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Eliane El Badaoui  
Eleonora Matteazzi



UMR 7235

Université de Paris Ouest Nanterre La Défense  
(bâtiment G)  
200, Avenue de la République  
92001 NANTERRE CEDEX

Tél et Fax : 33.(0)1.40.97.59.07  
Email : [nasam.zaroualete@u-paris10.fr](mailto:nasam.zaroualete@u-paris10.fr)



# To be a Mother, or not to be? Career and Wage Ladder in Italy and the UK

Eliane El Badaoui\*

Eleonora Matteazzi†

## Abstract

This paper examines the extent to which motherhood affects women's career accomplishments and wages in Italy and the UK. Using the EU-SILC 2009 data, a decomposition of the motherhood wage gap is implemented after accounting for double selection in labor market participation and motherhood. We find evidence of a negative correlation between labor market and fertility decisions. The results show that motherhood has no adverse effects on women's career path in Italy, and that job segregation explains most of the motherhood wage gap in the UK. Empirical findings suggest that the timing of motherhood and job continuity affect significantly the female wage profile.

**JEL Classification:** C34, J21, J24, J31

**Key-words:** Motherhood, Labor market participation, Wage gap, Career

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\*EconomiX - Université de Paris Ouest Nanterre - La Défense, 200 Avenue de la République, 92001 Nanterre Cedex, France. E-mail: eliane.badaoui@u-paris10.fr.

†Department of Economics, University of Verona, Vicolo Campiolo 2, 37129 Verona, Italy. E-mail: eleonora.matteazzi@univr.it.

# 1 Introduction

The microeconomic analysis provides evidence that fertility behavior and employment decision are interrelated (Willis [1973] and Moffitt [1984]). In most developed countries, the female decision to participate in the labor market generally goes hand in hand with a decrease in the demand for children (Heckman and Macurdy [1980]; Mroz [1987]).<sup>1</sup> If we try to zoom in on this relationship, several determinants could be identified in order to better understand the mechanisms that govern the female fertility-participation profile and its effect on the career and wage ladder.

The aim of this paper is to shed the light on the selection of women in motherhood and in employment and to explain the wage gap between mothers and childless women. Then, after controlling for differences in observable characteristics between mothers and childless women, we conclude on whether this gap is the result of a discrimination against mothers in the labor market or it is rather due to the selection in motherhood and in employment.

Female participation in paid employment is an important topic on the European policy agenda. The 2000 Lisbon European Council fixes a target of 60% for the female employment rate in 2010. Two years later, the Barcelona European Council focuses on the necessity to improve the national provision of child care facilities in order to remove barriers and disincentives to female employment. Adequate child care provision may help curbing decline in fertility rates, by lowering the opportunity cost of having children in terms of both labor market choices and career opportunities (European Commission [2009]). Thus, several European countries have implemented social policies aiming at encouraging both fertility and female employment. In this context, the establishment of generous optional maternity leave (Baker and Milligan [2008]), part-time opportunities as well as an increase of public child care provision at lower costs are effective policy options. Family-work reconciliation policies are positively related to women's employment and earnings (Pettit and Hook [2009]). Empirical studies tend to draw up a complete scheme of the relationship between female labor supply, fertility and child care availability.

At a micro-level, one would expect a positive effect of child care availability on fertility. This hypothesis is difficult to test because of limited data on demands. Empirical studies

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<sup>1</sup>At the macro level, the correlation between the total fertility rate and the employment rate of women has changed its sign and became positive from the late eighties. For instance, Ahn and Mira [2002] use a panel of OECD aggregate fertility and labor market and conclude on the reversal in the sign of the relationship between the total fertility rate and the female participation rate. This change is mainly due to the possibility of purchasing market child care, the rising income effect of wages at high levels of female wage, the higher education level attained by recent cohorts of women (Hotz *et al.* [1997]), and the negative correlation between unemployment and fertility from the mid-nineties (D'Addio and d'Ercole [2005]). The change in gender roles and attitudes towards domestic work further contributed to inverse the relationship between fertility and female employment (Arpino *et al.* [2013] and Balbo *et al.* [2013]).

give mixed results. [Blau and Robins \[1989\]](#) find support for the child care hypothesis. [Chiuri \[2000\]](#) concludes that non-monetary grandparents' support affects positively the participation of mothers in the labor market in Italy. Similarly, [Del Boca \[2002\]](#) shows that grandparents' support increases the probability of having children more than do formal child care availability. [Rindfuss \*et al.\* \[2007\]](#) examine the effect of child care availability on the transition to motherhood and find substantial pronatalist effects of child care availability, particularly at younger ages.<sup>2</sup> Interestingly, the authors focus on the first-birth timing and child care availability since the transition to motherhood is considered as a key life-course event ([Elder \[2003\]](#)) and more life-changing than second or higher order births ([Rindfuss \*et al.\* \[1988\]](#)).

Despite the expressed will to invert the relationship between female participation and fertility, motherhood continues to have an important adverse effect on female employment rate and wages. Empirical studies lend support to the observation that, compared to women without children, the mothers suffer from a wage penalty.<sup>3</sup> Besides wage penalty, mothers are less likely to successfully combine career and family ([Blau \[1998\]](#)). For instance, [Goldin \[1997\]](#) finds that college-educated women with children are less likely to have a career than those who are childless.<sup>4</sup>

Different factors are considered to influence the motherhood penalty including the possible discrimination against mothers ([Correll \*et al.\* \[2007\]](#)), and the subordination of women's careers to their husbands' careers ([Frank \[1978\]](#)) or to the needs of their children ([Da Rocha and Fuster \[2006\]](#)). Taking everything into account, the literature distinguishes, apart from the discrimination hypothesis, between a selection effect and a treatment effect. The former indicates that less productive women are more likely to have children at younger ages ([Amuedo-Dorantes and Kimmel \[2005\]](#)) and the latter states that maternity could modify women's behavior on the labor market and reduce mothers' productivity. Accordingly, the theory of human capital ([Becker \[1960\]](#); [Becker and Lewis \[1973\]](#)) states that women fail to accumulate work experience due to career breaks and may as well lose accumulated human capital and skills and forego on-the-job training. Thus, this human capital depreciation or disinvestment translates into a decrease in market productivity and, consequently, into a lower earning potential. For instance, [Budig and England \[2001\]](#)

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<sup>2</sup>The authors use the percentage of preschool-age children in day care centers by municipality and year to measure child care availability. They further consider the possibility of a woman's mother helping with child care.

<sup>3</sup>The motherhood penalty is important to study as it contributes to the poverty gap in households headed by single mothers and those where a couple lives ([McLanahan and Kelly \[1999\]](#)). It may also affect the bargaining power of married women within the household ([Blumstein and Schwartz \[1983\]](#)).

<sup>4</sup>The author uses several definitions of career, but especially emphasizes results where career is defined as having hourly earnings in the selected years exceeding that of the 25th percentile of men with 16 or more years of schooling in the Current Population Survey in the relevant year.

find that one-third of the motherhood penalty is explained by experience and job tenure. According to [Becker \[1985\]](#)'s work effort theory, even holding levels of human capital constant, children reduce women's productivity because of a diversion of effort from market to home responsibilities and a specialization in household tasks. [Anderson \*et al.\* \[2003\]](#) assert that the wage penalty suffered by mothers declines as children grow older and they find no significant penalty for children aged 14-17. However, when they distinguish by education levels, the results are inconsistent with the work effort theory. In accordance with the theory of compensating differentials ([Becker \[1991\]](#), [England \[1992\]](#)), mothers are more willing than other workers to choose "child-friendly" jobs that are easier to combine with parenting such as part-time works. In this context, mothers may trade off higher wages for jobs with some features compatible with motherhood ([Becker \[1991\]](#)). With regard to mother-friendliness measures, [Waldfogel \[1997\]](#) finds that controlling for part-time employment reduces the wage penalty.

This paper contributes to the literature by proposing a decomposition of the motherhood wage gap and simultaneously allowing the fertility decision to be endogenously determined through a comparative analysis in two European countries, Italy and the UK. The choice of these countries is relevant because they have specific peculiarities in terms of their welfare state regimes, types of political economies, industrial and labor relations, social protection systems, family and employment reconciliation policies, and levels of female and part-time employment. According to [Esping-Andersen \[1999\]](#), the UK is a liberal welfare state regime, characterized by means-tested assistance, modest universal transfers, and modest social-insurance plans. Redistribution is low and income inequality is high. Although public child care and long optional parental leave<sup>5</sup> are not available in the UK, mothers' employment is rather supported by a large supply of part-time jobs and private childcare services. Differently, Italy resembles more to a coordinated market economy that relies on social insurance schemes and a familist tradition. In particular, the child care system is limited and relatively expensive and part-time opportunities are low, women tend to rely primarily on family network in order to continue to work, especially when their children are young. Moreover, female labor market participation in Italy remains relatively low in spite of a low fertility rate ([Di Tommaso \[1999\]](#)).

In the empirical analysis, we use the EU-SILC cross-sectional data for the year 2009. We consider a sample of prime-age women from Italy and the UK. Our empirical analysis proceeds in three steps. First, we model female labor market participation and fertility as joint decisions. Second, we estimate selectivity-corrected wage equations separately for

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<sup>5</sup>We refer to parental leave and subsequent prolonged periods of paid leave to care for young children as defined by [OECD \[2014\]](#).

mothers and childless women. Finally, we use the [Neuman-Oaxaca \[2004\]](#) decomposition method in order to gauge the main determinants of the motherhood wage gap and examine the extent to which motherhood affects women’s career accomplishments. The results show that, after controlling for a large set of individual, household and workplace characteristics, whatever the country, there is no evidence of any wage penalties or premiums. In both countries, empirical findings reveal that mothers face a career ladder. Indeed, occupational segregation and under-representation of mothers in managerial positions constitute a very important factor in explaining the motherhood pay gap.

The paper is organized as follows. Section 2 describes the data set and presents the empirical specification. Estimation results are discussed in section 3. The final section concludes.

## 2 Data and Empirical Specification

### 2.1 Data and Summary Statistics

The empirical analysis is based on data provided by the European Union Statistics on Income and Living Conditions (EU-SILC, Eurostat) for all EU-27 Member States. Cross-sectional data for the year 2009 are used for Italy and the UK.<sup>6</sup> The two selected countries differ considerably by their types of political economies, social protection systems, family policies, fertility and the level of female and part-time employment. In particular, Table 1 shows that female total and part-time employment is much lower in Italy than in the UK. While female employment equals 46.4% in Italy, it represents 65% in the UK. Part-time employment is less frequent among Italian women, this applies to about 27.9% of working female in Italy and 41.7% in the UK. The fertility rate equals 1.94 and family-related public spending represents 3.8% of the GDP in 2009 in the UK. In Italy, the fertility rate is 1.41 children per woman, well below UK’s fertility rate, and family-related public spending represents only 1.6% of the GDP. The observed dissimilarity in the fertility rate between Italy and UK may stem from the cross-country difference in the type of welfare state. While caring and economic responsibilities are largely supported by market provision in UK enabling higher fertility, in Italy those responsibilities rest on the family and constrain fertility ([Balbo \*et al.\* \[2013\]](#)). As for the enrollment in formal childcare, the UK is ahead of Italy. The two countries show further differences related to the industrial

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<sup>6</sup>The EU-SILC data is also available from a 4-year rotational survey. We do not exploit the panel structure because a large set of information on working conditions, that play a crucial role in explaining individual wages and the earnings gap between mothers and childless women, are only available in the cross-sectional data. Indeed, the number of persons working at the local unit, being in a managerial position with supervisory responsibility, and the economic sector of the local unit are not available in the panel data.

and labor relation system. Indeed, differently from Italy, a statutory minimum wage exists in the UK, where wage inequalities are relatively high. Thus, Italy and the UK constitute interesting case studies for a comparative analysis.

The framework we adopt is static in the sense that we consider a one period lifetime perspective. This represents the traditional framework used to study the quality-quantity model of fertility (Becker [1960]) and the parental time allocation and demand for children (Willis [1973]).<sup>7</sup> The static framework has been extended to a dynamic life-cycle context (Francesconi [2002]). Because of the limited number of years in which families are observed, the EU-SILC 4-year panel is not suitable to study the relationship between fertility and employment decisions in a dynamic perspective.

The sample is reduced to women aged 25-40. Observations of students, retired, unemployed, self-employed, permanently disabled or/and unfit to work, women in the armed forces and family workers are dropped. Given that EU-SILC data contain information only on children living in the household, women older than 40 are excluded from our sample since they could have had children in the past, who do not leave anymore in the household.<sup>8</sup> The inclusion of women over 40 would have the pitfall of confounding parents and childless individuals. After controlling for missing values, the country sample size totals 3,739 observations for Italy and 1,202 observations for the UK.<sup>9</sup>

The data collected at both the household and individual level are rich and extensive. Concerning the work schedule, the dataset provides information on the number of hours usually worked per week in the main job - including paid and unpaid overtime - at the time of the survey. For employees, gross monthly earnings in the main job are recorded at the time of the survey.<sup>10</sup> Then hourly wages are computed as the ratio of gross monthly earnings to the number of hours usually worked per month.<sup>11</sup> The data also provide a large

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<sup>7</sup>The one period lifetime framework relies on the assumption that spouses agree, at the beginning of marriage, on the optimal number of children and time allocation between market and domestic work. This is also the approach adopted in the collective literature of family behavior (Blundell *et al.* [2005]; Cherchye *et al.* [2013]).

<sup>8</sup>EU-SILC does not provide information on family members living outside the household.

<sup>9</sup>Given that EU-SILC data do not provide information whether the couple has problems of sterility or infertility, we assume that couples have no obstacle to have biological children. This implies that we interpret the absence of offspring as a couple's decision of not having children.

<sup>10</sup>The gross monthly earnings (before tax and social contributions deduction) include usual paid overtime, tips and commission. Other payments, such as the 13<sup>th</sup> or 14<sup>th</sup> month payments, holiday pay, profit sharing or bonuses are taken into account on a monthly basis. In addition, the EU-SILC provides information about the gross employee cash or near cash annual income, in the main and any secondary or casual jobs, that refers to the income reference period, in general the preceding calendar year. In order to maintain time consistency between working hours and labor income, we opt for using the gross monthly earnings as well as the number of hours usually worked per week in the main job at the time of the survey. We note that gross monthly earnings are available for only five European countries among which Italy and the UK. This data availability partly explains the choice of Italy and UK.

<sup>11</sup>We drop the top and the bottom 1 percent of the wage distribution in order to limit the influence of extreme values.



set of information on working conditions, such as the number of persons working at the local unit, being in a managerial position with supervisory responsibility, the occupation, and the economic sector of the local unit. Following the Eurostat guidelines [2010], full-time and part-time employment are defined on the basis of the spontaneous answer given by the respondent rather than the actual number of hours worked.

The EU-SILC data provide evidence of disparities between the two selected countries in terms of female labor market participation, fertility and wages. In our sample, the female participation rate is 67% in Italy and 70% in the UK. Among women who participate in the labor market, 46% and 56% are mothers in Italy and UK, respectively. British mothers are slightly more likely than the Italian ones to participate in paid employment. As shown in Table 2, about 58% of British mothers participate to the labor market against less than 54% of Italian mothers. For Italy, these figures support the hypothesis according to which the shortage and the cost of child care provision, deeply-rooted family traditions and the rigidity of the labor market encourage women to remain/get out of the labor market once they transit to motherhood (Del Boca [2002]). In their classification of state regimes with regards to ‘time policies’, Anxo *et al.* [2007] include Italy in the *Mediterranean ‘exit or full-time model’* characterized by the lowest female participation rate and the persistence of the traditional ‘male breadwinner’ household model. In this country, when women participate in paid employment they typically work full-time. On the contrary, the UK is a typical example of the *‘maternal part-time work’ model*. In the UK, where the ‘adult worker model’ is much more developed, women continue to work in the labor market even when they become mothers, opting possibly for a part-time job. Among working mothers in the UK, the part-time employment rate is around 59%, whereas this figure falls up to 32% in Italy (Table 2). Thus, in the UK, part-time employment clearly serves as a tool to manage the trade-off between work and family life, even when children are older.

Depending on their employment and motherhood status, women differ also by their socio-demographic and workplace characteristics. As shown in Table 2, in both countries, childless women are on average younger than mothers. This is particularly true in Italy where women tend to delay motherhood compared to their British counterparts. Working and childless women are more likely to have a higher educational level than non-working women and mothers, respectively. In Italy, childless women are slightly more represented at the top of the occupational ladder, whereas mothers are more often employed as technicians and associate professionals or in less valued occupations. Mothers are more likely to be employed in economic sectors such as public administration, education, and human health. These are sectors where public employment is highly prevalent allowing mothers to have some advantages in terms of flexible work-schedules. In the UK, mothers are considerably

less represented at the top of the occupational hierarchy and are highly present in the education sector and human health and social work activities. British mothers represent also a large proportion in the wholesale and retail trade sector. On the contrary, childless women are over-represented in real estate, administrative and support service activities. In Italy, around 16% of childless women and mothers have a supervisory role. This figure is slightly different in the UK where the percentage of managers stands at around 37% and 29% among childless women and mothers, respectively. These figures may suggest that motherhood in Italy has no adverse effect on women's career path. This could find an explanation in the different motherhood timing of Italian and British women. Indeed, compared to British women, Italians tend to delay motherhood. In our sample, the average age at the first-birth is less than 26 years for British women and more than 28 years for Italian ones. The late transition to motherhood positively affects career outcomes and wages, especially for more educated women and those employed in managerial and professional occupations (Miller [2011]).

Furthermore, Table 3 shows that there are large cross-country differences on average hourly wages. The highest wages are found in the UK. As for the motherhood wage gap, i.e. the earnings difference between mothers and childless women expressed as a percentage of childless women's earnings, important differences are pointed out between the two countries. In Italy the hourly earnings of mothers are 13% higher than childless women on average. In the UK, mothers earn, on average, 14% less than childless women. Relevant wage differences are pointed out by sectors of economic activity and occupations. While in Italy, in all economic sectors and occupations, mothers' hourly earnings are on average higher than those of childless women, one observes some differences in the UK. The mean hourly wage of British mothers is higher than that of childless women in sectors such as construction or transport and storage, where a very small percentage of mothers work. Conversely, in sectors characterized by a high prevalence of mothers, such as public administration or activities like art and recreation, mothers are paid less than women without children.

The dissimilarities between Italy and the UK regarding the motherhood wage gap, for the whole economy and within branches and occupations, can be explained by national differences in the wage setting system and the type of industrial and labor relations. According to Hall and Soskice [2001], the UK is a typical example of liberal market economy where firms rely on competitive markets to coordinate with other economic actors, trade unions are rather weak, employment protection is low, labor turnover is high and wage setting is highly decentralized at the firm level and primarily a matter of contract between employers and employees. Furthermore, the Anglo-Saxon labor market is highly flexible

and part-time employment is a very widespread working arrangement. As suggested by several studies, part-time jobs are often of very poor quality and periods of part-time employment are very likely to induce pay penalty in terms of both reduced hourly earnings and reduced career advancements (Anxo *et al.* [2007], Fagan *et al.* [2006], Manning and Petrongolo [2005]). In his work, Paull [2006] argues that the gradual decline of women's wages following the first-birth may be caused by the accumulation of several periods of low wage growth, that corresponds to the time of children birth and school entry, during which women are much more likely to move into part-time jobs, non-permanent positions and non-supervisory roles. Italy resembles more to a coordinated model of market economy where firms rely primarily on strategic modes of coordination, trade unions are rather influent, employment protection is high, and job tenures are rather long. Long job tenures are made possible by quite generous maternal and parental leaves that raise the likelihood for women to return to work for the prior employer after childbirth, with possible positive consequences on women's subsequent pay (Waldfoegel [1997], [1998]). In addition, mothers who stay in the labor market and exhibit a continuous work profile are mainly those with a higher education level, higher wages, good-quality jobs or working in the public sector. Differently from UK, in Italy the dominant level at which the wage bargaining takes place is the sectoral or industry level. The high level of bargaining coverage and union density, together with a more coordinated bargaining between trade unions and employers associations, tend to compress the wage distribution and reduce earnings inequality (Blau and Khan [1999]; European Commission [2011]; Rubery *et al.* [2002]).

Given these cross-national differences in national economic policies and industrial and labor relations, it is crucial to decompose the pay differential between mothers and childless women in order to better understand the determinants of the observed motherhood wage gap for Italy and the UK.

## 2.2 Empirical Specification

The empirical analysis proceeds by steps. First, we consider the female decision whether to participate or not in the labor market and whether to have or not children. Second, we estimate separately selectivity-corrected wage equations for mothers and childless women. Third, we decompose the motherhood wage gap using the Neuman-Oaxaca [2004] procedure accounting for selectivity.

### A bivariate selectivity model of earnings

In the first stage, we simultaneously analyze the labor market participation and fertility decisions. Both decisions depend on some observed characteristics such as human cap-

ital indicators, but also on several unobserved individual characteristics such as ability, motivation, motherhood values, commitment and effort. These unobserved may affect the decision to work, the decision to have children, as well as individual earnings. Thus, expecting that employment and motherhood decisions are correlated, we use a bivariate probit model (Maddala [1983]) to account for the female choice as to the employment and fertility.

We denote by  $I_1^*$  and  $I_2^*$  the female labor force participation decision and the fertility decision, respectively. We specify the joint-decision model, where both choices are observed, as follows:

$$I_j^* = Z_j \gamma_j + \epsilon_j \quad \text{for } j = 1, 2. \quad (1)$$

The indicator variables for  $j = 1, 2$  are defined as:

$$I_j = \begin{cases} 1 & \text{iff } I_j^* > 0, \\ 0 & \text{otherwise} \end{cases} \quad (2)$$

where  $Z_1$  and  $Z_2$  are exogenous regressors,  $\gamma_1$  and  $\gamma_2$  are parameters to be estimated, and  $\epsilon_1$  and  $\epsilon_2$  are error terms following a bivariate normal distribution with zero means, unit variances, and covariance  $\sigma_{12}$ . The idea is that a woman becomes a mother if the expected benefit of motherhood exceeds the opportunity costs of having children. Analogously, a woman participates in the labor market if her expected market wage exceeds her reservation wage. There are four possible combination decisions  $DC(\cdot)$  in this model:

$$\begin{aligned} DC(1) &= \{I_1^* > 0, I_2^* > 0\} \\ DC(2) &= \{I_1^* > 0, I_2^* < 0\} \\ DC(3) &= \{I_1^* < 0, I_2^* > 0\} \\ DC(4) &= \{I_1^* < 0, I_2^* < 0\}. \end{aligned} \quad (3)$$

The vectors  $Z_1$  and  $Z_2$  include variables that affect the labor market participation and fertility decisions such as the age, the educational level, the country of birth, the region of residence, and the degree of urbanization of the area of residence.<sup>12</sup> We also introduce a dummy variable equal to one if the woman currently lives in couple and a dummy variable equal to one if the woman is currently single but had a legal union in the past. The latter could explain the presence of children born from a previous union. In addition, we use the household annual non-labor income and the partner's annual labor income as exclusion restrictions to estimate selections into motherhood and labor market participation.<sup>13</sup> The

<sup>12</sup>Note that the regional variable is not available for the UK.

<sup>13</sup>Non-labor income includes rentals of property or land, interests, dividends, profits from capital invest-

two income-related variables are common exclusion restrictions in the literature on female labor force participation.<sup>14</sup> We also include a binary variable that indicates whether the household benefits from unpaid (informal) child care for children younger than 12 years old.<sup>15</sup> Empirical findings suggest that extended families and grandparents play a key role in explaining labor force participation of mothers (Chiuri [2000]; Del Boca [2002]). The fourth exclusion restriction is the partner’s health condition. We include a dummy that equals one if the partner suffers from any chronic long-standing illness or condition. Health is an important aspect of human capital (Schultz [2002]). Good health allows the husband to have good performance at work and achieve high earnings (Strauss and Thomas [1998]), and we suspect a positive effect on fertility and a decline in female participation.<sup>16</sup> Such exclusion restrictions, together with the normality assumption, allow the identification of the wage equation.

### Log Earning Equations

In the second stage, we estimate separate log wage equations by Ordinary Least Squares for each type of worker, namely mothers and childless women. We define motherhood status as  $i = \text{mother}(m), \text{childless}(c)$ .

The wage equation is written as follows:

$$\log w_i = X\beta_i + \eta_i \quad (4)$$

The selectivity-corrected wage equations for mothers and childless women are given as follows:

$$\log w_i = X\beta_i + \theta_{i1}\lambda_{i1} + \theta_{i2}\lambda_{i2} + \tilde{\eta}_i, \quad \text{iff } DC \in \{DC(1), DC(2)\} \quad (5)$$

where  $X$  is a vector of exogenous variables explaining individual earnings that include all variables as in fertility and participation equations apart from the partner’s labor income and health condition, the household non labor income, and the availability of unpaid child care. The exclusions restrictions, together with distributional assumptions, allow wage identification. In Equation 5,  $\lambda_{i1}$  and  $\lambda_{i2}$  are the double selection-correction terms

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ments in unincorporated business, housing allowances, and alimonies. When the woman has no partner, the annual labor income of the partner takes zero value.

<sup>14</sup>See, for instance, Blundell and MaCurdy [1999] and Blundell *et al.* [2007].

<sup>15</sup>The unpaid child care is defined as the care provided by grand-parents, other household members (outside parents), other relatives, friends or neighbors without costs for the family. The availability of unpaid care is excluded from the fertility decision because the variable is blank for childless women.

<sup>16</sup>Other variables that could be used as exclusion restrictions are the supply of child care services and the unemployment rate at the region level, for instance. Unfortunately, the available regional variable does not allow the variability that is required in the child care provision. Indeed, no regional variable is available for the UK and only five macro-regions are defined for Italy.

computed from the first stage estimations (Maddala [1983]; Fische *et al.* [1981] and Tunali [1986]).  $\beta_i$ ,  $\theta_{i1}$ , and  $\theta_{i2}$  are the parameters to be estimated, and  $\tilde{\eta}_i$  represent the error terms normally distributed with zero means and standard deviation  $\sigma_i$ . We define the parameters  $\theta_{i1} = \sigma_i \cdot \rho_{i1}$  and  $\theta_{i2} = \sigma_i \cdot \rho_{i2}$ . Here,  $\rho_{i1}$  and  $\rho_{i2}$  capture, respectively, the correlation between the error terms  $\epsilon_1$  in the participation equation and  $\eta_i$  in the outcome equation, and the correlation between the error terms  $\epsilon_2$  in the fertility equation and  $\eta_i$  in the log hourly wage equation. We recall that earnings of women who take decisions  $DC(3)$  and  $DC(4)$  are not observed as they have no paid employment.

The computation of the selection-correction terms depends on whether the two simultaneous decisions are correlated or not. The selection-correction terms are computed as

$$\lambda_{ij} = (1 - \sigma_{12})^{-1} [P_a - \sigma_{12} P_b] \text{ for } i = m, c \text{ and } j = 1, 2 \quad (6)$$

where

$$P_a = \frac{\int_{-\infty}^{Z_2\gamma_2} \int_{-\infty}^{Z_1\gamma_1} \epsilon_1 f(\epsilon_1, \epsilon_2) d\epsilon_1 d\epsilon_2}{F(Z_1\gamma_1, Z_2\gamma_2)} \text{ and } P_b = \frac{\int_{-\infty}^{Z_1\gamma_1} \int_{-\infty}^{Z_2\gamma_2} \epsilon_2 f(\epsilon_1, \epsilon_2) d\epsilon_2 d\epsilon_1}{F(Z_1\gamma_1, Z_2\gamma_2)} \text{ iff } DC(1), \quad (7)$$

$$P_a = \frac{\int_{-\infty}^{Z_1\gamma_1} \int_{Z_2\gamma_2}^{\infty} \epsilon_1 f(\epsilon_1, \epsilon_2) d\epsilon_1 d\epsilon_2}{F(Z_1\gamma_1, -Z_2\gamma_2)} \text{ and } P_b = \frac{\int_{Z_2\gamma_2}^{\infty} \int_{-\infty}^{Z_1\gamma_1} \epsilon_2 f(\epsilon_1, \epsilon_2) d\epsilon_2 d\epsilon_1}{F(Z_1\gamma_1, -Z_2\gamma_2)} \text{ iff } DC(2).$$

$F$  is a bivariate standard normal distribution function and  $f$  is a bivariate normal density function.  $F(Z_1\gamma_1, Z_2\gamma_2)$  is the joint probability that a woman is a mother and an employee.  $F(Z_1\gamma_1, -Z_2\gamma_2)$  is the joint probability that a woman is childless and an employee.

In the empirical analysis, the exogenous variables considered in the log wage equations include: i) human capital indicators, ii) individual and household characteristics, and iii) job-related variables. Education levels and age are included as indicators of human capital accumulation. Age is used as a proxy of labor market experience.<sup>17</sup> However, we have reason to believe that the individual age is likely to overestimate women's real labor market experience because it does not consider child-related career interruptions or spells of inactivity. For this reason, in the log-earnings equation of mothers we also control for the age of the eldest child. Individual and household characteristics include the country of birth, the region of residence, the degree of urbanization of area of residence, the partnership status (dummy variable equals to one if she is currently in couple) and the marital status (dummy variable equals to one if she is single but she had a legal union in the past). Job-related variables include dummies for the occupation, the economic sector

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<sup>17</sup>Regrettably, EU-SILC data do not provide information on tenure and seniority. In addition, information on actual labor market experience is not well reported. We are aware of the problems that may result from this omission. We address this issue to some extent by using education, age and workplace characteristics as control variables.

of the local unit, the firm size, the managerial position with supervisory responsibility, and the permanent contract.<sup>18</sup>

### Wage Gap Decomposition

In the third step, we decompose the motherhood wage gap using the [Neuman-Oaxaca \[2004\]](#) procedure. The procedure decomposes the wage differential into three parts: i) an *explained part* that is the part of the raw wage differential due to different observable characteristics between groups of workers (i.e., mothers versus childless women); ii) an *unexplained part* that is the part of the raw wage gap due to different returns to identical characteristics, unobserved heterogeneity, or omitted relevant variables; iii) a *selection part* that is the part of the raw pay differential due to self-selection into motherhood and employment and to unobserved heterogeneity.

The two-fold decomposition, formulated from the viewpoint of childless women, is expressed as follows:

$$\begin{aligned} \overline{\log w_m} - \overline{\log w_c} = & \hat{\beta}^* (\bar{X}_m - \bar{X}_c) + \bar{X}_m (\hat{\beta}_m - \hat{\beta}^*) + \bar{X}_c (\hat{\beta}^* - \hat{\beta}_c) \\ & + (\hat{\theta}_{m1} \bar{\lambda}_{11} + \hat{\theta}_{m2} \bar{\lambda}_{12} - \hat{\theta}_{c1} \bar{\lambda}_{21} - \hat{\theta}_{c2} \bar{\lambda}_{22}) \end{aligned} \quad (8)$$

where  $\overline{\log w_j}$  are the predicted mean log hourly wages,  $\bar{X}_j$ ,  $\bar{\lambda}_{11}$ ,  $\bar{\lambda}_{12}$ ,  $\bar{\lambda}_{21}$  and  $\bar{\lambda}_{22}$  are the mean vectors of individual characteristics and selection-correction terms, respectively,  $\hat{\beta}_j$ ,  $\hat{\theta}_{j1}$  and  $\hat{\theta}_{j2}$  are estimated returns to wage determinants, and  $\hat{\beta}^*$  is the nondiscriminatory wage structure computed as a weighted sum of groups coefficients where the weights are given by group sizes ([Cotton \[1988\]](#)).<sup>19</sup>

The first term on the right-hand side of Equation 8 represents the explained part of the wage differential. The second and third terms are the unexplained part, whereas the fourth term is the selection part. If the second term is positive then mothers are likely to enjoy a pay premium because the returns of their characteristics are higher than nondiscriminatory returns. On the contrary, a negative value of the second term means that a wage penalty may exist for mothers. Conversely, concerning the third term, a positive value means that childless women may undergo a wage penalty, whereas a negative value could imply a wage premium for childless women.

<sup>18</sup>The type of the contract is not included for the UK because of the relatively high non-response rate.

<sup>19</sup>Other authors suggest to use, as an estimate of nondiscriminatory parameters, the average coefficients over both groups ([Reimers \[1983\]](#)) or coefficients from a pooled regression over all women ([Neumark \[1988\]](#)). Alternatively, we can use the coefficients estimated for a particular type of worker, generally discriminated in the labor market ([Oaxaca \[1973\]](#)).

### 3 Estimation Results

The main objective of this work is to evaluate the motherhood wage gap in order to disentangle individual characteristics that explain the observed differences in hourly earnings between mothers and childless women. We further check for the hypothesis according to which motherhood is an obstacle to women’s career accomplishment. To this end, we estimate three different specifications. In the first, we model the female labor market participation decision, assuming that fertility is an exogenous event. In the second specification, fertility and participation decisions are modeled using a bivariate probit. In the third specification, the two decisions remain jointly modeled but we further add the age at which women gave birth to their first child as a control variable in the wage equation. In what follows, we discuss empirical findings for the third and more complete specification. However, the decomposition results are presented for the three estimated specifications with the aim to highlight the relevance of modeling participation and fertility as joint decisions and the importance of considering motherhood timing.<sup>20</sup>

#### 3.1 Fertility and Participation Choices

The marginal effects on the response probabilities are reported in Table 4. As expected, in both countries, the probability of working, relative to being out of labor force, increases with the level of education. Employment status strongly depends on family situation and opportunities for unpaid childcare. Women living in couple are less likely to participate in paid employment. Compared to the UK, the effect is larger for Italy. Thus, the male-breadwinner model appears to be still well-entrenched in Italy. In both countries, the availability of unpaid childcare has a positive and significant effect on the probability of working. The magnitude of the effect is larger for Italy where the family network, especially grandparents, plays a prominent role as childcare providers, supporting maternal employment and allowing mothers to work longer hours in the labor market. The result is in line with the empirical literature (Chiuri [2000]). In the UK parents also rely on child-minders and/or family, friends or neighbors instead of formal center-based arrangements, especially for youngest children (OECD [2010]). Here, formal childcare services, whatever their form, are mainly used on part-time basis and may not cover a full working week. In this case, part-time jobs may help parents, and mothers especially, to manage the trade-off between work and family responsibilities.

In line with previous studies on female participation in paid employment, the house-

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<sup>20</sup>The first and second stage estimations of the first two specifications are available from authors upon request.



hold annual amount of non-labor income and partner's labor income negatively affect the probability of working (Apps *et al.* [2012] and Blundell *et al.* [2007]).

As for the fertility decision, in both countries, the probability of having children, with respect to being childless, increases with age. The effect is larger for Italy where women are more likely than British women to delay motherhood.<sup>21</sup> It is not surprising that the probability of having children decreases with the education level attained. Living or having lived (divorced, separated, or widow) in couple increases the likelihood to be mothers, especially in Italy where lone mothers and births outside marriage are less frequent than in the UK (OECD [2011]). As expected, living with a partner with chronic and long-standing health problems negatively affect the probability of having children. The effect is significant only for Italy. As for the impact of income sources on the fertility decision, the annual amount of household non-labor income has a positive and significant effect on fertility in the UK. In Italy the partner's labor income has a positive and significant effect. Moreover, resident foreign women in Italy are more likely to have children than Italian native women.

In both countries participation and fertility decisions are negatively correlated. Estimated values for  $\sigma_{12}$  are  $-0.476$  in Italy and  $-0.767$  in the UK. The results for the likelihood-ratio test of  $\rho = 0$  lead to reject the null hypothesis that the correlation between the two decision is zero at the 0.001 level.

### 3.2 Log Earning Equations

In the second stage of the analysis, log-earning equations are estimated, separately, for mothers (Table 5) and childless women (Table 6). In both countries, the higher the education level attained the higher is the wage. It is noteworthy that, for childless women only, wages increase with the age. The age at first birth negatively affects wages of British mothers.

In the UK only, for both mothers and childless women, being in a managerial position with supervisory responsibility positively affects earnings. When results are significant, working in a firm with more than 11 employees has a positive effect on wages in both countries. In Italy, holding a permanent contract positively affects hourly earnings, for both mothers and childless women. With respect to elementary occupations, when results are significant, all other occupations have a positive impact on wages, especially for those occupations being at the top of the occupational ladder. In Italy, mothers and childless women have higher returns in real estate activities and in sectors where public employment is large such as education, health services and social work activities. We find heterogeneous

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<sup>21</sup>The importance of the motherhood delay is underlined in Balbo *et al.* [2013].

effects related to the sector of economic activity for mothers and childless women in the UK. Part-time employment affects positively earnings of Italian mothers. As shown in [Matteazzi \*et al.\* \[2014\]](#), driven partly by the principle of *prorata temporis*<sup>22</sup> and partly by peculiar features of the industrial and labor relation system, female part-timers in Italy enjoy a pay premium with respect to their full-time female colleagues.

As for selection-correction terms, we find evidence of a positive and significant selection effect for Italian childless women. In other words, Italian childless women have some observed and unobserved characteristics that make them more likely to participate and have an above average earnings potential.<sup>23</sup>

### 3.3 Wage Gap Decomposition

We proceed now to the analysis of the wage gap decomposition results. The empirical findings are presented in [Table 7](#) and [Table 8](#) for Italy and the UK, respectively. In Italy, the motherhood wage gap is positive meaning that, on average, mothers earn more than childless women in terms of hourly wage. Whatever the specification we consider, different observable characteristics between mothers and childless women, overall, do not explain the pay gap. However, some variables matter significantly in explaining the earnings difference between the two considered groups of workers.

When children are considered as exogenous, as in the first specification, we find evidence of a pay premium for mothers and a pay penalty for childless women in Italy. The selection in paid employment is positive and significant for both mothers and childless women, but the selection effect is larger for women without children. This evidence suggests that, compared to mothers, women without offspring have better observed and unobserved characteristics that make them more likely to participate in paid employment and to have higher wages. Once we model participation and fertility as joint decisions, as in the second specification, results change remarkably. The previously found pay penalty for childless women disappears. The raw pay differential is mainly explained by a wage premium for mothers and by the selection of childless women in employment. Lastly, when we control for the age at first birth in log earning equations, as in the third specification, we find no evidence of a wage premium for mothers. This result suggests that motherhood

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<sup>22</sup>The Italian legislation applies the principle of non-discrimination by stipulating that part-time workers must not be treated in less favorably than comparable full-time workers. The applied principle of *prorata temporis* could be removed by some collective or individual agreements providing improved conditions for part-timers' earnings.

<sup>23</sup>However we estimate an additional specification of log-hourly wage equations for Italy that includes the real labor market experience among regressors. The experience has no significant impact on women's earnings. We have not performed the same analysis for the UK given the high non response rate for the variable experience.

does not negatively affect wages of Italian women because they are likely to postpone fertility until after careers are fully established. This is partly corroborated by the fact that Italian mothers and childless women have similar likelihood to hold a managerial position with supervisory responsibility. Indeed, the managerial position does not matter in explaining the raw pay gap.

Decomposition results show that the positive raw pay differential is partly explained by the higher average age of mothers relative to childless women. Also the over-representation of mothers in firms with more than 11 employees and in permanent contracts, where earning possibilities and job protection are higher, participate to explain the wage gap. Mothers are over-represented in branches of the economic activity such as education, human health, and social work activities where wages are higher compared with other economic sectors. Similarly, mothers are more likely than childless women to be employed on a part-time basis, which gives them a pay premium (Matteazzi *et al.* [2014]).

Other characteristics, such as education and type of occupation, tend to narrow the observed raw wage gap. On average mothers are less educated than childless women and, given the positive returns of higher education level, the difference in schooling tends to close the wage gap between mothers and non mothers. In addition, mothers are slightly under-represented at the top of the occupational ladder where earnings possibilities are higher.<sup>24</sup>

In the UK, the motherhood wage gap is negative and a considerable share of the pay differential is explained by several observed characteristics of mothers and childless women. Empirical findings change considerably across the three estimated specifications. With the first specification, we find evidence of a pay penalty for British mothers who are positively selected in the labor market. However, once we model the joint decision of labor market participation and fertility, the pay penalty and the selection part are no longer significant.

Differently from Italy, the negative motherhood wage gap in the UK is mainly driven by job segregation. Indeed, around 63% of the pay gap is explained by the fact that mothers are under-represented at the highest rungs of the occupational ladder and in managerial positions where wage returns are higher. In addition, compared with childless women, British mothers are confined to poorly paid sectors, such as wholesale and retail trade or accommodation and food services, where earnings are lower. Also the education attainment plays an important role in explaining the motherhood wage gap. On average, childless women are more educated than mothers and this contributes in explaining the negative raw pay differential. It is noteworthy that, for British mothers, the timing of

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<sup>24</sup>The results of the decomposition are robust to the introduction of the real labor market experience among explanatory variables in women's earnings in Italy. The magnitude, sign, and significance of the explained, unexplained, and selection parts are quite similar.

motherhood matters. More precisely, having children at the early stage of career has an adverse effect on wage progression.

To conclude, our findings support the need to model fertility and labor market participation as joint decisions. In the UK wage progressions and career path are strongly affected by the motherhood status. It is possible that having children at the early stage of the career and subsequent career-interruptions or periods of low wage growth, for which we do not have information, have a negative effect on mothers' wage progressions and career accomplishments over their life course. In Italy motherhood status does not seem to negatively affect women's earnings and career outcomes. This could find an explanation in the postponement of fertility until after the career is fully well-established. However, country differences in terms of welfare states and industrial and labor relations system may participate in explaining our empirical findings. In Italy, the availability of long maternal and parental leave allow mothers to remain with the same employer after childbirth. Thus, the fact of encouraging the job continuity after birth results in longer tenure and seniority, for which we do not have information, that may positively affect wages in the medium run (O'Neill and Polachek [1993], Waldfogel [1997], [1998]). Similar conclusions can be drawn about the important role played by the family network in Italy, where relatives, and especially grandparents, help mothers in achieving career continuity. In addition, in Italy employees enjoy a higher job protection than in the UK (Venn [2009]).

## 4 Conclusions

The main objective of this paper is to investigate to what extent motherhood affects women's wages and career accomplishments in Italy and the UK. We are interested in the motherhood wage gap, i.e. the earnings difference between mothers and childless women expressed as a percentage of childless women's earnings. Italy and the UK are very heterogeneous in terms of female employment, fertility, widespread of part-time employment, welfare-regimes, and industrial and labor relations. In Italy mothers earn, on average, more than childless women, whereas in the UK the opposite is true.

Using EU-SILC 2009 data, we first study female fertility and labor participation decisions making use of a bivariate probit model. Indeed, these two choices are interrelated. It is undoubtedly that the birth of a child decreases female participation in paid employment. However, it should be also the case that an ambitious and career-oriented woman increases her attachment to the labor force by reducing her fertility. The results clearly show that these two decisions are significantly and negatively correlated. In a second stage, we estimate selectivity-corrected log earning equations separately for mothers and child-

less women by ordinary least squares. Lastly, in the third stage of the empirical analysis, we decompose the raw motherhood wage gap using the [Neuman-Oaxaca \[2004\]](#) procedure, accounting for selectivity. In Italy the positive motherhood wage gap is only partly explained by differences in individual and workplace characteristics between mothers and non mothers. The results suggest that motherhood has no adverse effects on mothers' wage progressions and career path. This could be explained by the postponement of fertility until after the career is fully well-established as well as by the country industrial and labor relation system. The selection of childless women in employment is important in explaining the pay gap. As for the UK, results show that about 85% of the negative motherhood wage gap is explained by different observable characteristics between mothers and childless women. The job segregation explains most of the pay differential. Mothers are more concentrated in less valued sectors and lower paid occupations. In addition they are less represented in managerial positions with supervisory responsibility.

Empirical findings suggest that the timing of motherhood and job continuity may play an important role in explaining the female wage profile. This issue deserves great attention since it may have severe consequences, in the short and medium run, on female wages and, in the long run, on female pension entitlements and old-age poverty. What should be done? Actions are required at all levels. It is important to encourage women to have a continuous employment history. This is made possible by improving childcare provision, for instance. Thus, social policies might be addressed to its availability, cost and type. Hence, improving the provision of affordable and high-quality childcare services might positively affect both the fertility decision and the labor supply of mothers, especially of those with very young children the time allocation of whom may be sensitive to changes in the costs of child care. Indeed, better childcare services may enhance both female participation and mothers' full-time attachment to the labor market ([De Henau \*et al.\* \[2010\]](#)). Also maternity and parental leave schemes may be effective in favoring mothers' attachment to the labor market and in reducing pay penalty. It is also fundamental to pursue the reconciliation of work and family responsibilities in order to limit family-related career interruptions for mothers. Mothers continue to be largely responsible for childcare and other family responsibilities. Thus, family policies may foster husbands' participation in non paid activities. It is also important to tackle labor market segregation, stereotypes and pure discriminants against mothers. National legislation can enforce the principle of equal pay for work with equal value, whatever the motherhood status. Also social partners' agreements could contribute by fostering good practices.

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**Table 1: Cross-country Comparison**

	<i>Italy</i>	<i>UK</i>	<i>Source</i>
<b>Female employment (age group 15-64)</b>			
Total	46.4%	65.0%	EUROSTAT - European labor force surveys (2008)
Part-time	27.9%	41.7%	
Impact of motherhood on employment	13.5	16.9	
<b>Fertility rate</b>			
Fertility rate	1.41	1.94	Eurostat population statistics (2009)
<b>Public spending (% GDP)</b>			
Family related	1.6	3.8	ESSPROS and Social Expenditure Database (2009)
<b>Enrollment in formal childcare (%)</b>			
Under 3 years	29.2	40.8	ESSPROS and Social Expenditure Database (2009)
2 to 5 years	97.4	92.7	
<b>Labor and relation system</b>			
Statutory Minimum Wage	No	Yes	ICTWSS database on Institutional characteristics of Trade unions, wage Setting, state intervention and Social Pacts 1960-2010 (Visser 2011) (2009)
Bargaining Coverage adjusted (%)	80	34.4	
Dominant level at which bargaining takes place	Sectoral or industry level, with additional local or company level	Local or company level	
<b>Wage inequality</b>			
% of low-wage earners as proportion of all employees	12.36	22.05	EUROSTAT - Structure of earnings survey (2010)

Notes: Low-wage earners are employees earning two-thirds or less of the national median gross hourly earnings.

**Table 2: Descriptive Statistics**

	<i>Italy</i>		<i>UK</i>	
	Mothers	Childless women	Mothers	Childless women
<b>Participation rate</b>	53.5%	84.2%	58.0%	96.0%
<b>Mean age</b>	35.1	31.8	34.1	31.2
<b>Mean age at first birth</b>	27.4		25.5	
<b>Education level</b>				
1- Lower secondary education at most	34.9%	19.3%	12.5%	3.7%
2- Upper secondary education at most	50.8%	51.4%	59.8%	37.3%
3- Tertiary education	14.3%	29.7%	27.7%	60.0%
<b>Firm with more that 11 employees</b>	65.4%	57.9%	82.8%	86.9%
<b>Permanent contract</b>	85.4%	78.6%		
<b>Managerial position</b>	15.5%	15.6%	29.1%	37.2%
<b>Occupation</b>				
1- Legislators, senior officials and managers; professionals	7.3%	11.8%	22.1%	35.5%
2- Technicians and associate professionals	33.6%	30.1%	13.7%	21.2%
3- Clerks	19.5%	24.0%	23.0%	26.3%
4- Service workers and shop and market sales workers	17.2%	19.3%	30.0%	11.2%
5- Skilled workers	13.4%	9.3%	2.4%	2.2%
6- Elementary occupation	8.9%	5.6%	8.8%	3.6%
<b>Sector of economic activity</b>				
1- Agriculture forestry and fishing; mining and quarrying; manufacturing; electricity, etc.; water supply, etc.	23.7%	21.4%	4.0%	11.5%
2- Construction; transport and storage	4.4%	5.7%	4.9%	5.6%
3- Wholesale and retail trade, etc.	14.5%	17.4%	15.9%	7.3%
4- Accommodation and food services activities	5.0%	5.6%	5.1%	1.4%
5- Information and communication; financial and insurance activities	6.7%	7.7%	9.1%	9.5%
6- Real estate activities; professionals, etc.; administrative and support service	10.4%	11.8%	6.2%	15.4%
7- Public administration and defense; compulsory social security	5.2%	3.8%	7.3%	13.1%
8- Education; human health and social work activities	24.8%	17.8%	42.2%	33.0%
9- Other activities (art, recreation, extraterritorial organizations)	5.7%	8.8%	5.5%	3.4%
<b>Part-time employment</b>	32.4%	15.8%	58.9%	6.1%
<b>Observations</b>	1,822	1,369	781	373

Notes: (i) Among Italians, 55.5% of mothers and 84.2% of childless women participate in the labor market; (ii) For the UK, 58% of mothers and 96% of childless women participate in the labor market.

**Table 3: Mean wages by education level attained and workplace characteristics**

	<i>Italy</i>		<i>UK</i>	
	Mothers	Childless women	Mothers	Childless women
<b>Mean wage</b>	10.73	9.50	11.63	13.34
<b>Motherhood wage gap</b>		11.89		-14.70
<b>Education level</b>				
1- Lower secondary education at most	8.98	7.91	7.41	9.99
2- Upper secondary education at most	10.32	9.00	9.71	10.64
3- Tertiary education	12.16	10.24	14.12	14.16
<b>Firm with more than 11 employees</b>				
No	9.38	8.51	10.67	10.59
Yes	10.88	9.74	11.01	13.07
<b>Permanent contract</b>				
No	9.53	8.770		
Yes	10.51	9.34		
<b>Managerial position</b>				
No	10.24	9.13	10.04	11.86
Yes	11.05	9.72	13.17	14.25
<b>Occupation</b>				
1- Legislators, senior officials and managers; professionals	12.59	10.71	14.56	15.36
2- Technicians and associate professionals	11.42	9.67	14.01	13.73
3- Clerks	10.71	9.43	10.38	11.00
4- Service workers and shop and market sales workers	9.07	8.21	8.37	8.85
5- Skilled workers	8.85	8.08	8.81	7.94
6- Elementary occupation	8.55	8.07	8.01	9.06
<b>Sector of economic activity</b>				
1- Agriculture forestry and fishing; mining and quarrying; manufacturing; electricity, etc.; water supply, etc.	8.36	8.20	9.43	10.45
2- Construction; transport and storage	9.70	8.74	11.57	11.79
3- Wholesale and retail trade, etc.	10.11	9.50	11.10	12.27
4- Accommodation and food services activities	9.78	8.72	9.15	10.83
5- Information and communication; financial and insurance activities	8.96	8.06	7.15	7.85
6- Real estate activities; professionals, etc.; administrative and support service	12.18	10.40	13.85	14.58
7- Public administration and defense; compulsory social security	9.67	9.01	11.11	12.60
8- Education; human health and social work activities	12.04	11.16	12.60	13.12
9- Other activities (art, recreation, extraterritorial organizations)	11.60	10.27	11.28	13.42
<b>Part-time employment</b>				
No	10.45	9.29	11.83	12.82
Yes	10.18	8.84	10.33	10.33

**Table 4: Endogenous switching model with sample selection**  
**- Marginal effects on probabilities -**

	<i>Italy</i>		<i>UK</i>	
	Fertility	Participation	Fertility	Participation
Nationality	-0.121 (0.031)	0.134 (0.029)	0.063 (0.042)	0.106 (0.042)
Upper secondary education at most	-0.086 (0.027)	0.208 (0.020)	-0.163 (0.056)	0.237 (0.046)
Tertiary education at most	-0.182 (0.034)	0.215 (0.020)	-0.454 (0.056)	0.386 (0.037)
Age	0.040 (0.003)	-0.002 (0.002)	0.027 (0.003)	0.003 (0.003)
Living in couple	0.697 (0.019)	-0.242 (0.021)	0.309 (0.041)	-0.147 (0.035)
Single but separated, divorced, or widow	0.392 (0.024)	-0.096 (0.061)	0.167 (0.046)	-0.068 (0.072)
Living in a densely or intermediate populated area	-0.009 (0.027)	0.012 (0.021)	-0.060 (0.086)	0.066 (0.098)
Household annual non labor income	-0.000 (0.000)	-0.000 (0.000)	0.002 (0.001)	-0.004 (0.000)
Partner's annual labor income	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
Partner's health condition	-0.093 (0.042)	0.006 (0.035)	-0.017 (0.048)	-0.026 (0.046)
Availability of unpaid childcare	–	0.211 (0.017)	–	0.136 (0.026)
Region: North-West	-0.072 (0.046)	0.281 (0.023)	n.a.	n.a.
Region: North-East	-0.105 (0.046)	0.305 (0.022)	n.a.	n.a.
Region: Center	-0.037 (0.046)	0.245 (0.024)	n.a.	n.a.
Region: South	0.066 (0.046)	-0.020 (0.035)	n.a.	n.a.

Notes: (i) Reference category for education: lower secondary education at most; (ii) Reference category for region: Island; (iii) Standard errors are in parentheses and computed using Delta method; (iv) n.a. for not available; (v) - for not controlled for.

**Table 5: Log earning equation for mothers in Italy and the UK**

	<i>Italy</i>		<i>UK</i>	
Education 1	0.037	(0.029)	0.142	(0.071)
Education 2	0.118	(0.044)	0.401	(0.121)
Age	0.003	(0.008)	0.009	(0.010)
Age at first birth	-0.002	(0.002)	-0.009	(0.003)
Nationality	0.088	(0.035)	0.037	(0.059)
Living in couple	-0.090	(0.200)	-0.040	(0.086)
Single but separated, divorced, or widow	-0.021	(0.149)	-0.059	(0.086)
Region: North-West	0.051	(0.047)	n.a.	
Region: North-East	0.068	(0.050)	n.a.	
Region: Center	0.018	(0.044)	n.a.	
Region: South	-0.008	(0.043)	n.a.	
Living in a densely/intermediate populated area	-0.033	(0.020)	-0.069	(0.085)
Firm with more than 11 employees	0.096	(0.018)	-0.042	(0.038)
Permanent contract	0.067	(0.023)	n.a.	
Managerial position	0.019	(0.022)	0.089	(0.034)
Occupation 1	0.191	(0.047)	0.247	(0.065)
Occupation 2	0.120	(0.037)	0.213	(0.069)
Occupation 3	0.083	(0.037)	0.038	(0.061)
Occupation 4	-0.007	(0.037)	-0.066	(0.056)
Occupation 5	-0.052	(0.040)	-0.147	(0.107)
Sector of economic activity 2	0.008	(0.042)	-0.010	(0.096)
Sector of economic activity 3	0.006	(0.030)	-0.157	(0.081)
Sector of economic activity 4	0.001	(0.044)	-0.280	(0.099)
Sector of economic activity 5	0.131	(0.036)	0.095	(0.087)
Sector of economic activity 6	-0.043	(0.032)	-0.053	(0.091)
Sector of economic activity 7	0.121	(0.040)	0.029	(0.090)
Sector of economic activity 8	0.069	(0.027)	-0.101	(0.079)
Sector of economic activity 9	-0.050	(0.042)	-0.263	(0.094)
Part-time employment	0.035	(0.018)	-0.046	(0.030)
<i>Lambda1</i>	-0.038	(0.133)	-0.086	(0.1569)
<i>Lambda2</i>	0.001	(0.051)	0.082	(0.058)
Constant	1.947	(0.4645)	1.997	(0.469)
<b>Observations</b>	<b>975</b>		<b>453</b>	
<b>R<sup>2</sup></b>	<b>0.305</b>		<b>0.497</b>	

Notes: (i) n.a. for not available because of data quality issue.

**Table 6: Log earning equation for childless women in Italy and the UK**

	<i>Italy</i>		<i>UK</i>	
Education 1	0.181	(0.043)	-0.077	(0.090)
Education 2	0.259	(0.050)	-0.015	(0.139)
Age	0.013	(0.002)	0.019	(0.010)
Living in couple	-0.031	(0.066)	0.040	(0.082)
Single but separated, divorced, or widow	-0.037	(0.054)	0.129	(0.094)
Nationality	0.109	(0.034)	0.019	(0.052)
Region: North-West	0.313	(0.068)	n.a.	
Region: North-East	0.300	(0.072)	n.a.	
Region: Center	0.241	(0.062)	n.a.	
Region: South	0.049	(0.035)	n.a.	
Living in a densely/intermediate populated area	-0.044	(0.017)	-0.086	(0.093)
Firm with more than 11 employees	0.072	(0.014)	0.082	(0.042)
Permanent contract	0.069	(0.017)	n.a.	
Managerial position	0.009	(0.018)	0.092	(0.029)
Occupation 1	0.128	(0.039)	0.399	(0.080)
Occupation 2	0.056	(0.035)	0.349	(0.082)
Occupation 3	0.048	(0.036)	0.125	(0.079)
Occupation 4	0.001	(0.036)	-0.011	(0.084)
Occupation 5	-0.042	(0.040)	-0.119	(0.116)
Sector of economic activity 2	0.033	(0.031)	0.109	(0.072)
Sector of economic activity 3	-0.003	(0.023)	-0.096	(0.067)
Sector of economic activity 4	-0.007	(0.035)	-0.198	(0.135)
Sector of economic activity 5	0.098	(0.029)	0.113	(0.061)
Sector of economic activity 6	-0.009	(0.025)	-0.043	(0.055)
Sector of economic activity 7	0.139	(0.037)	0.088	(0.058)
Sector of economic activity 8	0.083	(0.023)	-0.013	(0.050)
Sector of economic activity 9	-0.041	(0.029)	0.020	(0.088)
Part-time employment	0.023	(0.019)	0.071	(0.059)
<i>Lambda1</i>	0.009	(0.056)	0.104	(0.156)
<i>Lambda2</i>	0.450	(0.155)	0.089	(0.122)
Constant	1.011	(0.163)	1.669	(0.252)
<b>Observations</b>	<b>1153</b>		<b>364</b>	
<b>R<sup>2</sup></b>	<b>0.304</b>		<b>0.492</b>	

Notes: (i) n.a. for not available because of data quality issue.



Table 7: Wage gap decomposition results for Italy

	<i>Heckman</i>			<i>Bivariate probit (1)</i>			<i>Bivariate probit (2)</i>		
Prediction for mothers' log wage	2.297		(0.009)	2.297		(0.009)	2.297		(0.009)
Prediction for childless women's log wage	2.187		(0.008)	2.187		(0.008)	2.187		(0.008)
Difference	0.110		(0.012)	0.110		(0.012)	0.110		(0.012)
<b>Explained part</b>									
Other individual and household characteristics	-0.027	-24.5%	(0.013)	-0.039	-35.5%	(0.061)	-0.037	-33.6%	(0.061)
Education	-0.019	-17.2%	(0.004)	-0.018	-16.4%	(0.004)	-0.017	-15.5%	(0.004)
Age	0.033	30.0%	(0.006)	0.030	27.3%	(0.014)	0.033	30.0%	(0.014)
Age at first birth							-0.008	-7.3%	(0.008)
Firm size	0.006	5.5%	(0.002)	0.006	5.5%	(0.002)	0.006	5.5%	(0.002)
Permanent contract	0.005	4.5%	(0.001)	0.005	4.5%	(0.001)	0.005	4.5%	(0.002)
Managerial position	0.000	0.0%	(0.000)	0.000	0.0%	(0.000)	0.000	0.0%	(0.000)
Occupations	-0.009	-8.2%	(0.003)	-0.009	-8.2%	(0.003)	-0.009	-8.2%	(0.003)
Sectors of economic activity	0.007	6.4%	(0.003)	0.007	6.4%	(0.003)	0.007	6.4%	(0.003)
Part-time employment	0.005	4.5%	(0.002)	0.005	4.5%	(0.002)	0.005	4.5%	(0.002)
Total	0.001	0.9%	(0.016)	-0.013	-11.8%	(0.076)	-0.016	-15.5%	(0.076)
<b>Unexplained part 1</b>	0.101	90.0%	(0.036)	0.123	111.8%	(0.063)	0.064	58.1%	(0.056)
<b>Unexplained part 2</b>	0.099	93.6%	(0.023)	0.138	125.5%	(0.099)	0.195	177.3%	(0.138)
<b>Selection</b>									
Employment: mothers	0.034	30.9%	(0.018)	-0.002	-1.8%	(0.032)	0.001	0.9%	(0.032)
Employment: childless women	0.126	114.5%	(0.044)	0.118	107.3%	(0.041)	0.118	107.3%	(0.041)
Motherhood: mothers				-0.023	-20.9%	(0.075)	-0.020	-18.2%	(0.075)
Motherhood: childless women				-0.004	-3.6%	(0.023)	-0.004	-3.6%	(0.022)
Total	-0.092	-83.6%	(0.050)	-0.139	-126.4%	(0.081)	-0.133	-120.9%	(0.081)

Notes: (i) Other individual and household characteristics include nationality, region, degree of urbanization of living area, partnership and marital status. Education includes all categories for education attainment. Occupations includes all six categories for occupation. Sectors of economic activity comprises all nine categories for the sector of economic activity. (ii) Unexplained part 1 refers to mothers's pay premium or penalty. Unexplained part 2 refers to childless women's pay premium or penalty.

**Table 8: Wage gap decomposition results for the UK**

	<i>Heckman</i>			<i>Bivariate probit (1)</i>			<i>Bivariate probit (2)</i>		
Prediction for mothers' log wage	2.314		(0.019)	2.314		(0.019)	2.314		(0.019)
Prediction for childless women's log wage	2.489		(0.018)	2.489		(0.018)	2.489		(0.018)
Difference	-0.175		(0.026)	-0.175		(0.026)	-0.175		(0.026)
<b>Explained part</b>									
Other individual and household characteristics	0.005	-2.9%	(0.007)	0.003	-1.7%	(0.016)	0.003	-1.7%	(0.016)
Education	-0.058	33.1%	(0.010)	-0.058	33.1%	(0.018)	-0.052	29.7%	(0.018)
Age	0.039	-22.3%	(0.009)	0.039	-22.3%	(0.025)	0.052	-29.7%	(0.025)
Age at first birth							-0.045	25.7%	(0.017)
Firm size	-0.001	0.6%	(0.001)	-0.001	0.6%	(0.001)	-0.001	0.6%	(0.001)
Managerial position	-0.008	4.6%	(0.004)	-0.008	4.6%	(0.004)	-0.008	4.6%	(0.004)
Occupations	-0.075	42.9%	(0.012)	-0.076	43.4%	(0.013)	-0.075	42.9%	(0.013)
Sectors of economic activity	-0.029	16.6%	(0.009)	-0.029	16.6%	(0.009)	-0.027	15.4%	(0.008)
Part-time employment	0.010	-5.7%	(0.018)	0.013	-11.8%	(0.019)	0.003	-1.7%	(0.016)
Total	-0.117	66.9%	(0.028)	-0.116	66.3%	(0.059)	-0.148	84.6%	(0.059)
<b>Unexplained part 1</b>									
	-0.096	54.8%	(0.033)	-0.170	97.1%	(0.124)	-0.114	65.1%	(0.117)
<b>Unexplained part 2</b>									
	-0.007	4.0%	(0.037)	0.068	-38.9%	(0.126)	0.019	-10.9%	(0.087)
<b>Selection</b>									
Employment: mothers	0.060	34.3%	(0.022)	0.058	-33.1%	(0.036)	0.053	-30.3%	(0.037)
Employment: childless women	0.015	8.6%	(0.029)	0.011	-6.3%	(0.017)	0.011	-6.3%	(0.017)
Motherhood: mothers				-0.083	47.4%	(0.092)	-0.054	30.9%	(0.093)
Motherhood: childless women				-0.080	45.7%	(0.116)	-0.080	45.7%	(0.116)
Total	0.046	-26.3%	(0.037)	0.044	-25.1%	(0.143)	0.068	38.9%	(0.144)

Notes: (i) Other individual and household characteristics include nationality, region, degree of urbanization of living area, partnership and marital status. Education includes all categories for education attainment. Occupations includes all six categories for occupation. Sectors of economic activity comprises all nine categories for the sector of economic activity. (ii) Unexplained part 1 refers to mothers's pay premium or penalty. Unexplained part 2 refers to childless women's pay premium or penalty.