coverage and more centralized wage setting. In addition, in Austria, PT employment is more evenly distributed among sectors and occupations than in the other countries, especially Poland and the United Kingdom, where PT positions are mainly low-skilled.

The decomposition of the FT-PT wage gap shows that the contribution of individual and household characteristics is rather small, whereas the contribution of job-related variables is much greater. Indeed, most of the FT-PT wage gap is driven by job segregation. Both horizontal and vertical segregation are responsible for this result, but vertical segregation has a much stronger effect. PT and FT jobs are not equally distributed along the occupational hierarchy, and this unequal allocation contributes to the FT-PT gender wage gap. The horizontal dimension of job segregation accounts for a sizable part of the FT-PT pay gap in Italy, where part-timers more often have a temporary contract and work in small establishments where earnings are lower. On the other hand, vertical segregation explains an especially large part of the pay gap in Poland and the United Kingdom, where, more than elsewhere, part-timers are concentrated in low-skilled occupations and where wage disparities between occupations are quite large.

In contrast to these cross-national differences, in all four countries the wage penalty for female PT employment occurs mainly through the segregation of part-timers in lower-paid sectors and in low-valued occupations rather than through selection or direct employer discrimination. Nevertheless, the over-representation of women in low-paid PT jobs and the lack of available PT work in higher-level jobs reflect indirect gender discrimination related to the organization of the labor market around the male breadwinner model.

The segregated nature of PT employment makes the European Union directive on equal treatment between part-timers and full-timers difficult to implement. This law can be applied only if comparable FT workers exist in the same company doing comparable work. This is rarely the case because PT jobs are concentrated at the lower levels of the occupational ladder and PT workers are less likely to hold managerial positions.

Thus, the objective of reducing horizontal and vertical segregation of PT employment should be placed on the political agenda. The evidence of a strong effect of vertical segregation calls for measures to diversify PT and FT positions at each end of the occupational distribution. One way to do this would be to remove the disincentives to work PT at the top and middle of the distribution and to offer more opportunities for PT work within existing jobs, including those with managerial responsibilities. This would also counteract the occupational downgrading process we observed in the United Kingdom. Another option would be to help part-timers at the bottom of the occupational distribution to become full-timers. A family policy that increases the provision of affordable and higher-quality childcare may make it easier for women to work FT and thus contribute to reducing FT-PT job segregation.

Appendix

Table A.1. Descriptive Statistics

Variable	Austria			Italy			Poland			United Kingdom		
	FT	PT	NE	FT	PT	NE	FT	PT	NE	FT	PT	NE
Employment rate	40.49	35.90	23.61	53.96	15.82	30.22	67.17	6.62	26.21	47.84	30.49	21.67
Employment rate of mothers with children in age group 0–5	9.33	34.49	56.18	44.57	19.01	36.42	54.19	6.01	39.8	18.75	33.75	47.5
Education (%)												
Lower secondary at most	11.51	17.18	23.95	22.34	34.17	48.91	4.34	9.87	16.06	9.03	11.60	25.72
Upper secondary at most	65.00	67.69	63.61	52.06	54.47	40.58	60.73	68.61	75.62	48.56	59.14	52.17
Tertiary	23.48	15.13	12.44	25.60	11.36	10.50	34.92	21.52	8.32	42.41	29.26	22.11
Experience (years) ^a	21.34	19.21	12.57	17.00	15.51	12.16	17.80	15.48	11.93	23.48	25.34	22.00
Number of children												
0–5 years old	0.04	0.18	0.55	0.17	0.24	0.26	0.15	0.18	0.31	0.09	0.28	0.62
6–11 years old	0.10	0.38	0.40	0.18	0.33	0.25	0.22	0.25	0.30	0.15	0.39	0.55
12 years and older	0.48	0.77	0.51	0.58	0.63	0.72	0.85	0.88	0.95	0.51	0.78	0.65
Health status (%)												
Good and very good	83.14	82.11	72.78	80.37	75.55	71.32	73.34	61.27	59.05	91.62	88.71	78.18
Fair	14.32	15.44	21	17.26	21	23.39	23.04	30.38	29.69	7.53	9.86	17.77
Bad and very bad	2.54	2.45	6.22	2.37	3.45	5.29	3.62	8.35	11.26	0.85	1.44	4.05
Availability of unpaid childcare (%)	5.44	18.3	14.93	12.69	18.03	7.18	12.93	11.65	7.36	9.1	20.53	15.17
Annual other household income/100 (euros)	14.87	19.21	19.29	17.48	15.86	13.60	1.43	1.60	2.83	11.46	14.50	32.93
Annual partner's labor income/100 (euros)	212.9	309.1	275.6	193.7	237.7	207.3	68.2	64.6	69.6	211.1	290.4	272.9
Home ownership (%)	37.13	40.75	22.13	55.87	15.34	28.79	69.17	5.79	25.03	51.95	32.81	15.24
Occupation (%)												
Legislators, senior officials and managers; professionals	20.29	10.08		15.32	5.01		32.01	17.57		33.71	14.75	
Technicians and associate professionals	20.42	18.37		32.75	21.65		15.94	9.46		18.07	13.66	
Clerks	27.13	25.76		19.63	22.21		12.13	10.81		12.13	24.37	
Service, shop and market sales workers	17.83	26.65		12.80	24.31		17.14	29.19		17.14	33.77	
Skilled agricultural and fishery workers; craft and related trades workers; plant and machine operators and assemblers	3.07	2.91		10.78	8.89		11.90	6.76		11.90	1.53	

(continued)

Table A.1. Continued

Variable	Austria			Italy			Poland			United Kingdom		
	FT	PT	NE	FT	PT	NE	FT	PT	NE	FT	PT	NE
Elementary occupations	10.64	16.24		8.73	17.93		10.88	26.22		10.88	11.91	
Dissimilarity index	0.23			0.37			0.39			0.63		
Managerial position (%)	46.31	30.12		19.39	10.18		16.73	5.14		42.44	18.25	
Industrial sector (%)												
Agriculture, forestry and fishing; mining; manufacturing; electricity; etc.; construction; transport and storage	17.55	14.00		25.15	18.42		26.69	16.49		13.70	7.10	
Wholesale and retail trade	14.00	23.40		10.46	16.64		15.76	24.59		10.34	17.16	
Accommodation and food service	5.75	7.61		3.39	9.05		3.07	4.05		1.88	4.70	
Information and communication; financial and insurance activities	8.15	4.9		6.32	5.74		4.99	4.05		8.19	5.90	
Real estate; professional, scientific and technical; etc.	8.92	12.88		8.21	13.00		5.89	10.00		10.61	6.23	
Public administration and social security	10.64	7.05		8.16	5.65		9.62	4.32		11.62	7.65	
Education	14.67	9.41		18.22	6.30		18.22	16.22		16.66	22.51	
Human health and social work	16.11	17.13		13.40	12.60		12.82	12.97		23.30	23.17	
Arts and entertainment; private households; etc.	4.22	3.92		6.69	12.60		2.94	7.30		3.69	5.57	
Dissimilarity index	0.32			0.45			0.37			0.35		
Firm size: more than 11 employees (%)	72.29	57.78		68.77	50.24		81.17	61.62		85.76	76.83	
Type of contact: permanent job (%) ^b	94.53	94.06		87.86	78.59		79.45	46.49		22.36	22.30	

Notes: FT, full-time; NE, nonemployed; PT, part-time.

^aFor the United Kingdom the percentage refers to potential experience (Age - Number of years spent in education - 6).

^bFor the United Kingdom, the percentage is calculated when information is available.

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