RETURN TO WORK AFTER CHILDBIRTH:
DOES PARENTAL LEAVE MATTER IN EUROPE?

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ABSTRACT

The aim of this paper is to investigate the role of the extended parental leave in the return to work for mothers of newborn children. Parental leaves have been introduced in the last 30 years in all European countries in order to extend the period of job-protection, allowing both parents to care for the child after the maternity leave period has expired. In this paper, I exploit the variability in policies offered by the EU countries, in terms of length of the leave and payments, and I study the influence of statutory leaves on the probability of staying at home with the child during the leave, and on the probability of working in the period of time following the leave. Using data from ECHP, I select women who have a child in the years of the survey, who have worked before, and I follow them over time. After studying the determinants of the return to work in each country separately, I generalize the results, matching women with similar human capital characteristics and fertility history from different countries and, consequently, under different parental leave regulations. Results suggest that the right to long and paid leaves gives mothers the opportunity to remain at home with the child at a lower cost, and that lengthy statutory leaves are associated with being more likely to be at work in the period following the leave.

NON-TECHNICAL SUMMARY

Although female labour market participation has increased everywhere, women are still likely to interrupt their career when they have a child, for a period of time longer than the basic maternity leave. The aim of this paper is to investigate the role of extended parental leave in the return to work for mothers of newborn children, exploiting the variability in policies across EU countries, in terms of length of the leave and payments during the period. Parental leaves (also called "child care" leaves) have been introduced in the last 30 years[1] in all European countries in order to extend the period of job-protection, allowing both parents to care for the child after the maternity leave period has expired.

Generally, supporters of these policies claim that leave results in healthier children and a better position for women in the labour market, while opponents state that these restrictions can adversely affect women's careers. What is the effect of providing long periods of leave on the time mothers stay at home looking after the child and on the probability to resume work after the leave? The answers to these questions are the objective of the paper. In the case of Europe, the EC directive requires 3 months of parental leave, but permits degrees of freedom for additional time, payments, and flexibility in the timing. And, indeed, the length and the features of statutory parental leave differ substantially across Europe: from the minimum of 3 months to a maximum of 3 years, from 0% to 100% paid. This variability allows the study of whether a longer and paid parental leave is associated with a higher/lower propensity to stay at home and care for the child during the leave, and with a higher/lower probability to work in the period of time following the leave.

Using data from the European Community Household Panel, I select women who have a child in the years of the survey, who have worked before, and I follow them over time. Results suggest that the right to long and paid leaves gives mothers the opportunity to remain at home with the child at a lower cost, and that lengthy statutory leaves are associated with being more likely to be at work in the period following the leave.

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[1] The first country to introduce the parental leave was Finland in 1978, followed by Austria in 1979.

1. Introduction

Although female labour market participation has increased everywhere, women are still likely to interrupt their career when they have a child, for a period of time longer than the basic maternity leave. The aim of this paper is to investigate the role of extended parental leave in the return to work for mothers of newborn children, exploiting the variability in policies across EU countries, in terms of length of the leave and payments during the period. Parental leaves (also called "child care" leaves) have been introduced in the last 30 years[2] in all European countries in order to extend the period of job-protection, allowing both parents to care for the child after the maternity leave period has expired.

The expected impact of leave from work on maternal employment is ambiguous (Klerman and Leibowitz, 1997; Waldfogel et al, 1999). On the one hand, it allows women to have a break to care for the child and its absence could persuade some women not to participate in the labour market. It also guarantees the return to the previous job so that she does not lose her specific human capital. On the other hand, it may withdraw women from the labour market for long periods, with negative implications for their future employability, wages, and career.

From an empirical point of view, several papers have studied the effect of maternity leave[3] on mothers' post-birth employment. Ruhm (1998), comparing employment rates and wages among women and men in different European countries, shows how maternity leave's availability is associated with an increase in women's employment but a reduction in their relative wages. Waldfogel et al (1999), comparing United States, UK, and Japan, find evidence of a positive effect of the leave on women's job retention. Klerman and Leibowitz (1997), using US census data, find empirical evidence of the association between statutory parental leave and longer work-breaks taken by women protected by these laws.

Generally, supporters of these policies claim that leave results in healthier children and a better position for women in the labour market, while opponents state that these restrictions can adversely affect women's careers. What happens when the statutory leave is longer? What is the effect of providing longer periods of leave on the time mothers stay at home looking after the child and on the probability to resume work after the leave? The answers to these questions are the objective of the paper. In the case of Europe, the EC directive requires 3 months of parental leave, but permits degrees of freedom for additional time, payments, and flexibility in the timing. And, indeed, the length and the features of statutory parental leave differ substantially across Europe: from the minimum of 3 months to a

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[2] The first country to introduce the parental leave was Finland in 1978, followed by Austria in 1979.
[3] As clear in part 2, I call "maternity leave" the short, almost mandatory, paid leave, taken just after childbirth, exclusively for the mother; while I call "parental leave" the optional, longer, not always paid leave, which follows the "maternity" leave and can be shared with the partner (following De Henau et al, 2007). Many papers call "parental" what for Europe is closer to the "maternity" definition.

maximum of 3 years, from 0% to 100% paid. This variability allows the study of whether a longer and paid parental leave is associated with a higher/lower propensity to stay at home and care for the child during the leave, and with a higher/lower probability to work in the period of time following the leave. These effects are not clear at priori. The increase in the length of the leave could reduce work in the period immediately surrounding childbirth, but it could also theoretically raise the employment during the leave period, in the case that some women would have definitely quit their job in the absence of such leave (Klerman, Leibowitz, 1997).Concerning post-leave employment, longer periods may have an ambiguous effect as well: on the one hand, women may lose human capital and career prospects which influence negatively their post-birth employment status; on the other hand, they have their job protected, which makes it easier to return to work (Berger and Waldfogel, 2004; Waldfogel et al, 1999). Understanding the economic consequences for women of the take-up of the leave is important, given the positive effects of the time spent with the child, especially during the first year elapsed from childbirth (James-Burdumy, 2005): a reduction in infant mortality (Ruhm, 2004), more breastfeeding, child immunization (Tanaka, 2005; Berger et al, 2005), better cognitive outcomes (Gregg et al, 2005; Ruhm, 2004), and better educational outcomes (Ermisch, Francesconi, 2002). However, in defence of mothers' work, the negative effects of maternal work are partially offset by positive effects of increased family income (Baum, 2003) and there is no evidence of detrimental effects on children's cognitive outcomes when mothers use formal instead of informal care (Gregg et al, 2005).

In this paper, I analyse employment decisions of mothers after childbirth, using the European Community Household Panel (ECHP) and treating the data in a survival perspective. I first present the institutional background for different European countries (part 2) and then the methodological framework (part 3). The ECHP data are illustrated in part 4, while part 5 comprises the empirical estimations. Parts 6 and 7 compare and interpret the results across countries. Conclusions follow (part 8).

2. The Institutional Background

Parental leaves extend the period of job-protection, allowing both parents to care for the child after the maternity leave period has expired. The EC directive requires a minimum of 14 weeks of maternity leave and of 3 months of parental leave (Table 1). While the length of maternity leave (14 - 22 weeks) and the replacement ratio (most of them over 80%) are quite homogenous among countries, parental leave differs substantially in terms of length, of paid period and of incentives for fathers' take-up. With respect to the mothers' take-up, maternity leave is used by almost all of them, while the extended

parental leave is optional and, given the amount of benefits, its use depends on mothers' constraints and preferences. The conditions required to qualify for the leave vary across countries, but women with 1 year of employment are usually covered[4].We see for Belgium, Portugal, and the Netherlands the minimum period of 3 months for each parent while very long leave of 2/3 years exists in France, Spain, Austria, Germany and Finland. For some countries, parental leave includes right to be paid during the period surrounding the childbirth, which can be related to the previous job (e.g., Finland and Italy) or as flat rate payment (e.g., Austria). The right to leave can be individual or family based: in the first case, if one parent does not take the leave, it is lost for the family. In this sense, parental leave could play an important role in re-equilibrating the work division in the couple and promoting gender equality (see last column in Table 1): short leave, well paid and with no possibility to transfer months from the father to the mother could lead fathers to share this task more frequently. In all countries, the job position is protected during the whole leave, with the exception of Spain where the protection covers just one year and in the Netherlands where employment is guaranteed in some collective agreements. In some countries mothers taking parental leaves lose pension and seniority rights (UK, Netherlands, Ireland, and half of them in Austria and France). Moreover, in some countries women are allowed to take only part of the leave and to work a reduced number of hours; or allowed to postpone the leave until the child is older, not immediately after childbirth. For simplicity, I only study the first transition from non-employment to employment, and I observe whether the availability of these arrangements changes women's choices between work and care activities. To the author's best knowledge, in all analyzed countries, parental leave arrangements have been introduced before the first wave of the utilized survey and have not changed substantially during the years of the survey[5], with the exception of Ireland and UK where the parental leave was introduced, respectively, in 1998 and 1999.

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[4] In almost all countries women need to be employed for 1 year to have the right to the parental leave, in some countries with the same employer. The most restrictive requirements are in Portugal where both the parents have to be employed, while the least restrictive are in Austria, where they only need to show to be eligible for family allowances.
[5] European Community Household Panel, 1994-2001.

	Maternity leave		Parental leave			
	Period (weeks)	Average replacement rate (%)	Total leave duration (months)	Paid period (% of the total leave)	Father period (months)	Transferable months
IT	22	80	11	55	6	0
DK	18	62	11	70	0	11
IE	18	70	6.5	0	3.25	0
UK	18	43	8	0	4	0
FI	18	66	33	100	0	33
PT	17	100	6	8	3	0
EL	17	50	7	0	3.5	0
ES	16	100	36	0	0	36
FR	16	100	36	100	0	36
LU	16	100	12	100	6	0
NL	16	100	6	0	3	0
AT	16	100	24	100	6	18
BE	15	77	6	100	3	0
GE	14	100	36	67	0	36
SE	14	80	18	79	2	12

Table 1: maternity leave and parental leave in Europe (source: De Henau et al, 2007)

Another policy which does not constitute the object of the study but can affect the return to work is the availability of childcare. The possibility of working when the child is young is constrained by the availability of childcare and, later, by the pre-primary and primary school system. Better access to care services for children as well as high quality and low costs can decrease the cost of working for mothers, discouraging them from looking after the child at home. We see large differences in the public availability of childcare among European countries, especially for children under 3 (Table 2). In Denmark 55% of young children are looked after in a public crèche compared with less than 5% in Southern European countries, in the UK, in Ireland and in the Netherlands. In almost all countries a high percentage of fees (around 80%) are covered by public funds, but the effect of such a relative low cost is made meaningless by the rationing of the service (Del Boca, Vuri, 2006). Finally, the opening hours may or may not coincide with the "normal" working day: in Denmark, Sweden, the Netherlands and France the service is open for more then 10 hours a day; in Greece the service covers only 5 hours a day with a lunch break in the middle of the day. A shorter daily service may force parents to work fewer hours or to find some informal solution to complement the formal ones. The situation changes dramatically if we look at the arrangements for children aged 3 and more (Table 2): the coverage is more than 70% in almost all countries; the public funding is on average between 80 and 100% while the opening hours remain more or less the same. These differences are often due to the authority with responsibility for these sectors: infants fall under the auspices of Social Affairs while pre-school children are under the responsibility of the Ministry of Education (De Henau et al, 2007). The Barcelona council

of March 2002 has stressed the necessity of improving the childcare system, adopting two very precise targets: by 2010, EU member states should provide, at least, 50 places for every 100 children under 3 and 90 every 100 children above 3.

	Infants (younger than 3 years old)			Pre school aged children (older than 3 years old)		
	Coverage (%)	Public funding (%)	Opening hours (per day)	Coverage (%)	Public funding (%)	Opening hours (per day)
DK	55	75	10.5	90	75	10.5
SE	40	85	11	72	85	11
FR	39	78	10	87	100	8
BE	30	83	9	99	100	7
FI	23	85	10	42	85	10
GE	9	82	10	73	82	6
PT	12	80	7	72	100	5
AT	10	82	7	70	82	6
IT	6	80	10	87	91	8
LU	3	83	9	76	100	5
EL	3	80	9	48	100	4
ES	5	80	5	77	100	5
IE	2	100	9	50	100	4
NL	2	65	10	66	100	7
UK	2	94	8	60	100	5

Table 2: percentage of slots per 100 children, percentage of costs covered by public funding and number of hours covered per day in European countries (source: De Henau et al, 2007)

3. The methodological framework

Suppose a woman takes labour market participation decisions in order to maximize the household's lifetime utility. When out of employment the household utility u (measured in terms of consumption goods) depends on the husband's labour income (when in a partnership), on her private income and on her productivity at home, which varies with the number and ages of children. When in paid employment, the wage she receives in the labour market is an additional determinant of the household utility (Ermisch, Wright, 1991).

After childbirth, she decides whether or not to work according to the wage offers she receives, which are assumed to be from a distribution $F(w, X)$ where X represents fixed characteristics of the woman.

Let $V_2(X, H)$ be the expected discounted lifetime utility when not in employment and $V_1(X, H, w)$ when employed at wage w in a household with characteristics represented by H. The expected value of the best option, over an infinite span of life, is given by

$$T(X) = \int\limits_{-\infty}^{+\infty} \max\{V_2(X,H), V_1(X,H,w)\} dF(w,X).$$

Burdett et al (1985) show that there is a stopping rule which guarantees the existence of this maximum: she will decide to be employed if and only if $V_1(X,H,w) > V_2(X,H)$, where $V_1(X,H,w)$ is strictly increasing in w. Burdett et al (1985) derive that the corresponding maximizing strategy is characterized by a reservation wage function $z(X,H)$ so that she decides to be employed if $w > z(X,H)$. We see that the larger is her utility for the time spent at home, the lower the probability to be employed, while the larger is her expected wage (which depends on her human capital) the higher the probability of employment.

When she has a child, the reservation wage may rise as motherhood increases the demand for her time in childcare activities, or it may decrease as a consequence of the increased demand for market goods required for home production (Ronsen, Sundstrom, 1996). When time in inactivity passes, women tend to lose some human capital with a negative impact on the mean of the wage offer distribution, while the child becomes less time intensive with a consequent lowering of the reservation wage. Moreover, maternity leave rights may guarantee the mother a return to her former job (and therefore she has the probability of receiving an offer of 1) while any associated transfers will increase her reservation wage (Berger and Waldfogel, 2004). On the whole, as time since childbirth passes, her participation behaviour will depend on the relationship between the loss in human capital which affects her potential wage; the loss in her productivity at home (due to the child's age) and the existence of maternity rights, which affect her reservation wage in opposite directions. In real terms, a woman has to choose between returning to work within the time permitted by the law, or quitting her job to remain home for a longer period (Klerman, Leibowitz, 1997).

In order to study mothers' participation in the labour market, I estimate a reduced form model of labour market participation where the dependent variable is defined as the elapsed duration since childbirth to entering the labour market. The higher is the probability of returning to work, the smaller is this duration. In this study the event of interest, the transition from non-work to work, may occur at any particular instant in time, but data are provided in discrete intervals of time, which leads to the use of a discrete hazard model. We observe a random sample of women from the moment of their childbirth onwards, and we follow them till the spell ends or until the end of the survey[6]: subsequently, we may or may not

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[6] We therefore have an "inflow" sample (Jenkins, 2004).

observe the transition into work. These latter observations are right censored. I assume that the process which gives rise to the censoring is independent of the survival time process.

Suppose the time is divided in equal intervals of 1 month, every interval indexed by a positive integer. Let T be called the time spent out of the labour market, h the hazard if returning to work, S the survivor function in inactivity. We observe every woman's spell from the first month after childbirth through to the end of the jth month, at which point her spell is either complete ($c_i=1$) or right censored ($c_i=0$). The hazard rate, for a woman i, is given by

$$h_{ij} = \Pr[T_i = j \mid T_i \geq j],$$

which is the probability of leaving the state of inactivity in the interval (j-1, j], given she has not worked until j-1.

The likelihood contribution for a censored spell is given by

$$L_i = \Pr(T_i > j) = S_i(j) = \prod_{k=1}^{j}(1 - h_{ik}),$$

while the likelihood contribution for a completed spell is given by

$$L_i = \Pr(T_i = j) = h_{ij}S_i(j-1) = \frac{h_{ij}}{1 - h_{ij}}\prod_{k=1}^{j}(1 - h_{ik}),$$

so that the likelihood for the whole sample is equal to

$$L = \prod_{i=1}^{n}[(\frac{h_{ij}}{1 - h_{ij}})^{c_i}\prod_{k=1}^{j}(1 - h_{ik})],$$

which implies that

$$\log L = \sum_{i=1}^{n}c_i\log(\frac{h_{ij}}{1 - h_{ij}}) + \sum_{i=1}^{n}\sum_{k=1}^{j}\log(1 - h_{ik}).$$

This expression has the same form as the likelihood for a common binary regression, where y_{ik} is equal to 1 when $c_i=1$ and T_i is included in the interval (j-1, j] (Jenkins, 2004):

$$\log L = \sum_{i=1}^{n} \sum_{k=1}^{j} [y_{ik} \log h_{ik} + (1 - y_{ik}) \log(1 - h_{ik})].$$

The hazard rate h may depend on the time already spent in inactivity and on some other characteristics of the woman, the household and the social and economic environment she faces. I choose a complementary log-log model specification, which is consistent with a continuous time model and interval censored survival time data (Jenkins, 2004). The hazard rate into work for a woman i at time j is given by

$$h_{ij} = 1 - \exp[-\exp(\alpha + \eta_i + \beta X_i + \delta H_i + \lambda E_i + \gamma_1 J_1 + \gamma_2 J_2) \qquad (1)$$

That is, the hazard is a function of the characteristics of the woman (X), of the household (H), of the regional economic environment (E), of the time spent not working (J_1) and of its square (J_2), which corresponds to the age (and age square) of the child.

I estimate a model with a woman specific variable η_i, which follows a normal distribution and is assumed to be independent from both time and the other explanatory variables. In fact, women in our sample may be more work or family attached and our covariates may not adequately identify this difference. If omitted variables are correlated with any of the included regressors, it will cause bias of the usual kind. But, even if they are not correlated, results will be biased and the bias will be different if we look at the estimated time dependence or at the estimated coefficients of the regressors: the model will tend to overestimate the negative effect of the time spent in the state, while the size of the estimated parameters will be underestimated (Lancaster, 1979; Nickell, 1979).

After estimated the return to work separately for countries, I predict the probability to be at work for some typical women, when the child is 0-5 years old:

$$1 - \hat{S}_{qzj} \qquad (2)$$

where z indicates the country of residence, j the elapsed time from childbirth and q a "typical" woman comparable across countries. I repeat this operation for different kinds of women; I pool the predicted probabilities from all countries, matching ideally every woman in each country with a similar woman in

all other countries, so that the remaining differences among countries may be attributed to the statutory parental leave

$$1 - \hat{S}_{qzj} = \beta_0 + \beta_1 PP_{zj} + \beta_2 UP_{zj} + u_{qzj} \qquad (3)$$

where PP is a dummy variable indicating the right to the paid parental leave in the country z at time j, while UP indicates the right to unpaid parental leave (job protection). The variables "on leave" and "on paid leave" are shared by all women in the same country (aggregate measures), given the age of the child. If the disturbances are correlated within countries that are used to merge aggregate with micro data, however, then even small levels of correlations can cause the standard errors from OLS to be seriously biased downward. The bias of the standard errors can result in spurious finding of statistical significance for the aggregate variable of interest (Moulton, 1990). Consequently, the bias has been corrected by adjusting the estimates of standard errors to account for the non-independence of observations within each country (Primo et al, 2007).

The advantage of using different countries where the right is universal instead of one country where the right is given according to particular agreements is to avoid the problem of women selecting themselves in certain jobs with preferred family policy (Berger and Waldfogel, 2004). On the other hand, I need to discuss issues related to the selection process of the studied population. The samples are composed of women who work and have a child. These two selection processes may lead us to observe very different women in the selected countries. For example, in countries with low female labour market participation, the ones who actually participate may be, on average, more career oriented than in other countries, so that a better performance can be due to this selection. Or, for example, in countries with more generous transfers and care systems, women from the poorest backgrounds may be more likely to have children, showing on average a worse work performance. To solve this problem I estimate the return to work by using, as primary predictor, the potential wage of women in our samples. Then, I predict the probability to be at work for some typical women (see equation (2)) by using the potential wage derived from the whole earnings distribution of working and not working women, mothers and not, in their fertile age, in each country separately (details in part 5). The assumption which makes possible the comparison across Europe is that there are no omitted variables correlated with the potential wage that affect the probability of having a child and of working.

4. The data

For the empirical analysis I use data from the European Community Household Panel (ECHP), a dataset provided by Eurostat which covers a wide range of topics and allows a comparison of the member countries for the years 1994-2001.

I select women, who have a child during the time of the survey, who have worked before[7] and I follow them over time: my dependent variable is defined as the duration, in months, between childbirth and the return to work. We do not have information about the take up of the leave and the coverage of the leave. I assume that women working before childbirth are likely to have the right to it, and I study whether the availability of less/more generous leave schemes influence their working decisions.

I study the return to work for Italy, Greece, Spain, Portugal, France, Belgium, Austria, Great Britain, and Finland. I cannot study the remaining countries because I do not have monthly information concerning the date of birth or the employment pattern[8].

In order to see when mothers return to work after having a child, I use two different and complementary sources of information: the job information stated at the moment of the interview, and the monthly activity calendar, which is reported for to the previous calendar year. I am actually interested whether they are "on the job" in the period surrounding childbirth and not whether they "hold" a job, since I am concerned with the potential loss in human capital, and the potential gain in child's health, which depend on how much time they spend at home (Klerman, Leibowitz, 1994). Many women are employed but not at work. Consequently, I double-check hours of work, hours of care, and earnings. I consider a woman to be "at work" when she works at least 15 hours a week, she cares for her child less than 9 hours a day, and her earnings are different from zero[9]. For women I observe returning to work, about 90% have complete information about activities in the months between that interview and the previous one. For these women I can determine the month they started working. For the other 10%, I impute the medium point in the interval of time between the two interviews. For women not returning to the labour market (right-censored observations), the date of the final interview is the end of the spell.

In order to study which factors make women more likely to return to work, I estimate a complementary log-log model with random effects. The regressions are estimated for each country separately. With reference to equation (1) I include variables related to the woman, her household and the regional economic environment.

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[7] I include women either working the previous wave or having worked in the last two years.
[8] German and Danish data do not have month of birth, Dutch and Luxembourgian data do not have the activity calendar, while Swedish dataset is not a panel.

In the hazard function I include the woman's potential wage, obtained by using a Heckman regression, and then imputed for every woman. The advantage of this procedure is that it controls for endogeneity, which may arise because women with higher work commitment will be more likely to have worked more in the past and to earn more at the time of the childbirth (Klerman, Leibowitz, 1994). The potential wage is estimated on the whole ECHP sample of women aged 16-45 (fertile period). I explain the logarithm of the wage by including the level of schooling (third, second, less than second)[10], age and its square (Tables A1-A2, see Appendix). I also include, in the selection equation, the following variables: married or cohabiting (single, excluded), with one or more than one child (childless, excluded), household income (excluding woman's earnings) and a set of dummies related to the region of residence and to the calendar year. In this way I can predict the logarithm of the potential wage for women in the sample, which has been made unconditional on their work decisions and represents what they could earn while working.

Moreover, in the discrete-time hazard model (1), I include the age of the child in months, and its square, to see if the hazard into work increases or decreases with time, and how this pattern varies across countries. Since parental leave was introduced in Ireland in 1998 and in UK in 1999, I introduce a dummy variable equal to 1 to indicate when the woman has the right to it. I consider household income to take into account its negative effect on the reservation wage. Although potentially endogenous, I include two variables regarding the fertility decisions of the woman: a dummy variable indicating the first childbirth compared to subsequent ones and a dummy variable indicating the birth of another child during the inactivity spell. I include them in order to maintain comparability among countries with different fertility behaviour. By including the variable "first childbirth", I assume that the effect of the regressors is the same for all childbirths, but for a shift parameter captured in this variable. An alternative could be to include only women at the first childbirth. But, first, this would imply small samples. Second, the possibility to observe the same woman more than once makes it easier to identify unobserved heterogeneity. Finally, I include the regional unemployment rate in order to consider the economic environment which women face. The regional unemployment rate is drawn from REGIO, a dataset from Eurostat which provides descriptive statistics on each country's labour market, year by year, region by region. All covariates change over time, with the exception of the potential wage and the dummy "first childbirth" which are constant over the spell.

In Table 3 I summarize the characteristics of the samples at the beginning of the spell. I have 10 countries in which I analyze from a minimum of 374 spells of inactivity (11,496 month-observations,

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[10] Given the inconsistencies in the education variable between waves, I make this variable constant over time. I include the level of education stated in the first wave they are interviewed since the first years of the panel look more reliable when compared with OECD statistics.

Austria) to a maximum of 880 spells (20,610 month-observations, Spain). The percentage of mothers returning to work by the end of the basic maternity leave varies from a minimum of 22% in Austria to a maximum to 60% in Portugal[11]. Indeed, these two countries represent two extremes for what concerns rights related to the parental leave: the Austrian government offers up to 18 months of paid leave while the Portuguese offers only 3 months, unpaid, with the exception of the first week. The "first childbirth" variable reflects different levels of fertility in Europe: we observe a high percentage (around 55%) of first-birth children in countries with a low fertility rate like Italy, Greece, Spain, Portugal, and a lower percentage of first-birth children (around 45%) in countries with a higher fertility rates like Ireland, Finland and Belgium. Household income is generally higher in North and Central Europe than in South Europe. The mean potential wage shows some variability across countries, going from 4 PPPs[12] per hour in Portugal to 8 PPPs in UK: these differences may be due to the characteristics of labour markets, to different self selection processes into work and fertility, and to the approximation driven by the use of the PPP indexes.

	Work (%)	Pot. wage (PPP)	HH income (PPP)	First childbirth (%)	Unempl. rate (%)	Number of spells	Number of month-observations
FI	24.7	7.02	15,615	43.0	11.1	526	9,544
UK	43.3	8.38	20,826	49.9	6.8	742	17,153
IE	34.9	7.87	20,368	34.9	10.4	561	13,531
FR	43.3	8.01	21,314	47.4	10.8	767	14,637
BE	57.8	7.60	24,039	43.4	10.1	429	5,633
AT	22.1	7.66	27,702	51.4	4.0	374	11,496
IT	48.1	7.02	18,294	56.9	11.7	813	13,318
EL	39.2	4.31	16,959	53.2	9.8	503	10,762
ES	27.8	6.29	17,719	54.9	19.8	880	20,610
PT	60.4	4.04	13,679	58.0	5.5	713	7,688

Table 3: descriptive statistics of the samples, the fourth month after childbirth (source: calculations from ECHP)

If we look at the variables used to predict the potential wage (Table 4), we see large differences across countries in the level of schooling: the percentage of highly educated women is very high in Belgium and Finland (above 50%) while very low in Portugal, Austria, and Italy (around 10%). However, Austria has a high percentage of women with secondary schooling (around 70%), while this is less the case for Italy and not the case for Portugal.

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[11] I assume that all women use the basic maternity leave so that they are at risk from the 4th month.
[12] PPP stands for parity purchasing power, and it is used to make incomes comparable across countries.

	Age	Tertiary education	Secondary education
		(%)	(%)
Finland	31.0	51.0	39.7
UK	29.8	42.8	14.2
Ireland	31.1	19.6	53.0
France	29.9	38.4	40.1
Belgium	30.6	60.1	28.9
Austria	28.2	11.3	68.7
Italy	31.2	12.8	53.2
Greece	29.1	43.5	33.5
Spain	30.4	28.3	23.1
Portugal	28.3	11.3	19.0

Table 4: human capital characteristics of the mothers in the samples (source: calculations from ECHP)

5. Mothers' return to work

In Table 5 I compare at which age of the child mothers re-enter the labour market. Overall, in Europe, at least 25% of new mothers are working when the basic maternity leave has expired. The few exceptions are represented by women in Austria and Finland, who return to work at a slower rate, probably influenced by the generous statutory parental leave they have the right to. On the other hand, in Belgium and in Portugal at least 50% of women are working by the time the child is only 4 months old. In almost all countries at least one-half of mothers are working when the child is 3 years old. In Italy, Spain, Greece and Ireland we are not able to observe the first 75% of them back in the labour market.

	First quartile survival time	Median survival time	Third quartile survival time
	(months)	(months)	(months)
Finland	9	22	42
UK	4	10	72
Ireland	4	35	-
France	4	14	75
Belgium	4	4	22
Austria	11	36	90
Italy	4	7	-
Greece	4	19	-
Spain	4	46	-
Portugal	4	4	22

Table 5: survival times out of labour market (source: calculations from ECHP)

The estimated parameters of the participation hazard equations are reported in tables 6a-6b. We find that the potential wage has a positive and significant effect: women with a higher opportunity cost associated with maternity tend to start working very early after childbirth. The impact seems to be

relatively larger in Italy, Spain and Greece while smaller in Austria and Finland. The effect of education is usually found weaker where policies are more generous (Gustaffson et al, 1996; Gutierrez-Domenech, 2005). As the child grows up, the likelihood for a woman to work will depend on the relationship between the decline of the potential wage and of the reservation wage, which depends on her productivity at home and on the statutory leave schemes. I estimate the sum of these effects by looking at the impact of the time spent out of the labour market. In all analyzed countries but Austria and Finland, the hazard to work decreases when time in inactivity passes by. The squared term is, however, positive and significant, but not so large in size to change the negative trend in the first years elapsed from childbirth. On the other hand, Austria and Finland, with longer statutory leave, show weak but positive duration dependence. Looking at the household characteristics we find a negative effect of household income on the hazard rate into work, as expected. In most countries, the first childbirth compared to subsequent ones raises the hazard into work, with the exception of Finland. Lengthy leaves introduce the possibility for women to have multiple children before returning to their job, causing substantial loss in human capital. Indeed, the effect of the birth of another child is negative in countries with long parental leave like France and Finland: in these countries the woman can decide to have only one career-break, giving birth to the second child before entering the labour market. In the French case, the leave is paid only for the second child. In Finland, she receives much generous benefits in the first 6 months of the leave than for the rest of the period. The increased benefit and the increased necessity of time for caring, in both cases, may have a negative influence on her working decision. In Belgium, when the woman decides to have two following children, she has to quit her job to remain home for a longer period, taking an unprotected break from the career[13]. In this case, the increased labour supply may be due the increased demand for market goods required in the larger family. When significant, the regional unemployment rate has the expected negative sign.

The dummy variable "EC directive" has a positive and significant effect in UK, where parental leave has been introduced in 1999. UK mothers, with the addition of this period of leave after the basic maternity leave, seem to be less likely to interrupt their career.

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[13] The parental leave is too short to have time to have another child.

	Finland	UK	Ireland	Belgium	Austria
Age of the child (/12)	0.04 (0.19)	-1.18*** (0.16)	-1.25*** (0.23)	-1.37*** (0.26)	0.05 (0.20)
Squared age (/144)	0.05 (0.04)	0.21*** (0.02)	0.20*** (0.03)	0.20*** (0.04)	0.06* (0.03)
Potential wage (PPP)	0.42** (0.19)	0.95*** (0.11)	0.77*** (0.13)	0.94*** (0.16)	0.31** (0.16)
Income (/10,000 PPP)	-0.14** (0.07)	-0.19*** (0.07)	-0.15 (0.10)	-0.04 (0.07)	-0.10 (0.06)
First childbirth	-0.75*** (0.17)	1.85*** (0.21)	2.02*** (0.30)	0.97*** (0.26)	1.07*** (0.31)
Another child	-0.73** (0.28)	0.22 (0.30)	0.29 (0.43)	1.15** (0.46)	-0.27 (0.34)
Unemployment rate	-0.10*** (0.03)	0.06 (0.05)	0.07 (0.06)	-0.08* (0.04)	-0.32* (0.18)
EC directive		0.65** (0.28)	0.53 (0.45)		
Constant	-4.51*** (1.41)	-10.69*** (1.07)	-9.94*** (1.34)	-6.91*** (1.29)	-5.86*** (1.51)

Table 6a: estimated parameters and standard errors in brackets (*** significant at 1% level, **at 5%, * at 10%)

	France	Italy	Greece	Spain	Portugal
Age of the child (/12)	-0.68*** (0.16)	-1.37*** (0.19)	-1.35*** (0.23)	-0.74*** (0.18)	-0.97*** (0.21)
Squared age (/144)	0.13*** (0.02)	0.19*** (0.03)	0.21*** (0.04)	0.13*** (0.03)	0.14*** (0.04)
Potential wage (PPP)	0.49*** (0.07)	0.89*** (0.12)	1.19*** (0.16)	1.01*** (0.09)	0.65*** (0.09)
Income (/10,000 PPP)	-0.17** (0.07)	-0.23** (0.09)	-0.19* (0.10)	-0.17* (0.10)	-0.17 (0.11)
First childbirth	2.66*** (0.24)	0.55** (0.22)	0.48* (0.29)	0.82*** (0.25)	0.48** (0.24)
Another child	-1.72*** (0.53)	0.78 (0.49)	0.67 (0.45)	-0.30 (0.48)	0.34 (0.47)
Unemployment rate	0.02 (0.05)	-0.03* (0.02)	0.03 (0.07)	-0.05** (0.02)	-0.04 (0.07)
Constant	-6.88*** (0.85)	-6.84*** (0.94)	-7.38*** (0.97)	-9.46*** (0.85)	-2.34*** (0.58)

Table 6b: estimated parameters and standard errors in brackets (*** significant at 1% level, **at 5%, * at 10%)

6. Comparing mothers' return to work across Europe

In order to facilitate the interpretations of the results, I plot the predicted probability of being at work for women comparable across countries. The probability of being back to work is given by the complement of the survivor function at any month elapsed from childbirth. In figure 1, I simulate the cases of three women 30 years old, at the first child, with different levels of schooling. I predict the survivor functions in inactivity with the potential wage for the three different women specified above, in each country, with a household income equal to the median one, and with an unemployment rate equal to the one stated in the OECD statistics for 2001. In this, I can first give an idea of the average level of labour market participation for new mothers in different countries when they have the first child, and then I can investigate the role played by education in order to ascertain how the reconciliation between work and family depends on the woman's characteristics rather than on the social and cultural environment.

Figure 1 indicates that in countries with generous statutory parental leave (Finland and Austria), a large proportion of mothers is out of the labour market after childbirth. About 75% of mothers with a medium level of schooling are inactive one year after childbirth in Austria and Finland. In Finland the payments mothers receive during the 6 months is related to their wage (a replacement rate of 66%), but it decreases radically in the subsequent two years and half to a fixed amount of money, and this may explain the leaning shape of the survivor function for highly educated women. In Austria mothers are paid for the whole leave period (1 and half years), and as already clear in the estimations, there is not such a difference among women with different schooling.

In France, only 5% of women with secondary education are not yet working when the child is 1 year old, nevertheless the leave is 36 months long. However, the leave for the first child is not paid[14]. This may explain the highest average post first-birth employment compared with other countries with long parental leave provisions. Moreover, in France the difference in behaviour between the first and the second childbirth is very large (see Table 6b), suggesting that mothers of more than one child tend to stay at home with the child for a longer period.

The three countries with the fastest return to work are those in which women have the right to shortest parental leave (3 months in Portugal and Belgium, 4 in the UK). British women do not receive any payment during this period; Portuguese women are paid only the first week, while Belgian women receive lump sum payments for the whole period, which may explain a higher percentage of women (20%) out of the labour market when the child is 6 months old.

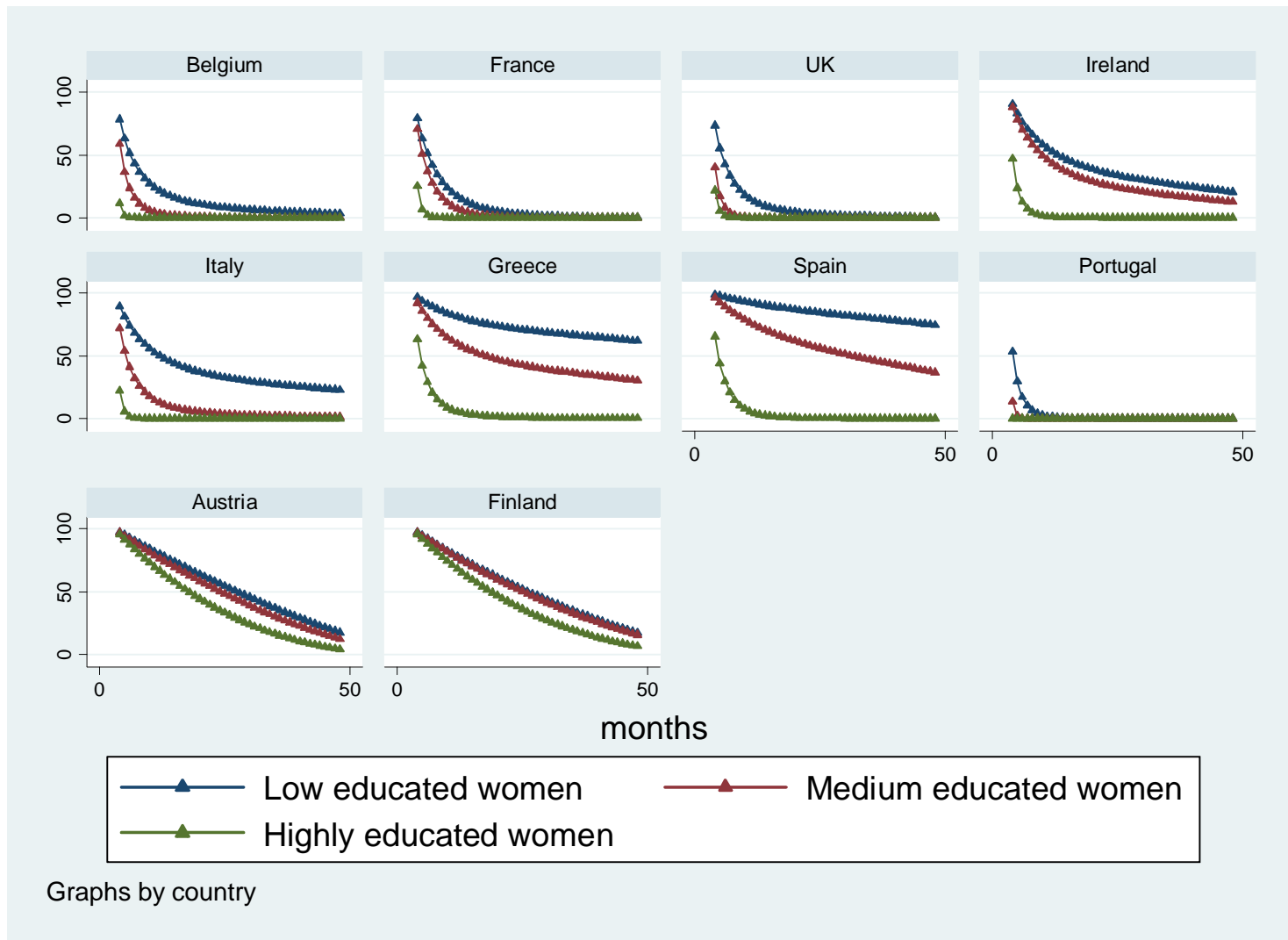[14] From 2004, the leave is paid also for the first child, but only for the first 6 months.

Figure 1: survivor functions in inactivity, by country and level of education

In Ireland, though mothers do not receive any payment for the leave, which lasts only three and half months, we observe a higher percentage of medium and low educated women out of the labour market when the child is 1 year old (35% and 45%, respectively). We observe the same phenomenon for Italy, Greece, and Spain: highly educated women seem to be influenced by the parental leave schemes, which grant shorter time in Italy, and Ireland compared to Spain and Greece, while medium and low educated women generally find it more difficult to return to work. Spain and Greece exhibit very low labour market participation after childbirth. The leave arrangements are not very generous (they have long leave but they do not receive any payment during the leave) and the availability of childcare services is very low. When the child is 3 years old, 25% of mothers are not yet working. For Italy, the situation is different: the connection with the previous job is stronger for highly educated women. The job is protected and they receive 30% of their wage for the 6 months of parental leave. What emerges in these three countries, and Ireland as well, are the differences between the three women: education plays a bigger role than in most of the other countries. While highly educated women return to work after childbirth, others are more likely to give up. This could be due the lack of protected leave which force women to quit their job, to the low childcare availability or to less favourable attitude towards women's work in these societies. In fact, comparing labour market participation of previous generations (for example in 1980, when the analyzed women were about 10 years old), is suggestive about different cultural attitudes in Europe with respect to female work. Italy, Spain, Greece and Ireland, where in 2000 we observe a slower return to work for less educated women, are the countries which show the lowest labour market participation rates in 1980 (below 40%, see Table A3 in Appendix).

In contrast, in Austria and in Finland, where long and paid leave is provided, the differences among women with different levels of human capital are almost non-existent. Also highly educated women take the opportunity to care for the children by themselves.

Generally, we observe that the different leave arrangements seem to shape survivor functions in inactivity in different countries. This simulation provides some idea of post-birth employment across countries, but the results cannot be generalized, since I am just graphically comparing three types of women.

7. Simulations and Interpretations

In order to compare more formally the results across Europe, I create a sample of women, from different countries, for which I predict the probability to be at work after childbirth. The hazard to work, and the derived probability to be at work, is calculated for 9 typologies of women, combining three levels of education (tertiary, secondary, less than secondary) and three ages at birth (25, 30, and 35). Since I am interested in the short and long run consequences of parental leave, I predict the probability to be at work from the 4th to the 36th month after childbirth (short run) and from the 37th to 60th (long run). For all 10 countries in the study, I predict the probabilities to be at work for these 9 typologies of women, for 57 points in time, and I pool the observations.

All women in the "simulated" sample have had their first child and do not have other children during the spell of inactivity, given the potential endogeneity of these two variables. The household income used in the predictions is the median one for each country, and the unemployment rate is the one stated at national level in 2001. In this way, the countries I am comparing can be considered equivalent in terms of human capital composition and fertility history. By picking the wage for the simulations from the wage distribution of all women in their fertile-age, women's work performances should not depend on the selection processes into work and into fertility, which would be different across countries.

In the short run (child younger than 3 years old), I observe whether the probability of working is lower when/where the right of parental leave exists. In the long run (once all leaves are expired[15], child 4-5 years old), I observe the influence of the statutory leave on mothers' employment in the post-leave period. Consequently, I estimate two OLS regressions[16] (equation (3)) where the outcome is the probability to be in work (expressed in percentage points). In the first regression (child younger than 3 years old), I include the dummy variables "on leave" and "on paid leave" which are equal to 1 in the months and in the countries where the woman has the right to them. In the second regression (child 3-5 years old), I include the number of years of paid and protected leave.

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[15] Not all parental leaves are actually expired. This is the case for France, Spain, Austria, and Finland, where parental leaves need to be taken immediately following the childbirth; but, for example, in Italy it can be taken until the age 8 of the child. However, I only study the first transition from non-work to work.

[16] A fractional logit regression has been also used, since it better fits my outcome variable which is restricted between 0 and 1 (Wooldridge, 2002). But betas are difficult to interpret. However, using a fractional logit regression, directions and significance of the estimated effects are confirmed.

I control for age of the child including the dummy "older child" which is equal to 1 when the child is older than 1 and half years in the first regression and older than 4 years old in the second regression. I include the level of education, though not necessary, to observe the relative importance of institutional variables compared to human capital variables.

Finally, in order to take into account different attitudes toward female work and different constraints, I consider childcare availability[17]. The unemployment rate has been also included since the predicted cases are constructed using the country-specific ones, which are quite variable across Europe.

Institutional characteristics seem to be important determinants of the return to work for mothers in Europe, also compared with human capital characteristics. In Table 7, we can see that the possibility to have transfers during the leave decreases the probability of working by 35 percentage points, while the unpaid parental leave does not seem to delay their return to work. Although long interruptions may have negative impact on future wages and career prospects, we see that women from countries with longer parental leave benefit from this break, working more in the post-leave period. Passing form 1 year leave to 2 years leave increases the probability to be at work by 4 percentage points.

 Finally, we observe that the educational level of the woman and the age of the child discriminate better when the child is young. Childcare availability is an important determinant in both regressions, while unemployment becomes significant when the child is older: women not-returning to work after the expiration of the parental leave are then more influenced by labour market conditions.

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[17] Available places in public crèches every 100 children (depending on the age of the child: infants from 4 to 30 months, pre-primary children from 31 months to 50).

	Mothers of children 0-3 years old	Mothers of children 4-5 years old
Tertiary education	29.9*** (7.6)	20.7** (7.9)
Secondary education	12.5*** (3.1)	10.6** (4.1)
On paid leave	-34.6 *** (7.3)	
On protected leave	-1.4 (9.5)	
Years of paid leave		-4.5 (4.2)
Years of protected leave		3.9** (1.7)
Older child	9.1* (4.7)	3.8** (1.4)
Childcare availability	0.2** (0.1)	0.3** (0.1)
Unemployment	-2.5 (1.7)	-3.0** (1.0)
Constant	71.0*** (14.1)	72.7*** (9.7)
Average months at work	61.2%	79.1%
Observations	2 970	2 160

Table 7: estimations from the two simulated samples (standard errors in brackets, adjusted for clustered observations)

8. Conclusions

The aim of this paper is to investigate the role of the extended parental leave in the return to work for mothers of newborn children in Europe. I first analyze the return to work separately by country: women with higher wages return more quickly, while women with higher family incomes return at work at a slower rate. The impact of human capital characteristics seems to be relatively larger in Italy, Spain and Greece while smaller in Austria and Finland, where parental leave arrangements are more generous.

In order to generalize the results, I match women with similar human capital characteristics and fertility history from different countries and, consequently, under different parental leave regulations. Exploiting the variability in policies offered by the EU countries, in terms of length of the leave and payments, I study the influence of statutory leaves on the probability of staying at home with the child during the leave, and on the probability to work in the period of time following the leave. Institutional characteristics seem to be important determinants of the return to work for mothers in Europe, also compared with human capital characteristics. The right to paid leave decreases the probability of being at work by 35 percentage points when the child is between 0 and 3 years old, while 1 year more of leave increases the probability of employment by 4 percentage points when the child 4-5 years old. These results suggest a positive effect of the length of the leave on mothers' employment and a precious opportunity for them for caring for the child when the leave is paid.

However, I do not look at the potential negative effect on women's career and wages. In order to avoid long work interruptions, some countries have introduced the possibility to take the leave on a part-time basis. Further research is needed to study this flexibility in timing and father's take-up.

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APPENDIX

	Finland	UK	Ireland	Belgium	Austria
log wage					
age	0.10	0.98***	0.50***	0.37***	0.96***
age squared	0.01	-0.14***	-0.05***	-0.03***	-0.12***
tertiary	0.15***	0.19***	0.32***	0.33***	0.22***
secondary	0.02*	0.14***	0.05***	0.13***	0.07***
constant	2.02***	0.32***	0.89***	0.99***	0.28***
selection					
age	2.43***	2.03***	2.93***	4.36***	1.40***
age squared	-0.28***	-0.25***	-0.42***	-0.60***	-0.19***
tertiary	0.44***	0.19***	1.01***	1.14***	0.81***
secondary	0.10**	0.06**	0.71***	0.44***	0.43***
married	0.28***	0.36***	0.07*	0.42***	-0.16***
cohabitant	0.23***	0.34***	0.27***	0.55***	0.24***
income	-0.02***	-0.00***	-0.01***	-0.01***	-0.01***
one	-0.34***	-0.99***	-0.54***	-0.31***	-0.11**
more	-0.24***	-1.38***	-1.04***	-0.62***	-0.54***
constant	-4.36***	-2.83***	-4.44***	-7.11***	-1.74***
time dummies	yes	yes	yes	yes	yes
region dummies	yes	yes	yes	yes	yes
rho	-0.90	-0.57	-0.62	0.30	-0.79
sigma	0.31	0.37	0.41	0.24	0.42
lambda	-0.28***	-0.21***	-0.26***	0.07***	-0.33***
observations	10,378	19,289	11,959	11,246	10,737

Table A1: Heckman regressions (*** significant at 1% level, **at 5%, * at 10%). Region and year dummies included but not reported.

	France	Italy	Greece	Spain	Portugal
log wage					
age	0.77***	0.13***	0.98***	0.43***	-0.04
age squared	-0.09***	0.00	-0.11***	-0.03***	-0.02***
tertiary	0.45***	0.41***	0.52***	0.51***	0.93***
secondary	0.12***	0.19***	0.21***	0.21***	0.45***
constant	0.35***	1.36***	-0.73***	0.61***	1.06***
selection					
age	3.72***	2.72***	3.10***	2.92***	3.41***
age squared	-0.47***	-0.35***	-0.40***	-0.38***	-0.49***
tertiary	0.53***	0.84***	0.91***	0.85***	1.07***
secondary	0.42***	0.47***	0.31***	0.21***	0.28***
married	0.10***	-0.01	-0.34***	-0.19***	0.20***
cohabitant	0.16***	0.23***	0.12	0.08*	-0.06
income	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***
one	-0.10**	-0.30***	-0.25***	-0.39***	-0.05
more	-0.66***	-0.53***	-0.44***	-0.69***	-0.46***
constant	-6.80***	-5.11***	-5.55***	-4.96***	-5.57***
time dummies	yes	yes	yes	yes	yes
region dummies	yes	yes	yes	yes	yes
rho	-0.23	-0.36	0.37	-0.10	-0.36
sigma	0.37	0.30	0.35	0.37	0.36
lambda	-0.09***	-0.11***	0.13***	-0.04**	-0.13***
observations	22,542	31,380	17,579	28,635	19,136

Table A2: Heckman regressions (*** significant at 1% level, **at 5%, * at 10%). Region and year dummies included but not reported.

	female participation 1980
	(%)
Finland	70.1
UK	58.3
Ireland	40.9
France	54.4
Belgium	47.0
Austria	52.7
Italy	39.6
Greece	33.0
Spain	32.2
Portugal	54.3

Table A3: female labour market participation in 1980 in the selected European countries