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# **Women's Part-Time - Full-Time Wage Differentials in Europe: an Endogenous Switching Model**

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# Women's Part-Time - Full-Time Wage Differentials in Europe: an Endogenous Switching Model

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## Abstract

This paper analyzes the composition of the wage differentials among part-time and full-time working women in seven European countries: France, Germany, Italy, Netherlands, Spain, Sweden and United Kingdom. Using cross-sectional microdata from the eighth waves of the European Union Statistics on Income and Living Conditions project (EU-SILC), the study investigates the variances in part-time/full-time hourly wage gap and the role of different occupational profiles as a possible explanation. Applying an Oaxaca-Blinder Wage Decomposition, corrected for double sample selection to account for participation decisions and part-time/full-time choice, the adjusted wage gap is found to be negative in all countries except Sweden, where data show a significant part-time premium. Controlling for different job-related characteristics, the research points to a reduction of the gap in all countries; the unexplained portion remains, however, relevant in some countries. In order to shed light on the latter, existing studies are evaluated showing how cross-country dissimilarities can be due to cultural characteristics connected to workers' preferences and different institutional frameworks.

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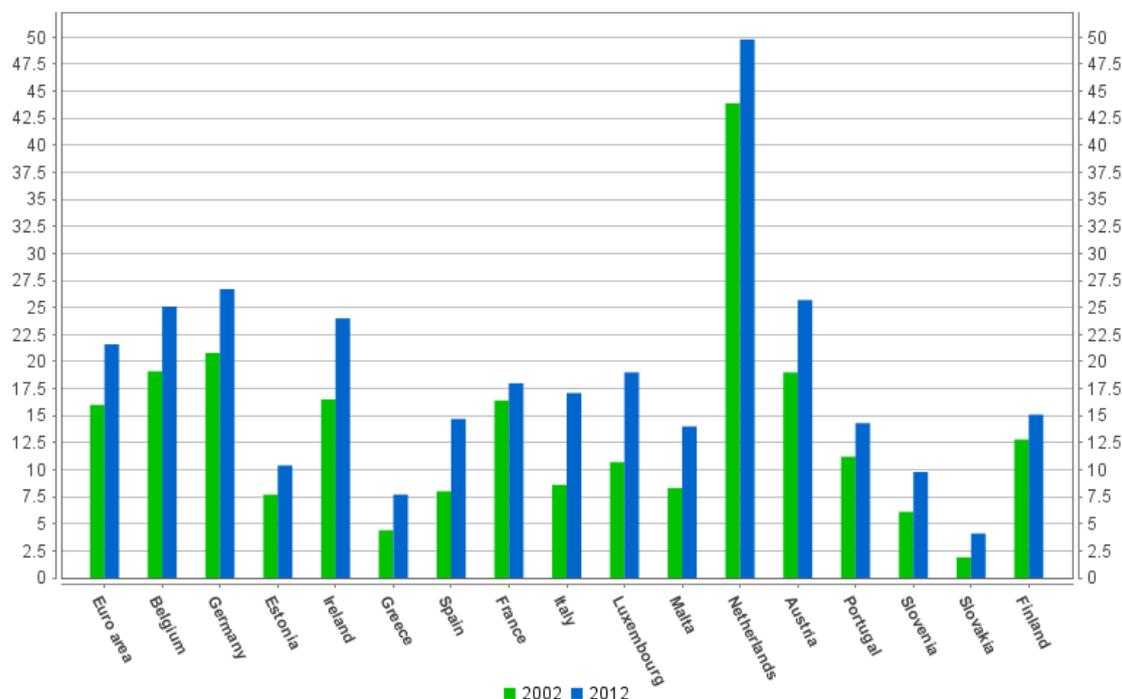
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# 1 Introduction

The growth in “atypical” work (part-time, temporary and casual jobs contracts) has recently gained remarkable attention. Even though theory shows that work-sharing fosters employment only under strict conditions (Calmfors, 1985, Calmfors and Hoel, 1989), the incidence of part-time work has significantly increased in many developed countries during the last decades. According to the Eurostat, the portion of part-time workers in the Euro Area<sup>2</sup> increased by 37.5% during the decade from 2002 to 2012. Despite this boost affected the entire area, relevant differences across countries with regard to the ratio of part-time employees to the total employment still persist (see Figure 1.1). There are several factors that can explain these discrepancies: different agreements between social forces have historical, religious and institutional roots.

**Figure 1.1:** Part-time employment 2002-2012 (% of total employment)



This graph has been created automatically by Eurostat software according to external user specifications. Persons in employment are those who, during the reference week, did any work for pay or profit for at least one hour, or were not working but had jobs from which they were temporarily absent. Family workers are included. The distinction between full-time and part-time work is made on the basis of a spontaneous answer given by the respondent.

Part-time is a useful instrument since it allows the fulfillment of specific individual preferences on working hours originated by different habits, duties and family-related issues. However, part-time work has been sometimes criticized as a form of underemployment, paying lower wages and providing less benefits than full-time work. Studies

<sup>2</sup>Referring to EA-17 - Latvia is excluded because it joined the Euro Area only in 2014

on part-time are often strictly connected to women, reflecting the fact that they are the most common users of this kind of work. As stated by Booth and van Ours (2013), efficiency implications of part-time working women can be considered through two opposite sides. On one hand, part-time jobs might be seen as wastage of resources and suboptimal utilization of investments in human capital since several part-time working women are highly educated. On the other hand, part-time job allows a higher labor force participation because, without it, many women would choose not to work rather than working full-time.

There is a large and growing economics literature about pros and cons of part-time contracts. Particular attention has been devoted on the effect of the use of part-time work on employment. Garibaldi and Mauro (2002) show that the increase in part-time work does not lead to an increment in total hours of work in all OECD Countries with exception of The Netherlands. In fact, as proved by van Lomwel and van Ours (2005), the growth of part-time labor is partly responsible for the so called “Dutch Employment Miracle”.

Another branch of research investigates the relationship between part-time work and life satisfaction. Booth and van Ours (2009) prove that, in Australia, part-time women have a higher level of job satisfaction, and that their life satisfaction increases if their partners work full-time. The same authors (Booth and van Ours, 2008) find that in the United Kingdom the relationship between part-time work and happiness is a puzzle: while part-time workers have a higher job satisfaction and working hours satisfaction, their life satisfaction is virtually unaffected by hours of work. In a report on the European labor force, Pissarides et al. (2005) show that women with a part-time job obtain as much as job satisfaction as those in full-time work.

Further studies, following the Moffitt (1984) approach, in which the hourly wage offered depends on the number of hours worked, focus on assessing differences between wages of part-time and full-time workers. Most of them prove that part-timers deal with a lower hourly wage compared to full-timers, calling into question the assumption of a constant gross wage to hour worked (Jones and Long, 1979; Ermisch and Wright, 1993; Manning and Petrongolo, 2008; Rodgers, 2004). An odd exception is the result of the analysis performed by Booth and Wood (2006) on Australian workers. They conclude that, once unobserved individual heterogeneity has been taken into account, part-time men and women typically earn an hourly pay premium.

Despite the presence of several country-specific research assessing wage differentials among part-time and full-time workers, literature on comparison of part-time wage gaps across countries is still poor. Only few studies analyzed these differences evaluating the part-time/full-time wage gaps among countries; even less did it in a multivariate environment.

The aim of this research is to contribute to the literature on part-time wage pay

penalties (or premiums) in two directions: substantive and methodological. The former concerns the provision of new evidence comparing and analyzing part-time wage gaps in seven European labor markets with different occupational structures. The latter deals with the fact that this is the first study that employs an endogenous switching model with a double sample selection for this purpose.

The remainder of the paper is structured as follows. Section 2 and section 3 provide, respectively, an overview of the theoretical background on part-time/full-time wage gap and an illustration of the research questions correlated by some expectations. Section 4 describes the reason behind the choice of the countries, section 5 contains a detailed description of the database and section 6 introduces the econometric approach used. In section 7 the results of the investigation are reported while section 8 involves a wide discussion of previous findings: it represents an attempt to shed light on the reasons behind the cross-country differences emerged from the analysis, advancing some hypotheses about the institutional frameworks and cultural characteristics connected to worker preferences. In section 9 conclusions are drawn.

## **2 Literature Review**

Part-time jobs are often characterized by poor wages, low benefits and little investments in training, bringing workers lower promotion perspectives and a higher risk to be dropped out of the labor market. Nevertheless it is not uncommon, particularly in some countries, to observe part-time workers, having no desire to switch to full-time. At the same time, many full-time workers, especially females, wish to work part-time but they are not given the chance to do so. However, wages are an important determinant leading preferences and forming different equilibria in labor markets. This section analyzes factors underpinning diverse directions of the part-time/full-time wage gap discussing the most influential theories. Furthermore, it explores the existing literature on cross-country differences in wage gap taking into account occupational segregation, highlighting dissimilarities in European countries.

### **Theories on the part-time/full-time wage gap**

The direction and the magnitude of the wage gap depends not only on demand-side (employers' characteristics) and supply-side (worker-specific preferences) features in a given labor market. Rather, it is a results of a set of several country specific factors: institutional frameworks, living conditions, cultural traits and habits. As pointed out by Hu and Tjstens (2003) it is difficult to find a systematic theoretical framework in any labor market; nevertheless, extensions of standard economic theories provide most explanations to the wage gap between full-time and part-time jobs.

The first one is the theory of endogeneity of wage setting. Based on a quasi-fixed labor cost, it analyzes the effects of working hours on productivity having a cohabitation of both type of labor as output. For the employers, quasi-fixed costs (hiring, training, monitoring and coordination) depend on the number of workers employed not on the hours worked. Consequently, assuming the same amount of hour worked, part-time workers are more “expensive” to the employers. To fill the gap employers offer a lower wage to part-timers. Thus, according to this theory, part-time workers are paid less than full-time workers only because they have higher costs due to a shorter working time horizon. Analyzing the determinants of employer demand for part-time workers, Montgomery (1988) proves that costs of recruiting and training represents a significant impediment to the hiring of part-timers, decreasing the relative attractiveness of part-time worker.

Another relevant theory is the wage compensation theory. It is based on the assumption that the direction and the size of the differentials in part-time and full-time wages depends on the bargaining power of the two agents: employer and employee.

Peter B. Doeringer (1971) identifies some particular labor force segments which find part-time work more convenient because they can combine their job with other activities during the day. These segments are represented mainly by women (or second earners in general), students and aged workers. Women prefer part-time because it permits them to have more time for their housework activities while elderly often use gradual retirement schemes. Students have a clear time constraint due to their studies. Particularly preferences or needs of this working categories reduces workers bargaining power during the salary negotiation.

On the other hand, there are some cases, less common, in which the employer wants to hire part-time employees rather than full-time ones. This is the case of many firms which need workers in predictable period of the day in which there are some peaks of work. Moreover, as highlighted by Barzel (1973), in specific services companies part-time workers are even more productive than full-time workers. In these case employees are in a favorable bargaining position and the direction of the wage gap could be opposite compared with the previous one.

The conclusion of this theory is that higher wages for full-time jobs are the consequence of a wage premium that employers have to pay to divert women from their desired form of work, while higher pro rata wages for part-time workers are the consequence of particular nature of some businesses for which it is economically convenient to hire part-time employees. Allaart and Bellmann (2007), analyzing different working segments in Germany and in The Netherlands, conclude that workers’ preferences are more important than employers’ needs.

The third theory discussed by Hu and Tijdens pertains the presence of a dual labor market: primary market and secondary market. In the former there are “good jobs”, characterized by good working condition, training and higher wages; on the contrary, “bad

jobs” offered in the latter involve low wages and poor working conditions. Secondary market, in a long-run equilibrium, tends to be filled by a group of workers whose attachment to paid employment is weaker. This group is mostly represented by youths, females and part-timers. The concentration of part-time jobs in the secondary market implies a pay penalty compared with full-time jobs, which, on the contrary, are characterized by higher wages and bonuses.

A fourth line of reasoning concerns the human capital accumulation theory, i.e. the assumption that education, training and practicing increase the skills of the workers and, consequently their earnings from work. The classical human capital theory states that individual’s wage is positively correlated with his/her level of human capital. According to this line of thought, lower wages for part-time workers, especially for the elderly, are the direct consequence of the shorter amount of work they performed in their past. An individual who has been working part-time for a given amount of years accumulate lower human capital, and therefore a lower productivity than an individual who has been working full-time along the same temporary horizon. This lower productivity is seen as a cause of the part-time pay penalty. Analyzing gender pay gap and part-time/full-time wage gap in UK, Manning and Robinson (2004) prove that on the entry into the labor market, earnings of men and women working part-time or full-time are very similar and they grow closely as long as there are no breaks in paid employment. Anyway, women are more likely to have breaks in paid employment and to re-enter in the labor market as part-timers. The consequence is that part-time women are paid less than full-time women because they are much more likely to be entrants. In a similar study for the US, Blank (1998), shows that individual’s working hours are correlated over time, so the wage gap is persistent and may increase over time.

Besides workers and employers characteristics, also institutional settings and policy affect part-time employment. The legal framework, through the creation of subsidies and social protection, may directly or indirectly influence the part-time/full-time wage gap. Apps (2004), exploring the Australian tax treatment of families, highlights that, in Australia, the effective marginal tax rates are higher for less skilled second earners. This particular tax treatment results into higher cost for employers that want to hire part-time workers or into lower wages for part-timers.

## **Part-time/full-time horizontal segregation**

Despite the presence of several theories explaining wage differentials among part-time and full-time workers, a deep understanding of the determinants of these disparities remains an open question. Recently, empirical studies have investigated the presence of an horizontal segregation between the two groups of workers, controlling whether the workforce of a specific industry or sector is mainly composed by part-time workers or viceversa. Most of

them provided evidence that, in some countries, occupational segregation is an important factor explaining most of the full-time/part-time wage gap.

It has been widely observed that, in the US, the vast majority of part-time workers is concentrated in less-paying working positions. Comparing earnings of part-time and full-time American workers, King (2000) reports a higher density of part-timers employed in five low-wage occupations: sales, clerical, food service, handlers and laborers. He also finds part-time penalties in all sectors except the health field, in which part-timers are paid a higher average wage than their full-time counterparts. However, a longitudinal analysis performed by Hirsch (2004) in the US documents the presence of substantive part-time/full-time wage gaps only among workers changing detailed industry and occupation in addition to part-time status.

Occupation is found to be an important factor explaining the full-time/part-time wage gap also in the European context. Allaart and Bellmann (2007), analyzing the distribution of workers in Germany and in The Netherlands, point out that specific sectors (construction and manufacturing in their case) have a lower concentration of part-timers compared with other occupations. A similar result is found in a subsequent study by Krillo and Masso (2010) in Estonia. Addabbo (1997) highlights that in Italy part-time workers are especially observed in the manufacturing sector where part-time is used as an alternative to dismissal from employment. Manning and Petrongolo (2008) prove that part-time pay penalties in UK are increasing as consequence of a rise in occupational segregation. Moreover, they declare that policies to reduce the wage gap are ineffective until “better jobs” are not available on a part-time base.

As proved, the horizontal segregation is a key determinant that can not be ignored in assessing part-time and full-time wages differences. However, despite this is a crucial factor, the importance of other characteristics of individuals from both sides, demand and supply of labor, can not be underestimated. In particular, even after controlling for different occupational sectors, many studies show significant disparities in the magnitude of the unexplained wage gap switching from one country to another, highlighting the presence of a “country effect”.

Bardasi and Gornick (2008) examine cross-national variation in wage gaps between part-time and full-time women workers in six different industrialized countries<sup>3</sup>: Canada, US, UK, Germany, Italy and Sweden. They find part-time wage penalties in all countries except in Sweden: the only “social democratic” State in their sample.

More recently Matteazzi et al. (2012), investigate the existence of wage penalties for part-time workers in four European countries. Their results show that segregation matters in explaining most of full-time/part-time wage gap. They also find evidence of significant differences among countries: while after controlling for occupational status and

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<sup>3</sup>Chosen because of their varied welfare state and regulatory designs, as well as diverse labor market structures and family activity rates.

self selection in Italy and UK the part-time pay penalty persists, the direction of the gap changes in Austria and Poland where significant part-time wage premiums are found.

### 3 Research Questions and Expectations

As shown before, part-time employment consistently increased in Europe during the last two decades capturing the attention of researchers and institutions. Indeed, in 1997, the European Union, highlighting the important impact of part-time on employment, adopted a directive<sup>4</sup> with the purpose to enhance equal employment conditions among part-time workers and full-time workers. The directive states that: “*Member States, following consultations with the social partners in accordance with national law or practice, should identify and review obstacles of a legal or administrative nature which may limit the opportunities for part-time work and, where appropriate, eliminate them*”. However, the presence of part-time workers is not equally distributed across European Countries: in 2012 the part-time rate<sup>5</sup> ranged from 4% in Slovakia to 49% in the Netherlands (see Figure 1.1). Previous theories and studies showed that these differences can be explained by several factors: rate of flexibility in the labor markets, regulations promoting part-time work, institutional structures and social systems, childcare services, taxation frame.

Aiming at providing a better understanding on this topic, this study analyzes part-time employment in seven European countries<sup>6</sup> in terms of wages differentials between part-time and full time women workers<sup>7</sup>. Specifically, the research intends to answer to the following interrelated questions:

- *Are there significant differences in hourly wages between part-time and full-time working women in Europe before and after controlling for self selection?*
- *How the direction and the magnitude of part-time/full-time wage gaps change among the European countries analyzed?*
- *Which portion of the part-time/full-time wage gap could be explained by job-related characteristics? And how this share varies across countries?*
- *Dissimilarities in institutional frameworks and differences in workers’ preferences: could they explain disparity results among countries?*

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<sup>4</sup>Council Directive 97/81/EC of 15 December 1997 concerning the Framework Agreement on part-time work concluded by UNICE, CEEP and the ETUC

<sup>5</sup>Presence of part-time workers over the total employment

<sup>6</sup>France, Germany, Italy, Netherlands, Spain, Sweden and United Kingdom.

<sup>7</sup>The reason behind the choice of providing evidences only about women is the consequence of two circumstances: small sample size of male part-time workers for meaningful analysis, and results of previous research showing that relatively few men are affected by part-time wage penalty.

With reference to the research questions expressed above, some expectations are disclosed based on theory and previous evidence.

Firstly, it is expected to find significant part time hourly wage penalty in all countries before “adjusting” the results, i.e. before taking into account personal differences that lead the individual choice towards part-time or full-time work. The main factors behind this expectation are given by observable and unobservable characteristics, which are different in the two groups advantaging full-time workers. In particular, theory (Manning and Robinson, 2004) suggests that full-time workers have a higher level of human capital (wage premiums foster individual with a higher level of human capital to work more hours). In addition, the first concern of women working part-time is not their market-work (otherwise they would choose for a full-time work); this would affect negatively their productivity, thus inducing lower wages. However, it has been reported (Gornick, 1999; Bardasi and Gornick 2000) that part-time rates are rarely predictable and they significantly vary within welfare state models. Therefore, it is expected that heterogeneity in terms of part-time employment rate in the labor market analyzed, being interrelated with the wage-structures, implies great disparity in the magnitude of the part-time penalty among countries.

Secondly, due to the abovementioned reasons, women employed part-time differ from women employed full-time in terms of personal characteristics: competences, ambition, attitude towards the work. The implication is that selection of women into employment and, in particular, into part-time work, can not be treated as an exogenous process. Thus, it is expected that the double sample selection<sup>8</sup> will have a relevant impact on the part-time/full-time wage gaps.

Thirdly, it is also expected that jobs and working sectors would explain relevant portions of the wage gaps in all the labor markets analyzed. In other words, there should be a concentration of part-timers in certain working sectors and, on the other hand, specific occupations in which workers are employed mostly full-time. As indicated by Hu and Tijdens (2003), theory asserts that the “part-time occupations” are typically less paid compared to the others. The reasons behind this circumstance regards the demand and the supply side both. The former aspect deals with the fact that for certain occupations employers find hiring part-time workers more convenient than hiring full-time workers and the reverse for others. The latter regards workers’ choices: part-time workers are more likely to be less attached to work earnings and less inclined to seek intensely a job; thus, presumably they could more easily employed in a lower-paid occupation. Furthermore, the research by Bardasi and Gornick (2008) and other studies demonstrate that part-time segregation in lower-paid works is higher in liberal countries and it is marginal in social democratic countries. Taking into account that the countries analyzed<sup>9</sup> in this study have

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<sup>8</sup>Employment versus non-employment and part-time versus full-time

<sup>9</sup>See next section for an extensive explanation of the characteristics of the countries analyzed and the

different background regarding the “level of welfare”, it is expected that the fraction of wage differential explained by differences in the occupation varies across these countries.

Finally, it is expected that different results in terms of magnitude of the wage gaps and level of occupational segregation among countries are strictly related to differences in institutional frameworks and in workers’ preferences based on cultural traits.

## 4 Cross National Econometric Analysis

The study examines wage differentials and their composition among part-time and full-time workers in seven European countries: France, Germany, Italy, Netherlands, Spain, Sweden and United Kingdom. These countries have been selected following a definite criteria aimed at having sufficient high variation in terms of welfare state, institutional structure, and labor force composition. The selection is based on the definition of the *welfare regimes* in terms of public and market provision, state tradition and power mobilization, introduced by Esping-Andersen (1990)<sup>10</sup>. According to the author, three dimension of developed welfare systems can be distinguished: “*social democratic*” welfare states, “*conservative*” welfare states, “*liberal*” welfare states. He demonstrated that, among the three groups, labor markets tend to have different trajectories and different regulations especially for women. Therefore, countries have been chosen to comprehend all the three categories: Netherlands and Sweden belong to the social democratic group; Germany, France, Spain and Italy belong to the conservative group; and United Kingdom is the unique European liberal welfare State. The four conservative countries can be further distinguished in “*continental*” welfare states (France and Germany) and “*Mediterranean*” welfare states (Italy and Spain).

Furthermore, as shown in figure 2.1, there are two kinds of differences depending on the geographical areas: the first one concerns the total amount of part-time workers employed, the second one is related to discrepancies on how part-time is spread among different categories. In fact, all examined countries, covering different European regions, differ in terms of use of part-time contracts and part-time gender gap (imbalance between part-time work for men and women). More specifically, the rate of women working part-time do vary widely among analyzed countries: according to Eurofound (2009) 76% of working women in The Netherlands has a part-time work, while in Spain women working part-time represent only the 23% of the female employment.

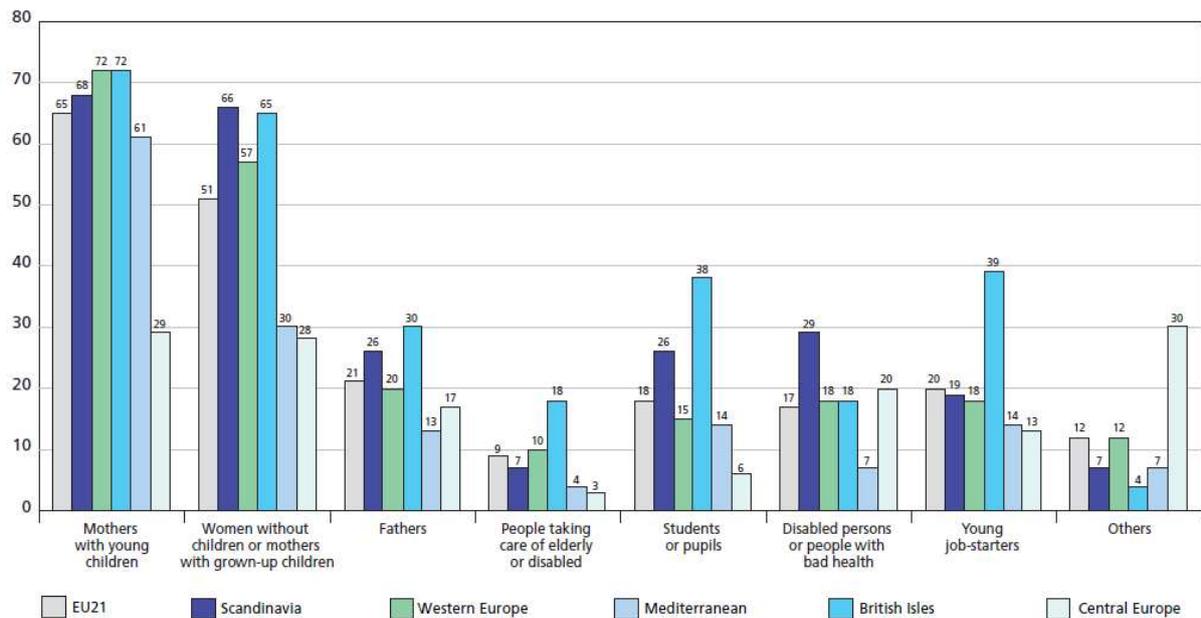
The third source of heterogeneity in the sample regards the reasons behind workers’ choices towards part-time employment. In Sweden, United Kingdom, Germany and Netherlands part-time work is a widespread popular choice led by particular work life

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selection criteria.

<sup>10</sup>A similar criteria has been also used by Bardasi and Gornick (2008)

**Figure 2.1:** Categories of Part-time workers by country group (% of total employment per category)



Source: European Foundation for the Improvement of Living and Working Conditions, *Working Time and work-life balance in European companies - 2006*. Database: ESWT, 2004-2005

balance needs, while in France, Italy and Spain it is mostly a consequence of employers business-related reasons.

This analysis aims at understanding whether countries in which there is a higher use of part-time contracts are also those in which part-time workers earn greater wages. Previous research (Allaart and Bellmann, 2007; Krillo and Masso, 2010; Bardasi and Gornick, 2008; Matteazzi et al., 2012) showed that, in Europe, a considerable portion of part-time/full time wage differentials is explained by different observed and unobserved worker-related characteristics, and by differences in occupation and job-sector. In this research, wages are analyzed, evaluating the impact of self-selection into part-time employment and the effect of job-related characteristics on part-time/full-time differentials in earnings.

## 5 Data

Micro-data used in this empirical analysis are exploited from the latest available version (2011) of the European Union Statistics on Income and Living Conditions (EU-SILC) database: a new homogenized panel survey which collects timely and comparable cross-sectional and longitudinal information on income, poverty, social exclusion and living conditions in 32 European States. EU-SILC replaced European Community Household Panel (ECHP) in the 2004 and it contains personal-based and household-based retrospective information. There is not a common survey in all countries, but the structure is

based on the idea of a "common framework". Guidelines define the lists of harmonized target variables (primary and secondary) to be transmitted to Eurostat and the procedure to collect data, which are classified to maximize the comparability of the produced information.

This study is about seven European Countries,<sup>11</sup> and it is based on a sample of married women with the spouse present. The sample is then restricted to individuals between 25 and 60 years of age living in households with no relatives. Also people serving in the armed forces, individuals with working disability and marginal part-timers are excluded from the sample. After doing so, 33,148 individuals remained, almost equally split among the seven countries. 17,715 individuals (equal to the 53.44% of the total) participate in the labor force<sup>12</sup>: among them 9,381 full-time employees and 8,334 part-timers. The focus of this analysis is on the comparison of the earnings differential among part-time and full-time workers; consequently, individuals outside the labor market are considered a residual category, and differences<sup>13</sup> in that group are ignored. The definition of part-time worker is usually made fixing a cut-off (e.g.: 30 hours per week) and considering full-timers all individuals upper this threshold. Here a self-definition is adopted, which allows for the country specific and industry specific differences in the concept of part-time worker.

The dependent variable is the natural logarithm of hourly gross wage, constructed using annual gross earnings of the individual, average weekly hours worked, and the number of months worked per year (assuming each month composed by 4 weeks). To limit the influence of extreme values, some outliers (the top and the bottom 5% of the wage distribution) have been dropped from the sample. This "cleaning procedure" has been adopted separately for each country in order to take into account the cross-country difference in the distribution of earnings. Hourly wages are regressed on a set of covariates, representing personal characteristics (age and education) and employment status (temporary contract, experience and job position/sector).

In addition, the research address the issue related to the sample selection. For this part, variables that are assumed to influence the individual choices regarding the participation in the labor force and the assignment to full-time or part-time employment have been taken in consideration.<sup>14</sup> This set includes age, education, # of children divided in age-range, family income and health.

Table 1 summarizes the sample composition regarding the rate of occupation and the share of part-time and full-time employees in the analyzed countries, underlining substantial divergences among them. There are evident disparities in terms of women labor market participation and women part-time employment. The female participation

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<sup>11</sup>Germany, Spain, France, Italy, Netherlands, Sweden and United Kingdom.

<sup>12</sup>Self-employed are excluded from this set.

<sup>13</sup>Unemployed, homemakers, voluntary, etc...

<sup>14</sup>Even if the wage itself could be considered a discriminant, it is not part of this set because it is endogenous in this model

is 81.3% in Sweden, while, as expected, the two Mediterranean countries are the ones in which the largest part of women is not employed: only the 38.5% of Italian women and 42% of the Spanish ones perform a paid work. Moreover, the country with the highest portion of employed women working part-time is The Netherlands (86.1% of the employed women are part-timers) followed by Germany (63.1%); in the other countries the majority of working women are employed full-time.

**Table 1:** Participation and part-time rates

	<b>Germany</b>	<b>Spain</b>	<b>France</b>	<b>Italy</b>	<b>Nether.</b>	<b>Sweden</b>	<b>U. K.</b>
	<i>%</i>	<i>%</i>	<i>%</i>	<i>%</i>	<i>%</i>	<i>%</i>	<i>%</i>
<b><i>% of Total</i></b>							
Not-employed	38.6	58.0	37.9	61.5	36.5	18.7	38.2
Employed	61.4	42.0	62.1	38.5	63.5	81.3	61.8
Full-Time	22.7	32.8	39.5	25.8	8.8	53.3	33.6
Part-Time	38.7	9.2	22.6	12.7	54.7	28.0	28.2
<b><i>% of Employed</i></b>							
Full-Time	36.9	78.1	63.7	66.9	13.9	65.6	54.3
Part-Time	63.1	21.9	36.3	33.1	86.1	34.4	45.7

## 6 Method

The primary aim of this analysis is understanding the causes of the unconditional earning differentials among working part-time and working full-time women in each country, and how different job profiles, mostly related to the job sector, can explain these differences.

The simplest and most popular approach is to estimate a single wage equation including a dummy variable for part-time work. This strategy captures the effect on wage of being a part-time worker, but it restricts all the other coefficients to be the same for full-time and part-time workers.

Hence, as reported by Heitmueller (2004) and Gang et al. (1999), an Endogenous Switching Model is more suitable to this case. It provides the estimation of the two wage equations separately; this is equivalent to estimate a single equation with the interactions of each regressor with the part-time dummy. Moreover, wage equations are corrected assessing for a double sample selection, participation versus non-participation in the labor market and part-time/full-time choice, and the the part-time effect on wage is computed through an Oaxaca-Blinder Decomposition.

### Wage Equations

At the first stage, the two wage equations, the former (1) for part-time and the latter (2) for full-time workers, are composed as follows:

$$\log \omega_{iPT} = X'_{iPT} \beta_{PT} + u_{iPT} \quad (1)$$

$$\log \omega_{iFT} = X'_{iFT} \beta_{FT} + u_{iFT} \quad (2)$$

The dependent variables  $\log \omega_{PT}$  and  $\log \omega_{FT}$  are the logarithm of the hourly wage rate received by part-time and full-time workers, respectively.  $X'_{PT}$  and  $X'_{FT}$  are matrix of different individual and job characteristics including nine dummies related to the International Standard Classification of Occupations categories (ISCO-88)<sup>15</sup>, while  $u_{PT}$  and  $u_{FT}$  are vectors of unobserved differences.

Estimations of the two regressions above using OLS may lead to inconsistent estimates, producing selection bias if choices regarding the participation in the labor force decision and the assignment to full-time or part-time employment are not random. The presence of a selection bias due to a non-random decision is commonly addressed by including an additional regressor in the regression equation which corrects the estimates (Heckman, 1979). In this case there are two sources of selection bias; consequently, to overcome the possibility of biased estimates, a double sample selection procedure, following Maddala and Nelson (1975) and Tunali (1986), is adopted. As indicated by Bardasi and Gornick (2000), and Bardasi and Gornick (2008), selection of women into full-time and part-time work could be predicted by individual and household characteristics. Let the participation and contract choice be determined by the following two equations:

$$P_i^* = \gamma B_i + \nu_i \quad (3)$$

$$S_i^* = \mu Z_i + v_i \quad (4)$$

Where  $P_i^*$  and  $S_i^*$  are the latent variables identifying, respectively, participation in labor force and part-time contract.  $B$  and  $Z$  are matrix of individual and household characteristics<sup>16</sup> that are supposed to predict the working decisions. An individual will participate in the labor market if the gain of work exceeds the utility of other activities outside the labor market (e.g.: leisure). Likewise the participation decision, individuals will choose to work part-time if they have strong preferences for an higher amount of free time or they think it is convenient from the point of view of earnings. Unfortunately the two latent variables are not observable, but it is possible to observe, the two index coefficients, P and S, which are defined as follows:

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<sup>15</sup>see Appendix 1 for detailed lists of variables used.

<sup>16</sup>The two matrix contain the same explanatory variables, but are denoted with two different letters to have a clearer notation in the calculation phase - see Appendix 1 for detailed lists of variables used.

$$P_i = \begin{cases} 0 & \text{if } P_i^* > 0 \\ 1 & \text{if } P_i^* \leq 0 \end{cases} \quad (5)$$

$$S_i = \begin{cases} 0 & \text{if } S_i^* > 0 \\ 1 & \text{if } S_i^* \leq 0 \end{cases} \quad (6)$$

where  $P_i = 1$  and  $P_i = 0$  note participation and non-participation in labor market, while  $S_i = 1$  and  $S_i = 0$  indicate part-time work and full-time work, respectively. Obviously,  $S_i$  can be observed only for participants ( $P_i = 1$ ).

In the first step, equations (3) and (4) are consistently estimated through the Maximum Likelihood (MLE) assuming a normal distribution of the error terms (Probit Model). Then, sample selection correction factors are constructed and are used to estimate (1) and (2) via simple OLS, including the correction terms as additional regressors. This procedure is similar to a two-step Heckman approach with extended correction terms (see Lee, 1979; Ham, 1980; Fische et al., 1981 and Tunali, 1986).

### Computation of the correction factors

In the calculus of the correction factors it is possible to distinguish two cases: the case in which participation decisions and the working-time choices are independent ( $\rho_{\nu\nu} = 0$ ), and the one in which there is dependence between the two processes ( $\rho_{\nu\nu} \neq 0$ ).  $\rho$  indicates the error correlation term between equation (3) and (4). In the first case ( $\rho_{\nu\nu} = 0$ ), the estimated correction terms for the part-time workers are:

$$\lambda_{i,p1} = \varphi(Z_i'\hat{\gamma})/\Phi(Z_i'\hat{\gamma}) \quad (7)$$

$$\lambda_{i,p2} = \varphi(B_i'\hat{\mu})/\Phi(B_i'\hat{\mu})$$

and the estimated correction terms for the full-time wage equation are:

$$\lambda_{i,f1} = \varphi(Z_i'\hat{\gamma})/\Phi(Z_i'\hat{\gamma}) \quad (8)$$

$$\lambda_{i,f2} = -\varphi(B_i'\hat{\mu})/\Phi(-B_i'\hat{\mu})$$

where  $\varphi$  and  $\Phi$  denote respectively the normal density function and the cumulative normal distribution function. Since wages are only observed for employed individuals, the correction terms for participation choice are the same for both groups.

In the second case the two selection processes are considered not independent one from the other and the two equations are estimated using a bivariate probit, assuming error correlation term to be  $\rho_{\nu\nu} \neq 0$ . In this case  $(u_i, \nu_i, \nu_i)$  are jointly normally distributed with mean zero and a covariance matrix  $\Sigma$ .

The correction terms constructed applying a maximum likelihood estimation to the bivariate probit model are the following:

$$\begin{aligned}
\lambda_{i,p1} &= \varphi(Z_i'\hat{\gamma})\Phi\left[\frac{B_i'\hat{\mu}-\rho Z_i'\hat{\gamma}}{(1-\rho^2)^{1/2}}\right] * \Phi_2(B_i'\hat{\mu}, Z_i'\hat{\gamma}, \rho)^{-1} \\
\lambda_{i,p2} &= \varphi(B_i'\hat{\mu})\Phi\left[\frac{Z_i'\hat{\gamma}-\rho B_i'\hat{\mu}}{(1-\rho^2)^{1/2}}\right] * \Phi_2(B_i'\hat{\mu}, Z_i'\hat{\gamma}, \rho)^{-1} \\
\lambda_{i,f1} &= \varphi(Z_i'\hat{\gamma})\Phi\left[-\frac{B_i'\hat{\mu}-\rho Z_i'\hat{\gamma}}{(1-\rho^2)^{1/2}}\right] * \Phi_2(-B_i'\hat{\mu}, Z_i'\hat{\gamma}, -\rho)^{-1} \\
\lambda_{i,f2} &= -\varphi(B_i'\hat{\mu})\Phi\left[\frac{Z_i'\hat{\gamma}-\rho B_i'\hat{\mu}}{(1-\rho^2)^{1/2}}\right] * \Phi_2(-B_i'\hat{\mu}, Z_i'\hat{\gamma}, -\rho)^{-1}
\end{aligned} \tag{9}$$

where  $\varphi$ ,  $\Phi$  and  $\Phi_2$  denote, respectively, the normal density function, the cumulative normal distribution function and the bivariate standard normal distribution function.

### Wage equation corrected

Once the corrections have been calculated, they can be included in the wage equations as additional regressors. Consequently, it is possible to re-write equations (1) and (2) as follows:

$$\begin{aligned}
\log \omega_{iPT} &= X'_{iPT}\beta_{PT} + \sigma_{11}\rho_{1\nu}\lambda_{i,p1} + \sigma_{11}\rho_{1\nu}\lambda_{i,p2} + \epsilon_{iPT} \\
&= X'_{iPT}\beta_{PT} + \delta_{1\nu}\lambda_{i,p1} + \delta_{1\nu}\lambda_{i,p2} + \epsilon_{iPT},
\end{aligned} \tag{10}$$

$$\begin{aligned}
\log \omega_{iFT} &= X'_{iFT}\beta_{FT} + \sigma_{22}\rho_{2\nu}\lambda_{i,f1} + \sigma_{22}\rho_{2\nu}\lambda_{i,f2} + \epsilon_{iFT} \\
&= X'_{iFT}\beta_{FT} + \delta_{2\nu}\lambda_{i,f1} + \delta_{2\nu}\lambda_{i,f2} + \epsilon_{iFT}.
\end{aligned} \tag{11}$$

Depending on the assumption on  $\rho_{\nu\nu}$ , the correction terms are either as in equations (7)-(8) if  $\rho_{\nu\nu} = 0$  or (9) otherwise. Be aware that if the coefficients  $\delta_{1/2,\nu/v}$  are significantly different from zero, it means that there is correlation between the error term of the regression equation and the error terms of the selection equations, i.e. the effect due to unobserved characteristics exists and it is significant.

### Oaxaca Decomposition

After consistently estimating the two wage equations, differences in part-time/full-time wage are computed using the Blinder and Oaxaca procedure (Blinder, 1973 and Oaxaca, 1973). The wage gap is split into three terms (Neuman and Oaxaca, 1998):

$$\begin{aligned}
\overline{\log \omega_{iPT}} - \overline{\log \omega_{iFT}} &= \widehat{\beta}_{PT}(X'_{iPT} - X'_{iFT}) + X'_{iFT}(\widehat{\beta}_{PT} - \widehat{\beta}_{FT}) \\
&\quad + [(\delta_{1\nu}\lambda_{i,p1} + \delta_{1\nu}\lambda_{i,p2}) - (\delta_{2\nu}\lambda_{i,f1} + \delta_{2\nu}\lambda_{i,f2})]
\end{aligned} \tag{12}$$

The term  $\widehat{\beta}_{PT}(X'_{iPT} - X'_{iFT})$  is the portion of the differential ascribable to differences in observed characteristics, while  $X'_{iFT}(\widehat{\beta}_{PT} - \widehat{\beta}_{FT})$  captures the portion attributable to differences in the estimated coefficients, i.e: unexplained part of the predicted mean wage gap. It is still unclear how to treat the selection terms in equation (12) in the literature. One line of thought deals with them by subtracting the terms from the left hand side creating a sort of adjusted wage differential (e.g. Reimers, 1983). In this research this an hybrid approach is used, subtracting only the correction factors related to part-time/full-time decisions from the overall differential.

## Machado-Mata Wage Decomposition

The standard approach explained in the previous section, proposed by Oaxaca (1973) and Blinder (1973), focuses on the average wage differential. This strategy does not take into account potential variations of the wage differences across the wage distribution. A straightforward approach, mostly used to analyze gender differences (see Dohmen et al., 2008 and Albrecht et al., 2009), provides the use of quantile regressions in order to decompose the gender wage gap at different points of the wage distribution. In this study the technique proposed by Mata and Machado (2005) is used to decompose the part/full time earnings gap at different quantiles. Thus, denoting with  $Q^\theta(\ln\omega_i)$  the log of hourly wage of individual  $i$  who leaves behind a fraction  $\theta$  of individuals, the gap can be written as follows:

$$Q^\theta(\ln\omega_{PT}) - Q^\theta(\ln\omega_{FT}) = Q^\theta[\widehat{\beta}_{PT}^\theta(X'_{iPT} - X'_{iFT})] + Q^\theta[X'_{iFT}(\widehat{\beta}_{PT}^\theta - \widehat{\beta}_{FT}^\theta)] \quad (13)$$

As before, the first term on the right hand side shows the contribution of differences in the analyzed characteristics among part-time and full-time workers to the earnings gap at the quantile  $\theta$ , and the second term indicates the unexplained part of that difference. Results presented in this paper follow the model in equation (13); for this part the correction factors in equation (12) are ignored. A STATA program written by Melly (2005) has been used; this program implements the procedure described above and it calculates standard errors for each quantile by bootstrapping.

## 7 Results

The empirical analysis aims at capturing the effects of different groups of variables on part-time/full time wage gap. In this section results are presented. At first, it is examined the extent to which part-time/full-time average wage differentials can be ascribed to differences regarding the occupational status. To this intent, three different decomposition models are estimated adopting the Oaxaca-Blinder procedure. In the first specification

the wage gap is estimated without corrections for sample selection bias; in the second and in the third, the selection effects<sup>17</sup> are deducted from the overall differentials. Specifically, two different sets of correction factors are applied: in the first case participation/non-participation and part-time/full-time choices are considered independent; in the second case dependence between the two decision-making processes is taken into account. After that, the analysis is extended on the entire wage distribution, rather than on the only mean. Hence, the part-time/full-time wage decomposition is calculated across different percentiles (from the first to the 99th percentile) following the Machado-Mata quantile decomposition method.

The remainder of this section starts by outlining the main estimation outcomes of the two selection equations and of the wage regressions. Thereafter, the results of the Oaxaca-Blinder wage decomposition models are reported and discussed. Finally, the series of quantile decompositions are plotted to detect the presence of “glass ceilings” and/or a “sticky floors”.

## Double Selection

The first stage of the double selection process consists in estimating a probit model on female participation/non-participation in paid employment. The estimated coefficients are reported in table appendix 2 (table A2.1). As expected, in all countries the age at which for a woman is more likely to perform a job ranges from 36 to 45 years old, and the probability of being employed, both full-time and part-time, rather than being not employed, increases with the level of education. Employment status strongly depends on the household composition: having children has a negative and significant effect on the probability to participate in the labor market. This effect is higher if children are aged between 0 and 5 years and it decreases at next age stages. Even if having children matters on the probability of performing a job in all countries, this phenomenon is prominent in United Kingdom, France and Germany. This could be the consequence of the availability of developed childcare facilities for Swedish and Dutch mothers and the use of unpaid childcare that is common in the southern European countries - Italy and Spain in this case. In Germany the effect is particularly remarkable for mothers of infants (0-2 years old); this might be due to the generosity of the German “*mutterschaftsurlaub*” (parental leave), which allows to the mother to be absent from work, after the period of compulsory maternity, for a further period, up to 12 months, perceiving an allowance equal to 67% of the salary. It is not surprising that having healthy problems negatively affects the probability of being employed in all countries; however the coefficient is not significant for Italian women. In line with the expectations and with other studies (Blundell et al.,

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<sup>17</sup>Selection effects are referred to the no-random choices regarding the participation in the labor market and the assignment to full-time or part-time employment, both.

2007; Apps et al., 2012) on female participation in paid employment is also the result related to the family income: the annual amount of household income has a negative and significant effect on the probability of working in the whole sample.

The second stage deals with the selection into one of the two types of job: full-time or part-time. The results of the probit model on part-time/full-time employment are reported in appendix 2 (table A2.2). A dominant trend among countries concerns the presence of a higher probability of working part-time for women in employment at advanced age stages. There are at least two reasons behind this tendency: “older women” are more likely to have a higher amount of household chores and, consequently, they find convenient working part-time; in some cases part-time job is used as instrument to pursue a gradual retirement compensation scheme. The two “Mediterranean” countries are the exceptions: in Italy part-time work is more likely to be a characteristic of women at early stages of their working career<sup>18</sup> while in Spain the coefficients are not significant. As expected, in all the countries there is a positive correlation between part-time work and education: a higher level of education attained reflects a lower probability to perform a part-time work. In all the examined countries, women with children are more likely to opt for part-time work, especially during the first life stages of their sons. This is a clear demonstration that part-time employment serves as an instrument to reconcile work and family chores. However, the incidence is not the same across countries: having children increases the probability of working part-time more sharply in Germany, Netherlands and United Kingdom rather than in the other countries. The coefficient regarding other sources of income is significant only in four countries: Germany, France, Netherlands and United Kingdom. In these countries the greater is the household income, the higher is the probability of working part-time rather than working full-time.

In all countries the simultaneity in the estimations of participation and working type decision is not supported. As shown in Table 2, results of the likelihood-ratio test lead not to reject the null hypothesis that the correlation coefficient between the two decisions ( $\rho_{vv}$ ) is zero at the 0.01 level of significance. Sweden is an exception: the coefficient is significantly different from 0 and attains to 10%.

**Table 2:** participation/non-participation - part-time/full-time choice correlation

	<b>Germany</b>	<b>Spain</b>	<b>France</b>	<b>Italy</b>	<b>Nether.</b>	<b>Sweden</b>	<b>U. K.</b>
$\rho_{vv}$	0.0182	0.0000	0.0093	-0.0418	-0.0234	0.1075	0.0030
p-value	(0.3405)	(0.9993)	(0.6690)	(0.0224)	(0.2313)	(0.0000)	(0.9049)

<sup>18</sup>This result could be related to a form of involuntary part-time.

## Wage Equations

In the second step, log wage equations for part-time and full-time are estimated separately using the probit results to construct selection correction terms. Results for full-time work (Table A3.1) and part-time work (Table A3.2) are reported in appendix 3<sup>19</sup>. The results of the hourly wages regressions are similar to those expected and, in general, are consistent across countries.

The coefficients related to the age of the respondent are broadly not significant for both part-time and full-time workers in almost all countries, indicating no particular disparities in wages associated with aging. However, in Italy and Spain there is evidence of lower returns for “older women”<sup>20</sup> in both groups of workers while in Sweden women older than 55 years are more likely to receive higher earnings compared with their younger counterparts.

For what concerns education level, whatever the group of workers, being “more educated” positively affects wages in all countries excepting Sweden, where individual with a higher level of education are more likely to earn less than the others. The effect is overall less sharp for part-time workers than full-time ones.

With reference to workplace characteristics, all occupations have a positive impact on wages with respect to mere primary sector elementary occupations (agricultural or fishery). Nevertheless, this effect is not significant for workers in the industry sector and in other elementary occupations in all countries apart from Italy. Besides, there are some differences among the other occupations: in average Manager, Senior Officials and Professionals get higher earnings than others employees.

Results related to temporary jobs are consistent with the literature on wage differentials for temporary workers (Comi and Grasseni, 2009; Picchio, 2006). Temps tend to receive lower earnings than permanent workers for both part-time and full-time employees in all countries. Besides, working experience matters only in few cases (Spain for full-timers, Netherlands for part-timers and Italy for both) affecting, as expected, positively the wages. However, this effect is very small.

Finally, the parameters of the Mill’s ratios are found to be statistically significant for most of the countries, indicating that the non-random selection is relevant and must be taken into account. Specifically, there is evidence of a significant participation bias for women employed full-time in Spain, France and Sweden, and for women employed part-time in Germany, Italy and Sweden. Regarding the part-time/full-time choice, selection effect is found to be significant for full-timers in Spain and France, and for part-timers in Germany and Sweden. As for United Kingdom, there is not evidence of a significant selection bias neither for participation/non-participation nor for part-time/full-time

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<sup>19</sup>Results regard the univariate case.

<sup>20</sup>Age range 56-65.

selection.

## Oaxaca Wage Decomposition

Using the results of the wage equations presented above, predicted log wages for part-time and full-time work can be consistently estimated. Tables 3, 4 and 5 report the results of the part-time/full-time wage differential decomposition applied to three different model specifications, respectively: model without sample selection, model including selection correction factors in the univariate case, model including selection correction factors in the bivariate case. Specifically, each table contains the difference in predicted log wages (unadjusted and adjusted) and its decomposition in two components: part attributable to observed characteristics and unexplained portion.

### Model without selection correction factors

The unadjusted wage gap (table 3) is statistically significant in all the analyzed countries. As expected, there is evidence of a pay penalty connected to part-time work in almost all the countries; Sweden turns out to be the only exception, displaying a wage premium of 27% for part-time working women.<sup>21</sup> The part-time penalty attains the 19% in Spain, it stands around the 15% in Germany, Italy, and United Kingdom and it is less than 10% in France and Netherlands. These results lie well in line with Matteazzi et al. (2013) but are slightly different from Bardasi and Gornick (2008).

More than half of the unadjusted part-time pay penalty is ascribable to differences in the “observed characteristics” (age, educational level and job-related characteristics) in all countries. However, results disclose noteworthy cross-country differences in the composition of the part-time/full-time unadjusted wage gap. Netherlands and United Kingdom are the countries in which the percentage of the wage differential explained by observable characteristics is lower compared to other countries. This explained portion is higher in Italy and Germany and even more in France and Spain.

Coherently with previous results, the decomposition of the part-time/full-time mean wage differential shows uncommon outcomes for Swedish women. Even if in this country there is a part-time pay premium, the “observed characteristics” are, as in the other countries, connected with lower wage. However, the portion related to differences in returns perform in the opposite direction, resulting in a positive differential.

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<sup>21</sup>The percentage difference is calculated starting from the log-wages in table 3, applying the following formula:  $\frac{e^{\log \omega_{iPT}} - e^{\log \omega_{iFT}}}{e^{\log \omega_{iFT}}}$

**Table 3:** Model without selection

<b>OAXACA-BLINDER WAGE DECOMPOSITION (PART-TIME/FULL-TIME)</b>							
<b>Specification 1 - No Selection</b>							
	GERMANY	SPAIN	FRANCE	ITALY	NEDHERLANDS	SWEDEN	UNITED KINGDOM
	ln_hourly_wage						
<b>Differential</b>							
Prediction_1	2.528*** (0.011)	2.158*** (0.018)	2.558*** (0.015)	2.421*** (0.013)	3.041*** (0.006)	3.158*** (0.019)	2.463*** (0.015)
Prediction_2	2.700*** (0.013)	2.367*** (0.011)	2.636*** (0.009)	2.598*** (0.009)	3.131*** (0.017)	2.912*** (0.012)	2.628*** (0.014)
Difference	-0.172*** (0.017)	-0.209*** (0.021)	-0.078*** (0.017)	-0.176*** (0.016)	-0.090*** (0.018)	0.245*** (0.022)	-0.165*** (0.020)
<b>Decomposition</b>							
Explained	-0.090*** (0.010)	-0.208*** (0.014)	-0.074*** (0.010)	-0.132*** (0.010)	-0.052*** (0.011)	-0.071*** (0.011)	-0.096*** (0.012)
Unexplained	-0.082*** (0.015)	-0.001 (0.018)	-0.004 (0.015)	-0.045*** (0.015)	-0.038** (0.015)	0.317*** (0.022)	-0.070*** (0.017)
<i>N</i>	2757	2287	2122	2986	2571	1710	1518

Prediction\_1: Regression on Part Time Wages

Prediction\_2: Regression on Full Time Wages

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## Models with selection correction factors in log wage equations

In the second and in the third model the selection correction factors in the univariate case ( $\rho_{vv} = 0$ ) first, and in the bivariate case ( $\rho_{vv} \neq 0$ ) after, are added. Results for these two specifications are reported in table 4 and in table 5, respectively. The model specifications with sample selection correction have an additional term aside from the wage difference, the explained and the unexplained component: the adjusted wage gap.<sup>22</sup> As shown in the previous sections the correlation between the participation decision and the part-time choice is approximately never significantly different from zero, indeed results in table 4 and table 5 are really close.

The findings for the wage differentials differ from those initially found without corrections, illustrating the relevance of taking into account selection into part-time or full-time work. Comparing new results to the output of the previous models is clear that the uncorrected wage penalties are biased downwards in Italy, Spain and Germany, while in Netherlands the pay penalty disappears switching into a pay premium after corrections are introduced (adjustments are not significant in France and United Kingdom). On the other hand, the part-time pay premium found in Sweden results to be even higher once accounting for sample selection corrections.

In Germany, Spain and Italy, not only the part-time pay penalty is higher than the unadjusted one, but also the unexplained part is much larger than the one in the previous model. This part, capturing differences in the returns of observed characteristics and effects due to omitted characteristics, encloses also the selection terms. Thus, these two results highlights that a part-time wage penalty exists in these countries and that the endogenous selection is important and must be taken into account. The effect results to be stronger in Italy and Spain.

Sample selection effect is remarkable in Netherlands, where a positive wage differential, caused by sample selection, indicates the existence of a pay premium for part-time workers. In addition, the coefficient related to the explained part does not change significantly. As a result, it is possible to state that the slight part-time wage premium is mainly due to selection related to personal and household characteristics, rather than job-related characteristics. Part-time work is a standard for Dutch women, full-time work for some “selected” workers might be forced by some financial constraints or exceptional needs.

The large adjusted pay premium for Swedish part-time working women means that, all other characteristics being equal, part-timers benefit a substantial earning advantage compared with their full-time colleagues. This extra wage is mainly due to a positive selection.

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<sup>22</sup>The adjusted wage gap is calculated by subtracting the selection term  $[(\delta_{1v}\lambda_{i,p1} + \delta_{1v}\lambda_{i,p2}) - (\delta_{2v}\lambda_{i,f1} + \delta_{2v}\lambda_{i,f2})]$  from the overall differential  $[\log \omega_{iPT} - \log \omega_{iFT}]$ .

**Table 4:** Model with Endogenous Selection - [ $\rho_{\nu\nu} = 0$ ]

<b>OAXACA-BLINDER WAGE DECOMPOSITION (PART-TIME/FULL-TIME)</b>							
<b>Specification 2 - Univariate Probit Models [<math>\rho_{\nu\nu} = 0</math>]</b>							
	GERMANY	SPAIN	FRANCE	ITALY	NEDHERLANDS	SWEDEN	UNITED KINGDOM
	ln_hourly_wage						
<b>Differential</b>							
Prediction_1	2.528*** (0.011)	2.158*** (0.018)	2.558*** (0.015)	2.421*** (0.013)	3.041*** (0.006)	3.158*** (0.019)	2.463*** (0.015)
Prediction_2	2.700*** (0.013)	2.367*** (0.011)	2.636*** (0.009)	2.598*** (0.009)	3.131*** (0.017)	2.912*** (0.012)	2.628*** (0.014)
Difference	-0.172*** (0.017)	-0.209*** (0.021)	-0.078*** (0.017)	-0.176*** (0.016)	-0.090*** (0.018)	0.245*** (0.022)	-0.165*** (0.020)
Adjusted	-0.187*** (0.069)	-0.417** (0.201)	-0.260 (0.176)	-0.584*** (0.168)	0.162* (0.089)	0.610*** (0.152)	0.010 (0.101)
<b>Decomposition</b>							
Explained	-0.076*** (0.013)	-0.193*** (0.017)	-0.067*** (0.012)	-0.137*** (0.014)	-0.056*** (0.012)	-0.102*** (0.014)	-0.100*** (0.016)
Unexplained	-0.112 (0.075)	-0.224 (0.206)	-0.193 (0.182)	-0.446** (0.175)	0.218** (0.091)	0.712*** (0.157)	0.109 (0.108)
<i>N</i>	2757	2287	2122	2986	2571	1710	1518

Values are adjusted to account for selection bias deducting the selection effects from the overall differential.

Prediction\_1: Regression on Part Time Wages

Prediction\_2: Regression on Full Time Wages

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 5:** Model with Endogenous Selection - [ $\rho_{vv} \neq 0$ ]

<b>OAXACA-BLINDER WAGE DECOMPOSITION (PART-TIME/FULL-TIME)</b>							
<b>Specification 3 - Bivariate Probit Bivariate Probit [<math>\rho_{vv} \neq 0</math>]</b>							
	GERMANY	SPAIN	FRANCE	ITALY	NEDHERLANDS	SWEDEN	UNITED KINGDOM
	ln_hourly_wage	ln_hourly_wage	ln_hourly_wage	ln_hourly_wage	ln_hourly_wage	ln_hourly_wage	ln_hourly_wage
<b>Differential</b>							
Prediction_1	2.528*** (0.011)	2.158*** (0.018)	2.558*** (0.015)	2.421*** (0.013)	3.041*** (0.006)	3.158*** (0.019)	2.463*** (0.015)
Prediction_2	2.700*** (0.013)	2.367*** (0.011)	2.636*** (0.009)	2.598*** (0.009)	3.131*** (0.017)	2.912*** (0.012)	2.628*** (0.014)
Difference	-0.172*** (0.017)	-0.209*** (0.021)	-0.078*** (0.017)	-0.176*** (0.016)	-0.090*** (0.018)	0.245*** (0.022)	-0.165*** (0.020)
Adjusted	-0.187*** (0.069)	-0.399** (0.196)	-0.260 (0.176)	-0.579*** (0.179)	0.171* (0.094)	0.661*** (0.156)	0.010 (0.101)
<b>Decomposition</b>							
Explained	-0.076*** (0.013)	-0.161*** (0.022)	-0.067*** (0.012)	-0.034 (0.031)	-0.055*** (0.011)	-0.015 (0.016)	-0.100*** (0.016)
Unexplained	-0.111 (0.075)	-0.238 (0.204)	-0.193 (0.182)	-0.546*** (0.205)	0.227** (0.094)	0.675*** (0.155)	0.109 (0.108)
<i>N</i>	2757	2287	2122	2986	2571	1710	1518

Values are adjusted to account for selection bias deducting the selection effects from the overall differential.

Prediction\_1: Regression on Part Time Wages

Prediction\_2: Regression on Full Time Wages

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

The findings presented in this section are, for a great part, consistent with expectations. Part-time pay penalties are found in all the countries except Sweden. In addition, most of the pay gap is found to be explained by observed characteristics mainly related to job-sector and occupation, emphasizing a concentration of part-time working women in low-paid professions at the bottom of the job pyramid. On the other hand, the results of the sample selection may be slightly misleading. Controlling for differences in personal and household-related characteristics increases the negative wage gap in three countries: Italy, Germany and Spain. The effect is the opposite in Sweden, where corrections widen the pre-existent part-time wage premium, and in Netherlands, where the unadjusted part-time pay penalty turns into a pay premium after adjustment are embedded.

## Machado-Mata Wage Decomposition

A critic frequently moved to the Oaxaca-Blinder approach concerns the fact that this method may offer an undesirable restrictive analysis of the phenomenon, because it is based on a point estimate of the wage gap (its mean). To address this issue a further analysis is performed using the Mata and Machado (2005) quantile decomposition approach. This technique is based on a quantile regression framework which, observing the variation of the wage gap across its distribution, points out picks or troughs which can not be detected by a means analysis. In addition, it enables a decomposition of the gap at each quantile into two components: a component due to differences in characteristics, and a component due to differences in the returns to these characteristics.

Following the procedure just described, the wage gap proposed in the first specification<sup>23</sup> has been calculated and decomposed at each percentile of its distribution. Results are summarized in figures 3.1-3.7, which show, for each country, the three distributions of interest: the part-time/full-time wage gap, the component due to differences in personal and job-related endowments, the component due to differences in the returns. For the last two distributions the 95% bootstrap<sup>24</sup> confidence intervals are also presented.

Several features are worth to be mentioned involving the distribution and the composition of the gaps. For what concerns the wage gap distribution, it displays many differences across countries. The gap shows a U-shape in Italy and United Kingdom, meaning that part-time and full-time wages are closer at the extremes, while the former falls behind the latter near the median. The same pattern is observed in Sweden with the difference that the higher gap in the middle of the distribution is in favor of part-timers rather than full-timers.

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<sup>23</sup>Model without the selection correction factors, i.e. before accounting for selection of women into the labor market and into part-time or full-time work.

<sup>24</sup>The number of bootstrap samples was 1000.

### Figures 3.1-3.7: Wage Decompositions (part-time/full-time)

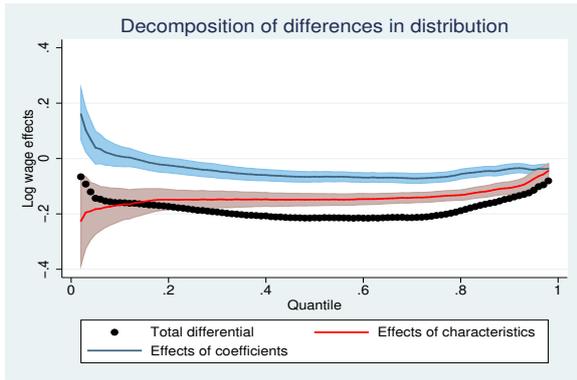


Figure 3.1: Italy

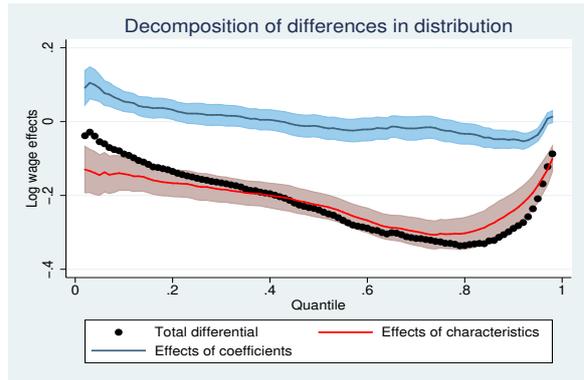


Figure 3.2: Spain

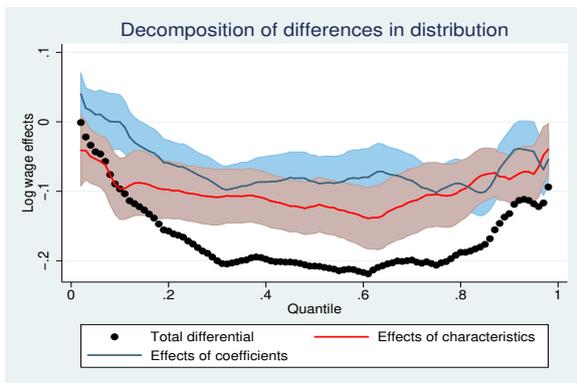


Figure 3.3: United Kingdom

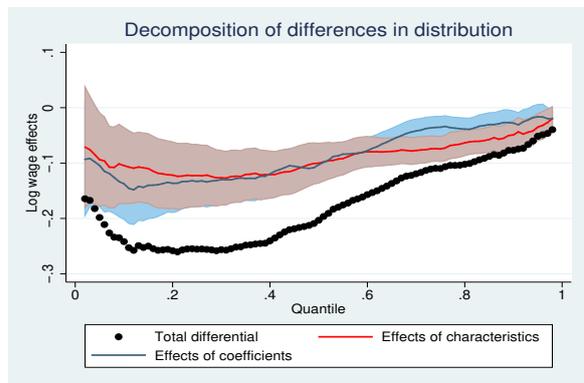


Figure 3.4: Germany

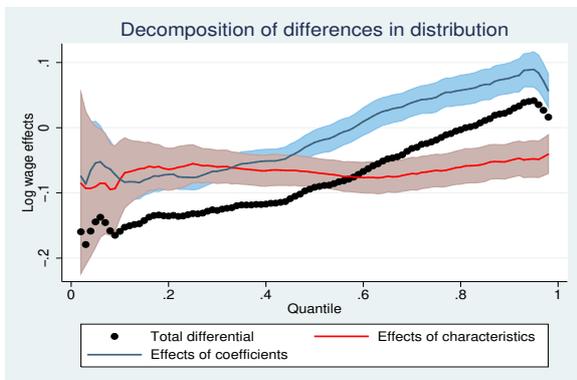


Figure 3.5: France

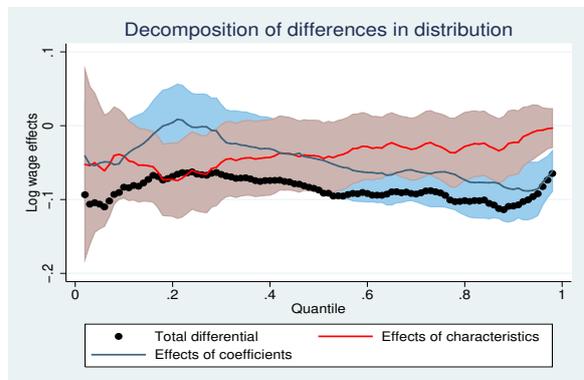


Figure 3.6: Netherlands

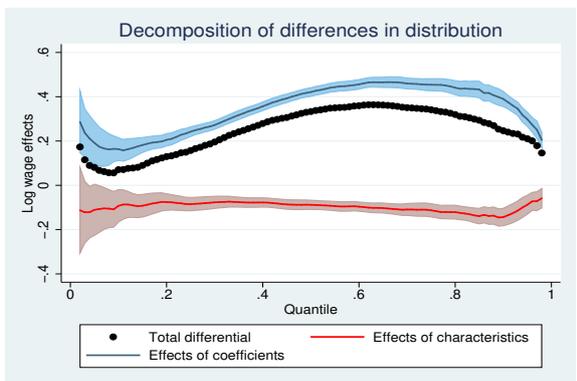


Figure 3.7: Sweden

A non-monotonic trend has also been detected in Spain and in Germany, but with some relevant differences. In the former the main increment in the wage gap is observed in the last quarter of the distribution. The wide pay penalties around the upper tail might be the consequence of barrier to further advancement for part-time workers once they have attained a fairly good job. Literature refers to this circumstances as “glass ceiling” effect. On the other hand, in Germany the wage gap widens at the lowest part of the quantile distribution suggesting a “sticky floor” effect, i.e. a discriminatory employment mechanism that keeps part-time workers with meager labor market characteristics at the bottom of the job hierarchical scale. In France the differential decreases along the distribution, displaying part-time penalties before the 80th percentile and increasing part-time premium in the upper tail, while it remains almost constant in Netherlands.

Switching the focus on the wage gap composition, other cross country differences emerge. Both the effect of covariates and the one due to differences in returns contribute to the evolution of the percentile estimates of the wage gap in Italy, Spain, United Kingdom, Germany and France. The former effect is significantly different from zero (the confidence intervals do not include zero) along the whole distribution in all these countries. However, while it almost fully explain the wage penalties in Italy and Spain (Figures 3.1 and 3.2), its impact is less remarkable in United Kingdom and Germany. In fact, as shown in Figures 3.3 and 3.4, differences in characteristics account for approximately the half of the wage gap in all of the estimated quantiles. An uncommon trend is observable in France. Figure 3.5 shows that differences in the characteristics account for most part of the wage differentials in the first two quartiles, while, in the second half of the distribution, the gap start decreasing and the effect of covariates remains constant at a negative level. On the other hand, the effect of characteristics does not match with the distribution of the wage gap in Netherlands and in Sweden (Figures 3.6 and 3.7). Au contraire, in the latter, the differences in characteristics not only does not explain the disparities in the gap but they have an opposite trend.

To sum up, the quantile decomposition analysis reveals noteworthy cross-country differences in the wage gap at different quantiles. In particular, it allows to detect the presence of some discrimination mechanism against part-time workers (glass ceiling and sticky floor effects). In addition, through a more detailed decomposition of the wage gap, it confirms that personal and job-related characteristics explain a large part of the part-time pay penalties in all the countries except Netherlands and Sweden.

## 8 Discussion: Explaining Cross Country Differences

The analysis displays consistent heterogeneity among countries in both part-time/full-time differential and level of job segregation. The highest part-time penalties are observed in

Spain, Italy and Germany, while they are slightly lower in France. The initial penalties found in United Kingdom and Netherlands disappear after controlling for sample selection; in the latter they even turn into significant pay premiums. Only in Sweden the part-time hourly wages are significantly higher than the full-time ones. In the four countries with permanent<sup>25</sup> part-time penalties, the portion of the gap due to job-related characteristics is statistically relevant: it is determinant in Spain and it is relevant across most of the distribution of wage differences in Germany and Italy.

Hence, it is clear that women working part-time and specific subgroups of them bear different pay penalties among the analyzed countries. These results indicate that part-time work, especially in some countries, is often associated to labor market inequalities.

Several reasons can explain why workers with similar occupations may receive different earnings among distinct labor markets. Differences in wages can not be analyzed without taking primarily into consideration the dimension of the labor markets. Indeed, it is often underlined that the creation of prices (wages) and the allocation of goods (workers) can result distorted in “thin” markets. Undoubtedly, the limited diffusion of part-time in some labor markets can restrict benefits from this type of work, thus affecting wages and representing a constraint to the development of part-time work. In general, theory asserts that equilibrium in labor markets - either in term of employment or earnings - is determined by preferences of workers, technology and market institutions.

The analyzed countries share about the same level of technology, therefore, in this section, only workers’ preferences and dissimilarities in institutional frameworks will be assessed.

## Preferences

Workers’ preferences and the ability to achieve them represent a crucial aspect in determining the amount of women working part-time and their earnings. First of all, differences arise from the household structure: traditional (central/southern Europe) versus modern (north of Europe and Scandinavia). In the former the figure of a single male breadwinner is predominant and women are in part stereotyped as being simply housewives and mothers; having in charge all the household chores leads, in most of the cases, women out of the labor market. In the latter roles distinction among partners is less relevant and a higher level of collaboration in the household allows women to crave their working time employment preferences.

The second point concerns preferences in terms of career’s objectives. Even though an individual career is often orientated to income maximization, in some cases individuals prioritize other values over monetary return. This clearly influences their preferences in the choice of work: when preferences for family time (such as spending time with

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<sup>25</sup>Before and after controlling for sample selection.

children) or spare time overcome the desire of higher earnings, individuals may prefer a part-time work rather than a full-time one. However, also the wish to maintain a job-position, relative to men or women without children, can force many mothers to remain in full-time employment even after the birth of a son. According to Kanji (2011) there are three theoretical standpoints forcing mothers to participate in full-time employment: profit maximization, polarization and preference theory. In a study on the British working women, he proves that mothers who are the main earners are more likely to stay in full-time employment than mothers who earn less than 80 per cent of their partners' earnings. He also finds that mothers who believe that family life suffers if the mother works full-time are more likely to participate in part-time work.

Family values are indeed the third cause that leads women working preferences. As pointed out by Kramarz et al. (2008), the Netherlands is a country in which traditional family values urge women to bring up their children by themselves. Verbakel (2010) states that the vast majority of Dutch mothers indicate that parents should not use childcare facilities for more than two days per week. Strong preferences for family care certainly fueled the increase of part-time employment in Netherlands.

Extremely importance to the family is attributed also in Mediterranean countries. On the contrary, in these countries part-time is not viewed as a means of work-sharing, but as an unstable form of work characterized by low promotion opportunity, training and earnings. Workers who choose part-time work expect lower benefits and invest less in human capital and job-commitment, contributing to self fulfilling their expectation. The result is a lower consideration of part-time in the labor market with clear negative effects on part-time wages.

Lastly, a general way to assess worker preferences is to analyze the portion of voluntary and involuntary part-time and full-time workers. Countries in which only a small portion of part-timers are willing to switch to full-time are the ones with lower part-time pay penalties. Boeri and Van Ours (2013) show that the share of involuntary part-time work for women is only the 5% in Netherlands compared with the 28.4% in France, the 37% in Italy and the 55% in Spain. In addition, Fernández-Kranz and Rodríguez-Planas (2011) state that Spain has one of the lowest rate of women working part-time among advanced economies, and the pay penalty to part-time work is among the worst in European Union. Results of the present study are consistent with these view. However, part-time penalties are also found in United Kingdom, where the involuntary part-time is only the 12.2%. The explanation is gathered by a study performed by Connolly and Gregory (2009). They show that part-time penalties in United Kingdom are due to an excess supply of part-time hours by British women in some occupations. They find that one-quarter of women in high-skill jobs are forced to downgrade occupationally when switching to part-time work, lowering their wages.

## Institutional Frameworks

Differences in the systems of social and labor market policies, norms and collective agreements provide constraints and incentives which contribute in shaping the variations across countries, altering workers' decisions and earnings.

First of all, some policies can be explicitly designed to promote the integration of part-time workers in the labor market. All the analyzed countries implemented the EU Directive<sup>26</sup> through a combination of legislation and collective bargaining. Yet, some countries have been more determined than others in achieving the target.

As underlined by Gornick and Meyers (2003), Netherlands went far beyond the basic Directive in enacting legislation to “normalize” part-time work and reached the declared target: enabling all couples to hold an “one and a half” job. The Work and Care Act (2001) inhibits all different treatment caused by differences in working hour and allows individuals to decrease their working hours. In Sweden the right to part-time work have been set even before the Directive. Since 1978 Swedish parents have the right to work part time at prorated pay until their children reach the age of eight. In United Kingdom new laws granted part-time workers the same rights as full-time workers in term of pay, holidays, training and benefits. In France and in Germany, the law obliges the employer to organize a part-time work if requested by the employees. On the other hand, in Italy and in Spain there is not an individual right forcing employers to accept part-time workers; however, part-time is recognized, regulated and high flexibility in determining the structure of the job contract is given to the agents.

Disparities in part-time protection legislations may be the cause of some cross-country difference in pay penalties for part-timers in selected occupations. For example, if workers do not have the right to work part-time without changing profession, a portion of women who want to work part-time can be forced to choose particular occupation profiles in which part-time work is over-represented. This often leads to situation of lower salary offer.

Another difference regards the public childcare provision, which markedly varies in the analyzed countries. Also the resources invested in early education are more significant in some countries and less in others.

Social Democratic countries are the best providers. In Sweden almost three-quarters of children under three years are in public care (Gornick and Meyers, 2003). According to Broekhof (2006), in the Netherlands, the 62% of 2-3 years old children receive “preschool education” through attendance at preschool playgroup. On the contrary, publicly supported childcare or early childhood education is very restricted in the United Kingdom, but there is a system of fee paying preschools. Childcare is usually undertaken by the

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<sup>26</sup>Council Directive 97/81/EC of 15 December 1997 concerning the Framework Agreement on part-time work concluded by UNICE, CEEP and the ETUC

parents while the public support is highly based on rights at work. Indeed, an efficient labor market allows the mother to leave the employment and to recover her position after. In Italy, Germany, France and Spain support for continuous maternal employment is more limited, in fact public care is mostly available for children older than three years. However, in Germany and France, several preschool are structured for giving care during the whole day. The limited use of childcare for “under threes” is not only a matter of services provided, but it is mainly a consequence of cultural habits which lead mothers to taking care of their children by themselves. These influences are stronger in the Mediterranean countries. In Italy, many mothers continue working after a childbirth only if informal childcare support is provided by grandparents or other relatives.

To sum up, different childcare service provisions and different habits surely influence the decisions related to working time and employment preferences. In particular, it can be assumed that many mothers will have unfulfilled employment preferences if the childcare infrastructure is inadequate and the environment pushes them to take up certain responsibility.

Finally, extreme importance must be attributed to collective agreements since, in most European countries where work-sharing policies are discussed and implemented, the collective bargaining coverage is high. According to the OECD, bargaining coverage is above 90% in France and Sweden and above 80% in Italy and Netherlands (Kramarz et al., 2008). As stated by Contensou and Vranceanu (2000), the institutional context influences the workers choices for what concerns working time decisions. The main determinants are both the bargaining power of employees and the weights attributed to different issues in the trade union objectives.

In Netherlands, during the 80s, unions were opposed to part-time work because of the inferiority of rights, wages, fringe benefits and career prospects in work sharing (Hemerijck and Visser, 2003). However, women increasingly asked employers to continue working at reduced hours after giving birth. The increased level of work participation by women allows them to impose their needs in the unions, leading public institutions to become favorable to part-time employment. On the other hand, in Sweden, even if centralized unions did not promote work-sharing, working time reductions have been implemented by providing other means to combine family needs and market work, such as subsidized absence policies and career interruptions.

In general, especially in countries where the importance of collective agreements is relevant, the presence of minorities and pressures within unions, aimed at modifying unions’ objectives, affects both use of part-time and workers earnings. Consequently, pay penalties in some European countries can be caused by unions consideration of part-time as an unstable work regime and not as a suitable option to let market work and family needs coexist.

## 9 Conclusion

Using the last wave of the EU-SILC survey, this study examines the part-time/full-time wage gap at the mean and over the entire wage distribution of the women workforce in seven European countries employing an endogenous switching model.

The first set of the analysis points out part-time wage penalties for women in all of the countries with the exception of Sweden. In addition, evidence shows noteworthy cross country differences in the magnitude of the penalties and their composition. The lowest values for the wage gap indicator are found in Netherlands and in France (less than 10%), followed by United Kingdom, Germany, Italy (around 15%) and Spain (20%). On the contrary, Swedish part-time working women earn significantly more than full-time ones: the pay premium attains the 25%.

In all the countries in which pay penalties are detected, they are largely ascribable to differences related to occupation and job-sector. The extent to which these “observed differences” explain the gap varies markedly across countries, ranging from 60% in Netherlands and United Kingdom to more than 90% in Spain. Despite the abovementioned pay premium, the impact of “observed characteristics” in Sweden is connected, as in the other countries, with lower wages.

The second set of the analysis assesses the issue of the endogenous selection, testing for double sample selection: participation/non-participation in the labor market and part-time/full-time choice. The application of correction factors leads to an increment of the already negative gap in three countries (Italy, Germany and Spain). On the other hand, the slight pre-existent part-time pay penalty in Netherlands turns into a pay premium after adjustment are embedded. In the end, corrections widen the part-time wage premium previously detected in Sweden, while they are found to be not significant in France and United Kingdom.

The third set of the analysis uses a quantile decomposition approach to observe the variation of the wage gap across its distribution. Results reveal different patterns across countries. In particular, it shows that the pay penalty is wider around the upper limit tail in Spain, highlighting a possible “glass ceiling” effect. In Germany and in France the wage gap is larger at the lowest part of the percentile distribution, suggesting instead the presence of “sticky floor” mechanism. The counterfactual decomposition also confirms that job-related characteristics explain a large part of the part-time pay penalty in all the countries except Netherlands and Sweden.

Finally, possible explanations to the cross-country differences found are provided. It is shown how these dissimilarities can be caused by cultural characteristics connected to workers’ preferences (family values, household model, career’s objective) and different institutional frameworks (ad hoc policies, childcare provision, collective agreements).

In the end, this study reveals the existence of considerable part-time penalties in all

the analyzed countries except Sweden and Netherlands before and after controlling for sample selection. Moreover, the study also points out the presence of considerable cross-country inequalities in both part-time use and part-time earnings. Furthermore, specific country related factors that might have been causing these differences have been assessed. In any case, the extent to which these dissimilarities are ascribable to particular issues remains an open question. Future investigations may shed a brighter light on this topic helping policies to remove labor market inequalities related to part-time work.

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## Appendix 1 - Variables Definition

In this section all variables used in descriptive tables and regression analysis are defined. The variables related to the employment status (i.e. lfp and part-time) are based on a self definition. This approach aims at capturing the individual own perception of her main activity at present.

### Selection Part

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<b>- Dependent Variables</b>	
<b>• Labor Force Participation</b>	
lfp	Dummy, 1 if individual is in paid employment
<b>• Part-Time/Full-Time</b>	
part_time	Dummy, 1 if individual is an employee working part-time

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<b>- Independent Variables</b>	
<b>• Age</b>	
age_25_35	Dummy, 1 if age of the respondent is younger than 35 and older than 25
age_36_45	Dummy, 1 if age of the respondent is younger than 45 and older than 35
age_46_55	Dummy, 1 if age of the respondent is younger than 55 and older than 45
age_56_65	Dummy, 1 if age of the respondent is younger than 65 and older than 55
<b>• Education</b>	
ed_primary	Dummy, 1 if highest education attained is primary or pre-primary
ed_secondary	Dummy, 1 if highest education attained is secondary (lower-secondary and post-secondary included)
ed_tertiary	Dummy, 1 if highest education attained is secondary (first and second stage) or higher
<b>• Children</b>	
ch_age_0_2	Number of children in household between 0 and 2 years of age
ch_age_3_5	Number of children in household between 3 and 5 years of age
ch_age_6_11	Number of children in household between 6 and 11 years of age
<b>• Health Problems</b>	
no_health_prob	No limitation in activities due to health problems
health_prob	Limitation in activities because of health problems
<b>• Household Income</b>	
fam_income	Household income ordered in a scale of 15 classes

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## Wage Regression Part

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### - Dependent Variable

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- **Hourly Wage (in logs)**

ln\_hourly\_wage    Log of the gross wage divided by the number of hours worked

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### - Independent Variables

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- **Age**

See Selection Part Above

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- **Education**

See Selection Part Above

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- **Temporary Contract**

permanent        Dummy, 1 if the respondent is employed in permanent contract

temporary        Dummy, 1 if the respondent is employed in temporary contract

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- **Occupation (ISCO-88)**

i.1                Dummy, 1 if the respondent is a Legislator, a Senior Official or a Manager

i.2                Dummy, 1 if the respondent is a Professional

i.3                Dummy, 1 if the respondent is a Technician or an Associate Professional

i.4                Dummy, 1 if the respondent is a Clerk

i.5                Dummy, 1 if the respondent is a Service Worker or Market Sales Worker

i.6                Dummy, 1 if the respondent is Skilled Agricultural or Fishery Worker

i.7                Dummy, 1 if the respondent is a Craft Worker or Related

i.8                Dummy, 1 if the respondent is a Plant Operator or a Machine Assembler

i.9                Dummy, 1 if the respondent has an Elementary Occupation

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- **Experience**

experience        number of years spent in paid work

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## Appendix 2 - Probit Selection Models

Table A2.1: Selection Regression 1

PROBIT MODEL ON THE PROBABILITY TO BE AN EMPLOYEE							
	GERMANY	SPAIN	FRANCE	ITALY	NEDHER.	SWEDEN	U. KINGDOM
	Participation						
age_25_35	1.051*** (0.082)	0.807*** (0.072)	1.109*** (0.100)	0.741*** (0.061)	1.082*** (0.097)	0.162 (0.127)	1.007*** (0.101)
age_36_45	1.170*** (0.062)	0.790*** (0.059)	1.249*** (0.075)	0.914*** (0.049)	1.066*** (0.070)	0.690*** (0.105)	1.081*** (0.085)
age_46_55	1.022*** (0.051)	0.722*** (0.051)	1.233*** (0.059)	0.803*** (0.042)	0.890*** (0.053)	0.537*** (0.084)	0.983*** (0.069)
age_56_65	.	.	.	.	.	.	.
ed_primary	-0.684*** (0.073)	-1.069*** (0.044)	-0.794*** (0.069)	-0.950*** (0.044)	-0.753*** (0.058)	-0.684*** (0.105)	-0.616*** (0.078)
ed_secondary	-0.276*** (0.044)	-0.551*** (0.050)	-0.394*** (0.057)	-0.339*** (0.042)	-0.211*** (0.049)	-0.257*** (0.070)	-0.020 (0.059)
ed_tertiary	.	.	.	.	.	.	.
no_children	.	.	.	.	.	.	.
ch_age_0_2	-1.445*** (0.097)	-0.006 (0.066)	-0.378*** (0.088)	-0.135*** (0.052)	-0.095 (0.081)	-0.329*** (0.106)	-0.493*** (0.086)
ch_age_3_5	-0.398*** (0.064)	-0.156*** (0.050)	-0.199*** (0.071)	-0.241*** (0.045)	-0.154** (0.061)	-0.245*** (0.089)	-0.443*** (0.076)
ch_age_6_11	-0.282*** (0.043)	-0.154*** (0.035)	-0.133*** (0.045)	-0.113*** (0.030)	-0.209*** (0.038)	-0.079 (0.064)	-0.301*** (0.051)
no_health_prob	.	.	.	.	.	.	.
health_prob	-0.769*** (0.092)	-0.299** (0.145)	-0.196* (0.103)	0.039 (0.086)	-0.720*** (0.203)	-0.873*** (0.188)	-0.660*** (0.138)
fam_income	-0.050*** (0.006)	-0.025*** (0.006)	-0.088*** (0.007)	-0.027*** (0.004)	-0.067*** (0.007)	-0.020* (0.010)	-0.026*** (0.007)
_cons	0.361*** (0.064)	-0.041 (0.066)	0.605*** (0.092)	-0.194*** (0.063)	0.643*** (0.093)	0.978*** (0.114)	0.072 (0.082)
<i>N</i>	4686	5853	3571	8287	4236	2156	2595

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A2.2: Selection Regression 2

PROBIT MODEL ON THE PROBABILITY TO WORK PART-TIME							
	GERMANY	SPAIN	FRANCE	ITALY	NEDHER.	SWEDEN	U. KINGDOM
	Part-Time (d)						
age_25_35	-0.786*** (0.107)	0.138 (0.134)	-0.388*** (0.129)	0.481*** (0.112)	-0.770*** (0.136)	-0.390*** (0.139)	-0.826*** (0.137)
age_36_45	-0.233*** (0.080)	0.142 (0.120)	-0.136 (0.102)	0.527*** (0.097)	-0.372*** (0.113)	-0.319*** (0.104)	-0.432*** (0.110)
age_46_55	-0.032 (0.069)	0.004 (0.112)	0.075 (0.087)	0.298*** (0.090)	-0.076 (0.095)	-0.234*** (0.086)	-0.203** (0.093)
age_56_65	.	.	.	.	.	.	.
ed_primary	0.840*** (0.112)	0.801*** (0.075)	0.552*** (0.088)	0.842*** (0.072)	0.451*** (0.100)	0.423*** (0.126)	0.614*** (0.117)
ed_secondary	0.630*** (0.054)	0.402*** (0.080)	0.248*** (0.066)	0.558*** (0.064)	0.496*** (0.074)	0.455*** (0.069)	0.376*** (0.073)
ed_tertiary	.	.	.	.	.	.	.
no_children	.	.	.	.	.	.	.
ch_age_0_2	0.903*** (0.200)	0.278*** (0.098)	0.341*** (0.110)	0.034 (0.080)	0.698*** (0.128)	0.266** (0.121)	0.595*** (0.123)
ch_age_3_5	0.698*** (0.101)	0.365*** (0.077)	0.275*** (0.085)	0.272*** (0.071)	0.555*** (0.106)	0.311*** (0.092)	0.568*** (0.107)
ch_age_6_11	0.667*** (0.067)	0.189*** (0.056)	0.252*** (0.052)	0.219*** (0.048)	0.429*** (0.070)	0.337*** (0.063)	0.531*** (0.067)
no_health_prob	.	.	.	.	.	.	.
health_prob	0.105 (0.165)	0.534* (0.278)	0.272* (0.145)	-0.352** (0.164)	-0.008 (0.423)	0.325 (0.269)	-0.170 (0.228)
fam_income	0.076*** (0.007)	-0.000 (0.011)	0.047*** (0.009)	0.005 (0.008)	0.090*** (0.011)	-0.013 (0.011)	0.046*** (0.009)
_cons	-0.655*** (0.083)	-1.411*** (0.132)	-1.011*** (0.119)	-1.476*** (0.116)	0.018 (0.137)	-0.538*** (0.118)	-0.643*** (0.112)
<i>N</i>	2757	2287	2122	2986	2571	1710	1518

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## Appendix 3 - Regressions on Wages - part-time and full-time

Table A3.1: Regression on Full-Time Wages

OLS REGRESSION ON WAGES (FULL-TIME)							
	GERMANY	SPAIN	FRANCE	ITALY	NEDHER.	SWEDEN	U. KINGDOM
	Wage	Wage	Wage	Wage	Wage	Wage	Wage
age_25_35	.	.	.	.	.	.	.
age_36_45	0.080 (0.066)	-0.006 (0.035)	0.093** (0.043)	-0.029 (0.039)	0.095 (0.071)	0.083 (0.065)	-0.064 (0.059)
age_46_55	0.046 (0.096)	-0.058 (0.059)	0.121* (0.068)	-0.098* (0.058)	0.021 (0.110)	0.092 (0.082)	-0.097 (0.088)
age_56_65	-0.002 (0.127)	-0.480*** (0.115)	-0.023 (0.094)	-0.291*** (0.111)	0.097 (0.178)	0.207* (0.108)	-0.104 (0.130)
ed_primary	.	.	.	.	.	.	.
ed_secondary	0.057 (0.060)	0.341*** (0.045)	0.066** (0.028)	0.251*** (0.044)	-0.005 (0.080)	-0.105* (0.055)	0.078 (0.058)
ed_tertiary	0.173*** (0.064)	0.655*** (0.077)	0.131*** (0.036)	0.350*** (0.058)	0.225*** (0.079)	-0.191*** (0.062)	0.277*** (0.054)
permanent	.	.	.	.	.	.	.
temporary	-0.214*** (0.049)	-0.127*** (0.023)	-0.183*** (0.031)	-0.250*** (0.027)	-0.020 (0.066)	-0.298*** (0.069)	-0.218*** (0.060)
i_1	0.626*** (0.159)	0.373 (0.244)	0.438*** (0.106)	0.590*** (0.076)	0.415 (0.260)	1.055*** (0.203)	0.316*** (0.107)
i_2	0.645*** (0.151)	0.572** (0.236)	0.388*** (0.103)	0.766*** (0.069)	0.474* (0.258)	0.856*** (0.200)	0.239** (0.108)
i_3	0.510*** (0.149)	0.385 (0.237)	0.336*** (0.101)	0.676*** (0.068)	0.451* (0.259)	0.739*** (0.200)	0.196* (0.108)
i_4	0.492*** (0.150)	0.275 (0.235)	0.190* (0.100)	0.644*** (0.068)	0.315 (0.260)	0.592*** (0.201)	0.036 (0.106)
i_5	0.149 (0.153)	0.093 (0.235)	0.046 (0.100)	0.491*** (0.069)	0.231 (0.264)	0.520*** (0.201)	-0.143 (0.106)
i_6	.	.	.	.	.	.	.
i_7	0.196 (0.166)	0.131 (0.239)	0.237* (0.122)	0.514*** (0.073)	0.123 (0.365)	0.545** (0.216)	-0.230 (0.166)
i_8	0.149 (0.156)	0.180 (0.238)	0.066 (0.106)	0.449*** (0.075)	0.225 (0.270)	0.614*** (0.207)	.
i_9	0.034 (0.159)	0.029 (0.235)	0.043 (0.102)	0.364*** (0.070)	0.112 (0.278)	0.439** (0.206)	-0.171 (0.112)
experience	0.004 (0.004)	0.007** (0.003)	0.004 (0.003)	0.018*** (0.003)	0.006 (0.005)	0.005 (0.004)	0.006 (0.004)
mills1	-0.087 (0.108)	0.829*** (0.135)	0.178* (0.103)	0.165 (0.111)	-0.190 (0.187)	-0.736*** (0.170)	-0.144 (0.143)
mills2	-0.006 (0.067)	0.478*** (0.126)	0.204 (0.127)	0.027 (0.123)	-0.162** (0.068)	-0.042 (0.117)	-0.134 (0.093)
_cons	2.017*** (0.171)	1.084*** (0.266)	2.193*** (0.115)	1.266*** (0.134)	2.277*** (0.279)	2.315*** (0.238)	2.274*** (0.142)
<i>N</i>	1041	1793	1354	2004	337	1146	835

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A3.2: Regression on Part-Time Wages

OLS REGRESSION ON WAGES (PART-TIME)							
	GERMANY	SPAIN	FRANCE	ITALY	NEDHER.	SWEDEN	U. KINGDOM
	Wage	Wage	Wage	Wage	Wage	Wage	Wage
age_25_35	.	.	.	.	.	.	.
age_36_45	0.128** (0.058)	0.017 (0.064)	0.044 (0.068)	0.004 (0.059)	-0.008 (0.025)	-0.211** (0.100)	-0.083 (0.065)
age_46_55	0.035 (0.082)	0.074 (0.115)	0.030 (0.107)	-0.133 (0.087)	-0.068* (0.040)	-0.260* (0.141)	-0.142 (0.097)
age_56_65	-0.122 (0.110)	0.129 (0.243)	-0.041 (0.152)	-0.672*** (0.201)	-0.079 (0.066)	-0.055 (0.196)	-0.204 (0.135)
ed_primary	.	.	.	.	.	.	.
ed_secondary	-0.018 (0.041)	0.002 (0.077)	-0.022 (0.038)	0.281*** (0.067)	0.086*** (0.028)	-0.130 (0.084)	0.085 (0.058)
ed_tertiary	0.072 (0.047)	0.109 (0.136)	0.096* (0.055)	0.198** (0.087)	0.217*** (0.029)	-0.172* (0.100)	0.231*** (0.054)
permanent	.	.	.	.	.	.	.
temporary	-0.154*** (0.035)	-0.058 (0.035)	-0.164*** (0.038)	-0.081** (0.033)	-0.054** (0.027)	-0.259*** (0.075)	-0.027 (0.060)
i_1	0.624*** (0.193)	0.546 (0.484)	0.829*** (0.159)	0.268** (0.106)	0.381*** (0.082)	.	0.112 (0.320)
i_2	0.813*** (0.170)	0.853** (0.350)	0.593*** (0.132)	0.564*** (0.106)	0.422*** (0.079)	-0.074 (0.153)	0.237 (0.320)
i_3	0.587*** (0.167)	0.547 (0.350)	0.589*** (0.128)	0.540*** (0.103)	0.324*** (0.078)	-0.008 (0.151)	0.243 (0.319)
i_4	0.459*** (0.167)	0.562 (0.346)	0.458*** (0.126)	0.409*** (0.100)	0.213*** (0.078)	-0.006 (0.158)	-0.036 (0.317)
i_5	0.188 (0.168)	0.323 (0.344)	0.297** (0.127)	0.196** (0.099)	0.112 (0.078)	-0.101 (0.152)	-0.185 (0.317)
i_6	.	.	.	.	.	.	.
i_7	0.399** (0.187)	0.376 (0.359)	0.312* (0.188)	0.211* (0.109)	0.077 (0.106)	-0.320 (0.225)	-0.087 (0.388)
i_8	0.136 (0.170)	0.631* (0.360)	0.285* (0.152)	0.253** (0.125)	0.105 (0.096)	-0.140 (0.187)	-0.238 (0.347)
i_9	0.139 (0.171)	0.320 (0.345)	0.208* (0.126)	0.159 (0.098)	0.036 (0.081)	-0.405** (0.163)	-0.181 (0.319)
experience	0.008** (0.004)	-0.004 (0.006)	0.001 (0.005)	0.010** (0.004)	0.006*** (0.002)	0.010 (0.006)	0.006 (0.004)
mills1	0.165** (0.071)	0.026 (0.263)	0.025 (0.149)	0.568*** (0.190)	0.017 (0.070)	-1.378*** (0.219)	0.049 (0.151)
mills2	0.038 (0.066)	0.034 (0.157)	0.067 (0.151)	0.383** (0.163)	-0.078 (0.064)	-0.328** (0.136)	-0.108 (0.098)
_cons	1.729*** (0.203)	1.709*** (0.527)	2.021*** (0.265)	0.868** (0.366)	2.533*** (0.100)	4.111*** (0.315)	2.353*** (0.384)
N	1716	494	768	982	2234	564	683

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$