

## Maternity and Labour Market Outcome: Short Term and Long Term Effects

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### Abstract

The provision of maternity leave benefits and their design is the crucial policy instrument a government can use in order to reduce gender differences in the labour market due to fertility. The role of parental leave can be modeled within a standard model of demand and supply of labour and can be seen as a form of subsidized child care. Their existence allows women to take care of the children themselves while keeping links with the labour market. In a life-cycle framework, maternity leave provisions may affect pension entitlements throughout their impact on length of working-careers and wages. Using a unique dataset (SHARELIFE<sup>1</sup>) on individuals' life histories for different European countries, we estimate both short and long time effects of the existence of maternity leave provisions. The overall effect of parental leave on participation in the labour market after childbirth and length of interruption is positive as predicted by theory: maternity leave increases labour market attachment and reduces the length of interruption due to motherhood, in particular for women who otherwise would have left job for good. On the long term, the effect of discontinuous work-careers on pension income is reduced by the positive impact of maternity leave on the labour market participation. However, it still remains the negative impact of maternity leave on pension income due to lower salary prospects of mothers.

**Keywords:** Maternity leave, pension income, labour market participation, instrumental variables.

**JEL Classification:** C26, J13, J26

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## 1 Introduction

The provision of maternity leave benefits and their design is the crucial policy instrument a government can use in order to reduce gender differences in the labour market due to fertility. In most European countries mothers (parents) are entitled to take a period of paid-leave, but these policy provisions have not been always in place and the implementation has varied quite a lot across Europe.

Economic theory suggests that, because of the specialization effect, the responsibility for childcare falls on women hence reducing their labour supply (Becker, 1985), furthermore both parents would be affected by a “home-intensity” effect which makes more valuable the time spent at home (Lundberg and Rose, 2002). As a result mothers are more likely to experience gaps in their career or even leave the labour market for good. The existence of parental leave arrangements affects women’s choices both in terms of labour supply and in terms of fertility, by effectively increasing the net wage, hence producing substitution effects and income effects typically observed in the female labour supply literature.

In this paper we make use of a unique data set (SHARELIFE) on individuals’ life histories for different European countries. The Survey records retrospective information on the entire fertility history and labour supply behaviour over the life-cycle.

The role of parental leave benefits can be modeled within a standard model of demand and supply of labour: they are a form of subsidized child care in which the subsidy is provided to the parents who are providing child-care themselves. *Ceteris paribus*, maternity leave provisions increase labour supply of women making participation in the labour market more attractive because the effective wage is higher (i.e. they do not need to pay for care out of pocket (Baker, Gruber and Milligan, 2008)). However, since maternity benefits increase the labour costs for firms, they could induce a drop in female wages akin to that of a tax (Boeri and van Ours, 2008). Because in Europe parental leave is typically mandated and financed through a nation-wide contribution or taxation system, the negative effects on wages from the demand side are typically negligible.

Within a life-cycle framework, maternity leave benefits not only affect the behaviour of mothers at the intensive margin and extensive margin, but can affect pension entitlements both because they impact on the length of working life and because they might affect wages. Both elements enter a typical social security benefit or pension benefit calculation.

Empirically, the effect of motherhood on women’s labour supply has been a long-standing focus of economic research seeking to explain the rise in the labour force participation of women , together with the decline in fertility rate. As for the long-term effects of maternity, the empirical evidence is very scanty.

The aim of this paper is to fill this gap by analyzing the effect of motherhood on pension income at retirement, given the labour market participation of women at childbirth. SHARELIFE is particularly suitable for this analysis since it contains complete life time histories, including all employment and maternity episodes experienced by European women currently aged 50 and over. Moreover, details on maternity leave provisions and other institutional features of the SHARE countries are collected and provided together with the survey data.

In our analysis we specify maternity leave provisions through their main characteristics: the duration and the amount of the benefit, the latter expressed in terms of “replacement rate” (ratio of maternity benefit over the wage).

We first analyze the effect of the maternity leave provision on the probability of remaining in the labour market during maternity. A woman remains in the labour market if she continues working without interruption or if she enjoys a spell of maternity leave while remaining with the same employer. Women who leave their job and restart to work at some point later in their life or decide not to work anymore are considered as “out of the labour market”. However, labour market participation and fertility are simultaneous choices. In order to deal with this endogeneity

issue we use an instrumental variable approach, where the number of siblings of the mother at the age of ten and the availability of the contraception pill are used as instruments for the number of children.

The analysis shows that the higher the level of the benefit the higher the probability that a woman decides to remain in the labour market.

Theory suggests that maternity benefits reduce women wages. Thus, we expect a negative effect of maternity provision on pension income over and above the positive one induced by the higher labour market participation. Moreover, women with children should have lower pension than other women who had interruptions in their work careers for other reasons. In order to disentangle these effects, we select a sample of women at the age of 25 and we regress (log) pension income on a dummy variable indicating whether the woman dropped out of the labour market for any reason, and on the number of years the woman spent out of the labour force. We include maternity benefit duration and amount when the women in the sample have 25 years of age to account for the effect through wages.

Staying out of the labour force for a long time have a negative impact on pension benefit at retirement. The effect of maternity leave on labour costs is captured by the length of maternity leave: the effect is negative and significant.

The paper is organized as follows. Section 2 describes the theoretical background of our analysis. Section 3 briefly illustrates the characteristics of maternity leave provisions across Europe. Section 4 describes the data and the estimation strategy. Section 5 discusses the empirical results. Finally, section 6 offers some concluding remarks.

## **2 Theoretical model (background)**

The provision of maternity leave benefits is an important part of a research area which stems from the standard female labour supply models to analyze the welfare effect of differential taxation and mandated benefits. Maternity leave benefits are a crucial policy instrument a government can use in order to reduce gender differences due to fertility and child care in labour market participation, labour supply and accumulation of human capital. These policy instruments can in fact increase labour market attachment and also make it more likely to return to the same employer, hence reducing losses in human capital. In this paper we relate this literature to new evidence on long term effects of children on women's labour supply and ultimately social security (pension) outcomes.

In order to provide a basic set up for our empirical results we briefly review the main literature starting from the standard female labour supply model with fertility, then moving on to the literature in the effects of maternal leave benefits and child care benefits.

The standard female labour supply model suggests that, because of the specialization effect, the responsibility for childcare of a newborn baby falls on women (on top of child-bearing), hence the birth of a child is associated with a reduction in mothers' labour supply (Becker, 1973 and 1985). The idea is that women have a comparative advantage in child-care versus market-work, e.g. due to biological reasons or market arrangements. If this is the case, then fertility can also produce a self-reinforcing widening gap in specialization, because wages of men and women will reflect on-the-job specialization of human capital (Becker 1985). With a newly born baby, both parents would be affected by a "home-intensity" effect which makes more valuable the time spent at home (Lundberg and Rose, 2002), but once again this is more likely to affect mothers rather than fathers.

More recently a growing literature has analyzed the labour supply (participation) decision and fertility choices of women in a life-cycle framework by stressing the inter-temporal nature of the two decisions along the lines of the standard inter-temporal labour supply literature reviewed in Heckman and Killingsworth, 1986 (see for example Hotz and Miller 1988; Cigno 1991 and Del

Boca and Sauer, 2009). In this framework not only the labour supply decision and fertility decision are jointly determined, but there is also cross-dependence across times, the presence of unobserved heterogeneity makes it hard to capture this cross-dependence. The idea is that both state-dependence and unobserved heterogeneity are important in carrying out proper estimates of labour supply decisions. The former (state dependence) implies that having a child may not only lower participation in the short run, but also affect future employment because of the loss in human capital. The latter (unobserved heterogeneity) implies that – for example – non employment spells around the time of childbirth will have little effect on subsequent employment probabilities. By focussing the attention on European data Del Boca and Sauer (2009) find that state-dependence is relevant in women’s decisions and this outcome may be largely explained by different institutional settings existing in the different countries.

In our paper the focus is on the effect of parental leave arrangements on long term outcomes: the above literature makes clear that in our analysis we cannot treat the fertility decision of women as “exogenous” even if we do not develop a fully dynamic choice model for both labour supply and fertility.

The relevant literature for our analysis is the one modeling the existence of parental leave (in particular mandated). This has been found to increase the labour supply of women, however, there could be a negative effect on wages (Rhum, 1998). These equilibrium results are due to several features of the problem: in a competitive market mandated parental leave benefits reduce the economic efficiency because they distort choices of the optimal compensation package, unless asymmetries of information play a role. If mandates are group-specific, the group who most benefits from the benefit would also see its wages reduced (the cost is passed on to the worker) as discussed by Gruber (1994), possibly counteracting the hypothetical beneficial effects on the continuity of the labour contract.

Hence, by considering the standard representation of the labour market, parental leave benefits would shift the labour supply curve of mothers to the right and the labour demand curve on the left to take account of the extra costs of providing the benefit (Rhum 1998, Boeri and van Ours, 2008). However in European countries parental leave benefits are typically universal benefits financed by the contributions of the entire workforce or even by taxation at large, hence the negative effect on the demand curve should be greatly reduced at the “with benefit” equilibrium. As a result employment of mothers should rise and wages should fall (to a lower extent) at the new equilibrium, unless countries have in place rules or rigidities that prevents the wage from decreasing, in which case the only effect would be an increase in the equilibrium level of employment.

The impact of parental leave provisions can be analyzed in a framework similar to that of child-care provisions. As pointed out by Blau (2003) there are basically two<sup>2</sup> arguments in favour of government intervention: (i) guaranteeing self-sufficiency, i.e. making it easier for the family and particularly the mother to work and (ii) overcoming market imperfections in order to guarantee good quality care and mitigate the negative externalities emerging from low quality care.

In the case of parental leave the positive effects are on labour market attachment of women and health of the children (Rhum 1998, Baker and Milligan 2005, Baker, Gruber and Milligan 2008, Pronzato 2009), but the essence of the argument is the same as in Blau.

The effects of the introduction of parental leave can be captured by a simple static model (Blau, 2003) where the mother is the only one taking care of the baby, she cannot take care of the child while working and she is assumed to maximize utility of consumption ( $C$ ) and leisure ( $I$ ). Taking care of the child is part of the leisure activities.

$$U = U(C, I)$$

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<sup>2</sup> Blau analyzes the importance of public child-care for low income families, hence he puts forward a third argument based on redistributive issues which we do not address in this paper.

If the wage rate is  $w$ , (prices of consumption expenditures other than on child care are normalized to 1) and  $R$  is non-wage income (e.g. income of the father),  $p$  is the cost per hour (in Euros) of child care,  $h$  is time spent working, then the budget constraint is

$$\begin{aligned} C &= y = R + (w - p)h \\ h + l &= 1 \end{aligned}$$

Where  $y$  is total income net of child-related expenditures. In this model the optimal choice could be at a corner solution where the mother stays at home ( $l=1, h=0, C=R$ ), this is if the reservation wage of the mother is higher than the net market wage ( $w-p$ ). Introducing a public subsidy (i.e. a parental leave benefit in our case) makes the budget line steeper and may induce the mother to work. However the final outcome depends on the substitution and income effect prevailing and, because an increase in the net wage makes the time spent at home more valuable, given that leisure is a normal good, the total income effect may prevail and the woman may actually decide to stay at home as a result.

The effects of statutory parental leave on labour supply are controversial. In particular if one looks at post-birth employment several authors (e.g. Han et al. 2007) find basically no effect in the US context. Baker and Milligan (2005) report instead significantly larger effects for Canada, while Pronzato (2009) finds that results vary across European countries, but typically long periods of job protection increase the probability of returning to work but at the same time statutory paid leave increases the probability of staying at home in the first year after birth.

### 3 Maternity leave provisions across Europe

In order to cope with an ageing population and a reduction in the work-force, many developed countries face the challenge of raising female labor force participation rates in the short-run and raising fertility in the long run (Boeri and Van Ours 2008). Parental leave policies, aimed at providing support for parents to combine work, are now common in most European (and OECD) countries but they are quite a recent feature of the welfare state as they find their origins at the end of the XIX century<sup>3</sup>. At the time, the main concern was the protection of the health of the child and mother. Parental leave policies introduced at the beginning of the XX century were characterized by compulsory pre and post natal leave; but income support and job protection were typically not included (Ruhm 1998).

After a break in the post World War II period, when the main goal of family policies was to restore the position of women to their “proper” roles of mothers and wives (Frank and Lipner 1988), the end of the 1960s were characterized by a new approach: maternity leave policies evolved from a restriction on the employment of women during the period of childbirth to a job-protected time off-work to care for newborns and young children (Ruhm 1998).

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<sup>3</sup> The German Imperial Industrial Code in 1891 and following amendments (1903 and 1911) supplied women with maternity leave period after childbirth and paid time off work in the two weeks before delivery (Ruhm 1998).

**Table 1: Maternity leave provisions across Europe**

Country	Year of introduction	Duration(weeks)	Benefit(%)
Sweden	1970	26-64	48-90
Denmark	1970	14-30	88-100
Germany	1970	14	100
Netherlands	1970	12-16	100
Belgium	1970	14-15	60-77
France	1970	14-16	50-100
Switzerland	1970	10-16	100
Austria	1950	12-16	100
Italy	1970	17-21,5	80
Spain	1970	12-16	75-100
Greece	1970	12-16	50
Poland	1974	16	100
Czech Republic	1961	28	69

Note: Benefit is expressed as a percentage of wages in the manufacturing sector. Maternity leave provisions information are not available for East Germany separately from West Germany. The two numbers for the duration and the benefit columns indicate respectively the lowest and the highest number of weeks and benefit level fixed by law during the years.

In all European countries, with the exception of Austria, maternity leave provisions have been introduced in the seventies. The characteristics of these provisions have not changed much over time: they typically provide income support, at least for a portion of the leave from work, and the replacement rate often exceeds 80 percent (Greece, Poland and Belgium are exception). Maternity leave benefits are financed by a combination of payroll taxes and general government revenues; some countries require direct employer contributions (Ruhm 1998). In some countries, characteristics of early maternity leave legislations still remain in place: compulsory rather than voluntary post-natal leave and required pre-natal leave (such as in Austria, France and Italy) (Ruhm 1998).

In the last decades, for most European countries, the overall trend has been toward longer leave period and more generous benefits.

## 4 Data and methodology

### 4.1. Data

SHARELIFE is the third wave of data collection for SHARE, which focuses on people's life histories. Almost 30,000 men and women across 13 European countries took part in this round of the survey. The respondent are representative for the European population aged 50 and over in Scandinavia (Denmark and Sweden), Central Europe (Austria, France, Germany, Switzerland, Belgium and the Netherlands), the Mediterranean (Spain, Italy and Greece), as well as two transition countries (the Czech Republic and Poland).

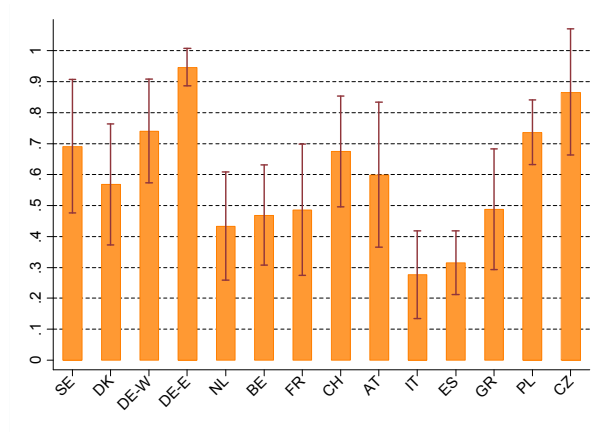
The SHARELIFE questionnaire covers several important areas of respondents' lives, ranging from housing to detailed questions on health and health care. Complete working and maternity histories make these data particularly suitable for our analysis.

SHARELIFE links individual micro data over the respondents' entire life with institutional macro data on the welfare state. Information on the timing of introduction of parental leave legislation and characteristics, such as duration (in weeks) and replacement rate, of maternity benefits are included in our dataset.

SHARELIFE contains information on 14,925 women: 12,554 women had at least one job and, among them, 11,067 had at least one child. About 43% of these women (4,808) are retired, while the majority of them is still working, disabled, unemployed or out of the labour force.

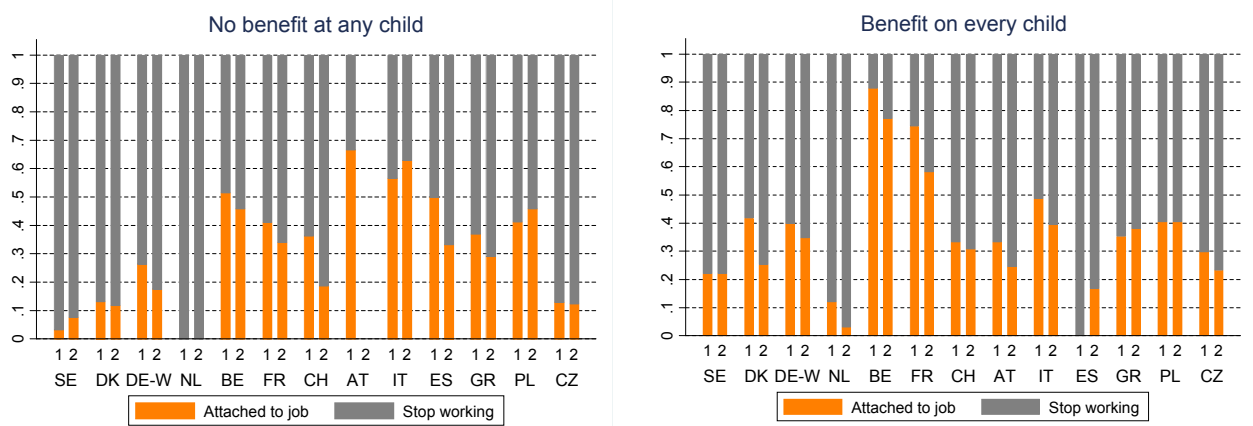
When looking at the subsample of women who were working at the time of motherhood, we are considering a selected group of the population. Figure 1 shows that the labour market participation rate of women at the time of childbirth is indeed very heterogeneous across countries.

**Figure 1:** Fraction of women working at the time of childbearing by country



In some countries, such as Italy and Spain, the fraction of women working at the time of childbirth is very low (about 30%). In most of the other countries the labour market participation rate is above 50% with peaks of 90% for the Czech Republic and East Germany. As mentioned before, the existence of maternity leave provisions at the time of motherhood is likely to influence the labour market participation of women and the pension income at retirement.

**Figure 2:** Job attachment after childbearing conditional on the presence of maternity benefits (women with two children)



Note: In the graphs women with 2 children are considered, for each child the labour market outcome is displayed.

At the time of childbirth, women have to choose if remain in the job market or drop out.

In SHARELIFE, for each maternity episode, it is asked whether the respondent continued working without interruption, stopped temporarily her job (maternity leave) or left the labour market and never work again.

Figure 2 shows country averages of labour market consequences of childbearing conditional on the number of children and on the existence of maternity benefit at the time of childbirth. Individuals “attached to job” are women who decide, after childbirth to take maternity leave within the same job or to continue working without interruption. On the contrary, “stop working” refers to women who decide to exit from the labour market temporarily or forever.

Comparing the labour force attachment in the presence (right panel) and in the absence (left panel) of maternity leave provisions, a high variability between countries arises. The effect of the existence of parental leave for most of countries is an increase in job attachment, as expected. For some countries instead it seems to increase the probability of dropping out of the labour market (see, for example Italy and Spain).

Women who decide to stop working because of childbirth, have to choose for how long stay out of the labour market.

**Figure. 3:** Average length of maternity leave by country

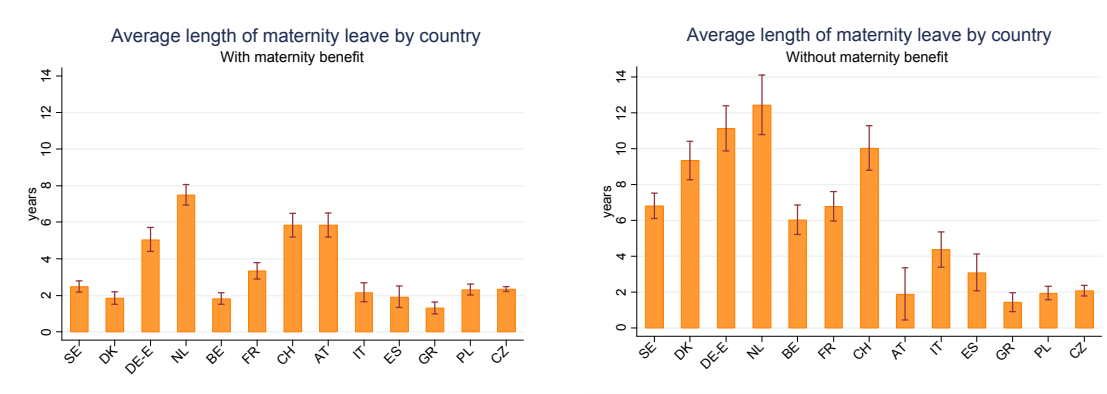
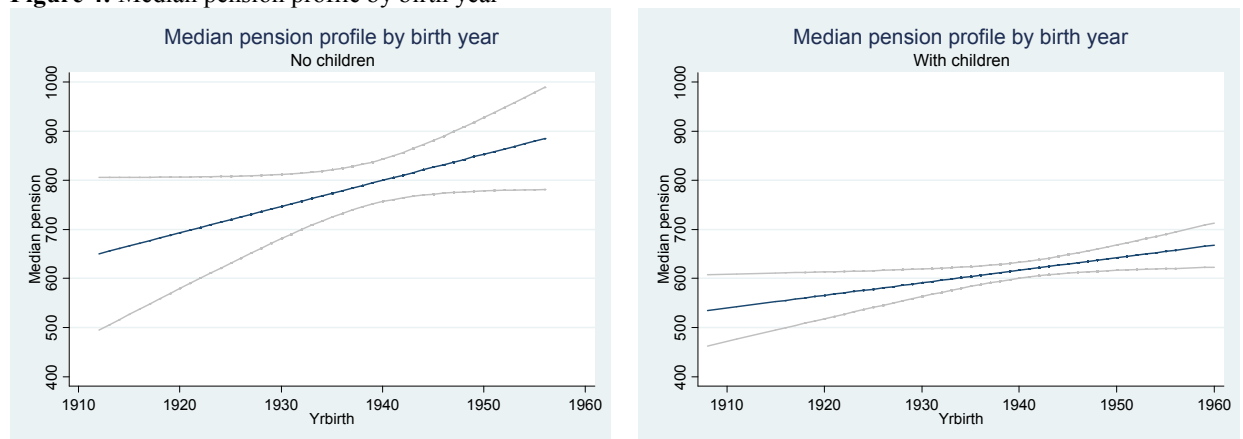


Figure 1 describes the average length of the job interruptions due to childbirth across Europe. For most countries job interruption at the time of childbirth is strongly reduced when there are maternity leave provisions.

**Figure 4:** Median pension profile by birth year





Pension provisions are typically related to working life histories. The effect of employment interruptions on social security (pension) income at retirement could be stronger for mother than for the other women.

Figure 4 shows the median pension profile by birth year for women without (left panel) and with (right panel) children. We look at the first pension benefit received by individuals when retired and in order to obtain comparable amounts between countries and along time, we convert all pension amounts in 2006 PPP-adjusted German Euros (Trevisan et al., 2011). Mother appears to have lower median pension than women without children.

## **4.2. Estimation strategy**

Several authors have addressed the “life-cycle” joint decision of labour supply and fertility: in some cases fully developed dynamic stochastic models have been developed (see for example Del Boca and Sauer, 2009), in other cases a more “reduced form” approach has been followed (e.g. Han et. al 2008; Del Boca, Pronzato and Pasqua (2009)). Much less has been done on the effects of parental leave benefits on economic outcomes (e.g. labour force participation of mothers). Notable exceptions are Rhum (2003), Baker and Milligan, Baker Gruber and Milligan and Pronzato (2009).

In our model we can exploit the unique information contained in the Sharelife data, which displays variation over time for each respondent (retrospectively) and also across countries. One main advantage of such data set is that we can focus on the short term and long term effects of child bearing and maternal leave on labour supply and on pension outcomes respectively. In order to make the problem tractable we take a “reduced form” approach and deal with fertility choices by simply instrumenting the number of children included in the labour supply equation (or pension regression) as explanatory variable.

When focusing on the first outcome (the labour supply decision of the mother), it is worth noticing that the Sharelife survey records relevant events of individuals’ lives along a timeline: there are years in which individuals may have experienced many important events, such as a new job, the birth of a child, changing housing accommodation. In other years no relevant event would be take place, and therefore there would be no record in the survey for that individual in that particular year.

Given this structure, in principle we could think of our data set as a “retrospective panel”, however we cannot trace back all the “year-to-year” changes as if these were proper transitions. Also the birth of a child is a relatively “rare event” in the life of a woman, so that we would find ourselves with many years where all the relevant variables are missing. For these reasons we decided to construct a data-set of “births”, where each record pertains to a child-birth plus all the information available for the mother at the time.

In the second model, when pension outcomes are used as dependent variable, we simply use the information on the retired woman in the cross-sectional format as observed in the year 2006, plus retrospective information on socio-economic conditions and past fertility.

### **4.2.1 Short term effects of maternity**

As explained in section 4 above, we take a reduced form approach and thus we estimate three simultaneous labour supply equations. In particular, we estimate a system of three probit equations for the first, the second and the third maternity episode. For each probit equations the

labour market outcome considered is the probability to have an interruption due childbearing longer than 6 months<sup>4</sup>.

$$\begin{cases} Y_{first} = \beta_{first,1}X + \beta_{first,2}X_{mat} + \beta_{first,3}X_{child} + \varepsilon_1 \\ Y_{second} = \beta_{second,1}X + \beta_{second,2}X_{mat} + \beta_{second,3}X_{child} + \varepsilon_2 \\ Y_{third} = \beta_{third,1}X + \beta_{third,2}X_{mat} + \beta_{third,3}X_{child} + \varepsilon_3 \end{cases}$$

Y is a dummy variable taking value 1 if the interruption due to childbirth is longer than 6 months. X is a set of controlling variables such as years of education, age at childbirth, wage and characteristics of the last job before maternity and country dummies.

The two key variables which capture the role of parental leave provisions are those describing the characteristics of the maternity benefit at the moment of childbirth ( $X_{mat}$ ): (i) the generosity of the benefit, measured in terms of replacement rate of the wage prior to the interruption, and (ii) the length of the benefits measured as the maximum number of months of maternity leave. Finally,  $X_{child}$  is a set of variables explaining the fertility decision. These variables are number of brother and sisters woman had at the age of 10, the sex of the first child and whether the contraceptive pill was available in the country at the moment of childbearing.

In order to control for unobserved heterogeneity, standard errors of both labour supply equations are clustered by individual. Estimation results must therefore being interpreted as conditional on those two sample selections.

#### 4.2.2 Long term effects of maternity

Sharelife is a life-history survey, and therefore contains a detailed description of crucial events in life in different dimensions (economic conditions, health conditions etc..) for a representative sample of elderly women in Europe. Because of this unique feature of the data, we can assess the long term impact of maternity leave on pension income. In particular, we regress (log) pension income of retired women on a number of standard covariates and on a set of variable capturing the life-time working and fertility history of women. The sample we use for this part of the analysis includes all retired women who worked at least once in their life, including those who had no children, observed in the SHARE sample in 2006. Fertility decisions, captured by the total number of children, are instrumented through observables which are specific to the woman, such as the number of brothers and sisters she had at the age of 10. Among the regressors we include cohort dummies and a second set of dummies indicating the decade in which individuals retired, aiming to identify periods of major changes in welfare states. Characteristics of employment refer to the situation women faced in the last (main) job. We include amongst the regressors three variables capturing the period women spend outside the labour market. The first variable measures the length of interruption due to childbearing during a working period; the second variable captures the length of interruption due to childbearing outside the working period; finally, the third variable measures the length of periods outside the labour market due to other reason than maternity, such as unemployment. The characteristics of maternity leave are measured along the life-time of women. More specifically, the institutional length is given by the sum over all the maternities; the benefit (measured as percentage of wage) is given by the weighted average benefit over all maternities<sup>5</sup>.

<sup>4</sup> The estimations have been repeated also for interruption longer than 1 year. Results are qualitatively the same.

<sup>5</sup> For women without children these two institutional variables take value 0.

$$\ln(\text{pension}) = \gamma_1 X + \gamma_2 \text{Length} + \gamma_3 \text{IVNchildren} + \varepsilon$$

## 5. Estimation results

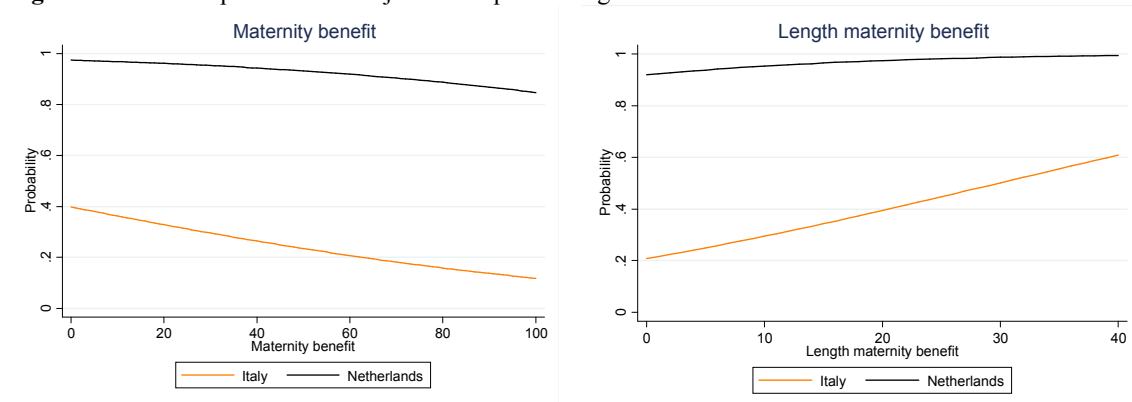
### 5.1. Short term effects

On analyzing the short term effect of maternity leave on labour supply of women, we consider the probability of having an interruption due to childbearing longer than 6 months. Table 2<sup>6</sup> shows the estimation results.

The three columns present the results for the first, the second and the third maternity respectively. The outcome variables is a dummy variables taking value 1 if women has an interruption due to childbearing longer than 6 months, 0 otherwise.

The variables capturing the effect of parental leave are “maternity benefit” (i.e. the maternity benefit’s replacement rate) and “length maternity leave” (i.e. the length of maternity leave in weeks). More generous maternity benefits increases labour market attachment. As expected, the effect of maternity leave provisions is particularly strong for women who otherwise would have left job for good. For these women, as predicted by theory, the parental leave are a form of subsidized child care. It stimulates mothers to take care of children themselves while keeping links with the labour market (Boeri and Van Ours, 2008) .

**Figure 5:** Predicted probabilities of job interruptions longer than 6 months



Note: Comparison between Italian and Dutch fulltime employee in the service sector, with a working partner and mean wage.

To give a description of the effect of the characteristics of maternity leave on the probability of having job interruptions longer than 6 months, figure 6 shows the predicted probabilities for an Italian and a Dutch woman, full time employees in the service sector, with working partner and mean wage. The positive effect of the maternity benefit and the negative effect of the length of maternity leave on job attachment is clear.

The effects of the characteristics of the job show that women working fulltime or in more protected industry (i.e. civil servant) are more willing to remain in the labour force; while women having a partner have higher probability of leave the labour force. The first wage in the job the mother has at the time of childbirth has not effect. This is probably due to the fact, in particular for women who has long tenure in the job at the time of motherhood, the correlation with labour supply at maternity (conditional on industry, type of job and years of education) might be very

<sup>6</sup> See Appendix A.

weak. Interestingly, the variable capturing the availability of contraception pill at the time of childbirth is positive and significant (third child makes an exception). This might be an indicator of willingness to have children for women.

## 5.2. Long term effect

Maternity leave benefits affect pension income through their effect on the length of interruption in the case of childbirth. As we already discussed, they determine the probability and length of career interruptions, thus affecting contribution history. Such an effect is captured by the two regressors *total length in job* and *total length out of job*, which count the number of weeks out of the labour force because of childbearing, during working period or not respectively.

The interesting result is that interruption during the working period has no effect on pension income, while interruption because of childbearing out of the job has negative and significant effect. As an example, one year of interruption due to childbirth reduces by 0.9% pension income. The interruption for other reasons, such as unemployment, has negative and significant effect on pension income. This effect is lower than the one before. One year more on unemployment reduces pension benefit by 0.78%. The fact that interruption on job has no effect is probably due to the existence of imputed contributions which protect future pension income for women during childbearing.

Most of the remaining regressors have the expected effect: fulltime workers and more educated women have higher pension income, while self employed, controlling for the sector of activity, have lower pension income. Cohort of birth has a significant effect as well: women born before 1950 have lower pensions. This is likely to be related to a general increase in the generosity of welfare states and pension systems of whom younger cohorts benefited. Finally, the significance of most country dummies and of dummies accounting for the decade in which women retired, signal the relevance of different features of the pension systems throughout Europe.

## 6. Conclusion

The role of parental leave benefits can be modeled within a standard model of demand and supply of labour: they are a form of subsidized child care that allows women to take care of their children themselves while keeping links with the labour market. *Ceteris paribus*, maternity leave provisions increase labour supply of women making participation in the labour market more attractive because the effective wage is higher (i.e. they do not need to pay for care out of pocket (Baker, Gruber and Milligan, 2008)). However, since maternity benefits increase the labour costs for firms, they could induce a drop in female wages akin to that of a tax (Boeri and van Ours, 2008).

Within a life-cycle framework, maternity leave benefits not only affect the behaviour of mothers at the intensive margin and extensive margin, but can affect pension entitlements both because they impact on the length of working life and because they might affect wages. Both elements enter a typical social security benefit or pension benefit calculation.

Using SHARELIFE data containing, among other information, entire job and maternity lives of respondents we estimate both short and long term effects of maternity leave.

On the short term, we look at the attachment of women to labour market after childbirth, looking at the probability of taking leaves longer than 6 months. The effect of maternity leave on pension income is negative, in particular when benefits are generous and available for long periods, and it is due to lower salary prospects of mother. On the long term maternity leaves when not covered

by imputed benefits has negative effect on pension, and this effect is slightly stronger than the one of interruption due to other reasons.

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## Appendix A: Estimation Results

**Tab. 2:** Estimation results three simultaneous probit equations for first, second and third maternity (coefficients)

	First child		Second child		Third child	
Maternity benefit	-0.008	***	-0.009	***	-0.010	***
	(0.001)		(0.002)		(0.003)	
Lenght maternity leave	0.027	***	0.036	***	-0.023	***
	(0.004)		(0.006)		(0.009)	
Years of education	-0.051	***	-0.040	***	-0.008	
	(0.006)		(0.007)		(0.012)	
Self employment	-0.745	***	-0.812	***	-1.131	***
	(0.135)		(0.151)		(0.275)	
Full time	-0.221	***	-0.861	***	-0.929	***
	(0.052)		(0.062)		(0.107)	
Primary	-0.261	***	-0.515	***	-0.174	
	(0.100)		(0.123)		(0.197)	
Manufacturing	-0.030		-0.109		0.060	
	(0.054)		(0.077)		(0.152)	
Public	-0.022		-0.493	***	-0.073	
	(0.081)		(0.123)		(0.229)	
Partner	0.515	***	0.528	***	0.144	
	(0.089)		(0.190)		(0.287)	
Partnerwork	0.053		-0.006		0.137	
	(0.043)		(0.054)		(0.090)	
Age childbirth	0.006		-0.008		-0.006	
	(0.005)		(0.006)		(0.010)	
Lnwage	0.017		0.016		0.047	*
	(0.016)		(0.019)		(0.028)	
Sweden	0.059		-0.216		0.102	
	(0.108)		(0.156)		(0.254)	
Denmark	-0.741	***	-0.733	***	-0.316	
	(0.095)		(0.126)		(0.216)	
Italy	-1.226	***	-1.171	***	-0.968	***
	(0.109)		(0.143)		(0.252)	
East Germany	-0.350	**	0.176		0.179	
	(0.152)		(0.208)		(0.366)	
Netherlands	0.513	***	0.148		0.471	**
	(0.103)		(0.134)		(0.222)	
Belgium	-1.106	***	-1.174	***	-0.639	***
	(0.095)		(0.124)		(0.207)	

<b>Tab 2 (cont)</b>						
France	-0.980 (0.102)	***	-0.893 (0.132)	***	-0.103 (0.217)	
Switzerland	0.238 (0.108)	**	-0.117 (0.137)		0.106 (0.223)	
Austria	0.416 (0.135)	***	0.415 (0.178)	**	0.769 (0.293)	***
Spain	-1.229 (0.157)	***	-1.290 (0.195)	***	-1.103 (0.304)	***
Greece	-1.038 (0.132)	***	-1.137 (0.168)	***	-0.162 (0.351)	
Czech Republic	-0.059 (0.106)		-0.024 (0.150)		0.611 (0.247)	**
Control pill	0.106 (0.061)	*	0.173 (0.081)	**	0.332 (0.166)	**
Number sibling	-0.008 (0.011)		-0.006 (0.014)		-0.029 (0.021)	
Male first child	0.039 (0.041)		0.049 (0.050)		-0.155 (0.086)	*
<b>N. Observations</b>	4,455		3,164		1,095	

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Clustered standard error in parenthesis. West Germany is used as baseline country. Poland is excluded from the estimation.

**Tab. 3:** Estimation results OLS: logarithm of first pension benefit received

<b>ln(pension)</b>	<b>Coefficient</b>	
Number of children	-0.071 (0.083)	
Total length maternity in job	0.0003 (0.0003)	
Total length maternity out job	-0.00014 (0.000)	*
Total length other reason	-0.00013 (0.000)	**
Years of education	0.016 (0.003)	***
Self employed	-0.159 (0.041)	***
Full time	0.124 (0.027)	***
Public	0.141 (0.024)	***



Lnwage	0.040	***
	(0.009)	
Years with partner	-0.001	
	(0.002)	
Books at age 10	-0.008	
	(0.023)	
Cohort <1920	0.024	
	(0.112)	
Cohort 1920-1929	0.005	
	(0.055)	
Cohort 1930-1939	-0.050	
	(0.043)	
Cohort 1940-1949	0.006	
	(0.038)	
Retired <1970	0.145	
	(0.101)	
Retired 1970-1979	0.073	
	(0.073)	
Retired 1980-1989	0.088	**
	(0.041)	
Retired >2000	-0.028	
	(0.025)	
Sweden	0.245	***
	(0.047)	
Denmark	0.265	***
	(0.052)	
East Germany	-0.089	
	(0.056)	
Netherlands	0.420	***
	(0.067)	
Belgium	0.264	***
	(0.054)	
France	0.272	***
	(0.052)	
Switzerland	0.507	***
	(0.057)	
Austria	0.173	***
	(0.058)	
Italy	-0.063	
	(0.056)	
Spain	0.098	
	(0.079)	
Greece	0.380	***

	(0.073)	
Czech Republic	-0.383	***
	(0.048)	
<hr/>		
N. Observations	5,539	

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Robust standard error in parenthesis.  
West Germany is used as baseline country dummy. Cohort >1950 and retirement  
Dummy for years 1990-99 are used as baseline.