



The time and the transitions back to work in France after maternity

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Abstract

Previous studies have shown that childrearing has a different impact on a mother's professional career, depending, among other reasons, on how much time passed from birth to return to work. In this paper, we use a competing risks model to determine which variables may explain time out of work, as well as the transition back to work for young mothers in France. In our study, mothers can decide to go back to the same employer, change a personal but also a professional employer and/or change labour supply. Our results show that it is mostly the age of the mothers at birth, their pre-birth wages, tenure, firm size as well as the state of the economy as a whole that play a large role in the way young mothers go back to work, if at all. This research highlights the key factors on which causal research should be based in order to advise firms and also policy-makers on how to influence mothers' labour supply behaviors.

Keywords Post-natal Leave · Labour Supply · Competing Risks · Administrative Data

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1 Introduction

The birth of a first child is an important event in a woman's life, not only from a personal but also a professional point of view. For France, Pailhé and Solaz (2007) show that 34.1% of women make a professional transition after the birth of a first child. For several decades, the economic literature has been interested in the impact of the birth of a child and seeks to understand the determinants and causes of these changes. Waldfogel (1997), for example, studied the question of the family wage gap, that is, to understand where the differences in wages between women with children and women without children come from. The family wage gap has been studied in most developed countries (Gangl & Ziefle, 2009, for the United Kingdom, Germany and the United States; Davies & Pierre, 2005, for a European comparison; Meurs et al., 2010 and Wilner, 2016, for France). The main reasons given to explain the family wage gap are a lower accumulation (or depreciation) of human capital, statistical discrimination, presence of unobserved heterogeneity and self-selection of mothers in lower-paying firms.

The effect of birth on wages is not the only interesting aspect to study. Indeed, understanding the determinants of professional transitions made by mothers is a major issue for employers and public decision-makers. From the employer's point of view, anticipating the length of parental leave and understanding the determinants of young mothers' choices can help companies adopt internal policies to minimize replacement costs for absent women workers and increase women's devotion to their firm. From the public policy point of view, understanding mothers' behaviors makes it possible to adapt and propose policies concerning, in particular, the provision of childcare or the duration of parental leave, which minimizes economic costs for society. More generally, it is interesting to understand when and how mothers are coming back to work after giving birth. This paper attempts to answer this question in the case of France, by estimating a competing risks model as in Arntz et al. (2017).

Literature in this area has often used reforms of maternity (or parental) leave policies to study the labour supply behavior of women after birth. For example, Lalive & Zweimüller (2009) study the impact of two maternity leave reforms in Austria on future fertility decisions and on the career of mothers. The first reform, in 1990, was an extension of the job protection period, which, before the reform ended with the first birthday of the first child, and after the reform with the first birthday of the second child. The second reform, in 1996, was a six months reduction of the job protection period. The first reform increased fertility and return to work was delayed even after the job protection period had ended. The second reform shortened the pacing between the first and the second birth, but without major impact on total fertility. In a subsequent article, Lalive et al. (2014) study the impact of a third reform which was implemented in the year 2000. This reform increased the maximum duration of cash benefits the parents were entitled to for having the first child. This reform increased the time mothers spent at home before returning to work. Schönberg and Ludsteck (2014) show that successive expansions of maternity leave coverage in Germany has reduced the employment rate of mothers in the short term. For the case of Japan, Asai (2015), shows that the

increase in cash benefits given during parental leave has only a small effect on working behavior of Japanese women.

Another branch of literature has focused on availability of child care on labour force participation. A poorly developed public child care system may encourage or force mothers not to return to work in the years following birth. For example, Mahringer & Zulehner (2015) use, for the Austrian case, the various local regulations to estimate the impact of child-care costs on the participation of mothers in the labour market. Despite the negative effect of the cost of childcare on employment, the authors show that increasing the availability of child-care can have the same effect on employment as reducing costs. Finseraas et al. (2017) also show that, with Norwegian data, free childcare increase the extensive labor supply of low earnings mothers. Morrissey (2017) carries out a detailed literature review of papers studying the link between the availability of childcare, childcare costs and the parental participation to the labour market. He shows a significant heterogeneity in the results of different studies based on the American case or other developed countries. Part of this heterogeneity could be due to the specific context of each country in terms of public policies or culture. For this reason, country-specific studies are needed to understand child care issues in different national contexts.

Other articles have studied the determinants of mothers' transitions from employment to non-employment. For example, Gustafsson et al. (1996) make a comparative study between Germany, Sweden and the United Kingdom. They show that a higher accumulation of human capital increases the likelihood of a mother in West Germany returning to employment and increases the speed at which the mother returns to employment. In their study this variable does not seem to have any effect for the Swedish case. Ondrich et al. (2003) study German women and show that mothers with a high level of education and women with a lot of experience are more likely to return to work. They show that firm size before birth does not seem to play a role. Gutiérrez-Domenèch (2005) carries out a comparative study on transition to non-employment for Belgium, West Germany, Italy, Spain and Sweden. The level of education increases the probability of being employed after the birth of a first child, except in Sweden where the variable has no effect, the latter result confirming the work of Gustafsson et al. (1996). On the other hand, Gutiérrez-Domenèch (2005) finds that professional experience plays a positive role in the probability of being employed after birth for all countries.

Studies based on French data have mainly focused on the family wage gap (Davies and Pierre, 2005; Meurs et al., 2010; Wilner, 2016) or on the impact of reform on parental leave (Joseph et al., 2013; Lequien, 2012; Piketty, 2005). Only a few articles were interested in transitions made by mothers after birth. For example, Pailhé & Solaz (2007) study the impact of a birth on the probability, for mothers, to invest less in the labour market. The authors show that the higher the birth order, the greater the likelihood of reducing working hours. Age at birth reduces the probability to invest less in the labour market and the opposite effect is observed with the level of education. Similarly, Domingo & Marc (2012), analyze the professional trajectories of mothers with at least two children in France. In particular, they study the effects of a break or a reduction of work on the probability of working full-time or to be in involuntary part-time work 12 years after the birth of the last child. They show the importance of personal characteristics and the conditions of the last job on the

occupational situation of the mothers after a birth. Thus, being young at the time of birth, having high level of education or not taking parental leave will increase the probability of being employed 12 years after the last child was born. Despite these different works, there are no studies on French data, as far as we know, which have been concerned with the determinants of transitions achieved by mothers after birth, including a broad set of possible transitions and studying the probabilities of return in continuous time.

The papers from which we draw the most inspiration are Fitzenberger et al. (2016) and Arntz et al. (2017), which focus on Germany. Fitzenberger et al. (2016) use a dataset from a large German company to study the return to job of women after giving birth to the first child. Their data, covering the years from 2000 to 2008, show that return-to-job after the first birth is a source of high uncertainty for firms. Indeed, an important part of the first-time mothers do not return to work after the parental leave. This is less the case for women who are more involved in their careers. This paper offers a very interesting and detailed analysis, however the conclusions are drawn from female workers of a single firm. Therefore results from Fitzenberger et al. (2016) should be taken with caution. Arntz et al. (2017) use German data from 1985–2005, and focus on the link between labour market conditions, legislation, the length of maternity duration and the return to work. The authors show that there have been important changes in the behaviour of women during the last three decades. Women are more likely to give birth to the second child or to work again for the same employer, but part time, than getting back to work full time or dropping completely out of the labour market. It seems that the maternity leave legislation plays a role in this pattern. The authors show that the longer the job protection period, the longer the maternity leave taken by the mothers. This fact leads to important costs for the employer and for the economy as a whole. However, these findings might not be generalizable to France. Fertility and labour supply decisions of French women are quite different from their German counterparts. For example, total fertility rate is 1.60 in Germany while it is 1.92 for France in 2016. The percentage of part time working women aged 20 to 49 is 43.9% for Germany, against 29.1% for France in 2017.¹

Using a rich administrative dataset, we study young mothers' decisions; how long mothers decide to stay in post-natal leave after the first birth, and how mothers come back to work. Different mothers, with different careers and working in different environments will take different decisions as to how long their break will be, and how they will come back to work. We use, as in Arntz et al. (2017), a competing risks model to study this question for France. After estimating the model, we discuss which variables affect how mothers return to work. The paper is constructed as follows: in Section 2 we present France's institutional setting to give the reader a better understanding of the particularities of France, Section 3 presents the studied transitions, Section 4 describes the data, Section 5 explains the methodology employed and Section 6 presents and discusses the results. We conclude in Section 7.

¹ Source: Eurostat (downloaded: 11/09/2018).

2 Institutional setting

2.1 Statutory maternity leave

In France, since 1980, the statutory maternity leave is decomposed into two components: the statutory pre-maternity leave (6 weeks for the first child) and the statutory post-maternity leave (10 weeks for the first child). During this leave, mothers receive a compensation if they have contributed to a social security scheme some time before the leave and take a minimum of 8 weeks of maternity leave. The compensation is equal to the average income of the last three months before maternity leave with a daily ceiling of 84.90€ (in 2017). During the statutory maternity leave, a woman cannot be fired from her job. After the statutory maternity leave, the employer has to give the mother her previous job or a similar job with at least the same wage. The statutory maternity leave is considered as a period of effective service, thus the mother enjoys the same wage increase as employees of the firm with the same occupation.

2.2 Parental leave

After the end of the statutory maternity leave, a mother (or father) can reduce her working hours to take care of her child until the child's third birthday, this is the parental leave.² Only persons who have at least one year of service in a company at the date of birth of the child are eligible for this leave. The Parental leave can not be refused by the employer and protects the job of the parent who takes it, but it is not paid by the employer. However, the state proposes to remunerate parental leave but in proportions that have evolved over time.

We present below the evolution of the public care of the parental leave:

- Before 2004, each parent of only one child could take parental leave up to 3 years but the parental leave was paid neither by the employer or by the state.
- Between 2004 and 2015, each parent of only one child could take parental leave up to 3 years as before, but in this period, 6 months of the parental leave (to be divided between the parents) could be paid by the state, which was called the *Complément de Libre Choix d'Activité (CLCA)*. To benefit from the *CLCA* it was necessary to respect certain conditions. It was required to have contributed for 8 quarters to the public pension system in the last 2 years. The amount of the benefits, per month, in January 2017, was 390.92€ if the parent stops working, 252.71€ for the half-time work or less, and 145.78€ if the parent works for 50% to 80% of the full time work. Before April 2014, depending on the household income, these amounts could have been increased by about 185€.
- Since 2015, as before, each parent of only one child can take parental leave up to 3 years but another benefit was introduced and replaced the *CLCA*. The new policy called *Prestation partagée d'éducation de l'enfant (PreParE)* remunerates the parental leave for 1 year (max 6 months per parent). The amounts and conditions, for parents of a first child, are the same as for the *CLCA*.

² This is the so-called *congé parental d'éducation* in French.

The *PreParE*, like the *Elterngeld* in Germany, was set up to encourage fathers to take parental leave. Indeed, the allowance is limited to 6 months per parent, so to benefit for 1 year, the mother and father must take 6 months of paid parental leave.

2.3 Childcare

If the parents want to go back to work before the child is three years old, many opportunities for childcare exist in France. Parents can also employ childminders. According to the DREES, there are, on average in each department of metropolitan France, 64.8 places in preschool childcare facilities (nurseries, licensed childminder...) per 100 children under 3 years old in 2015.³ The French family allowance funds support some of the expenses related to childcare (for parents who are working or searching for a job). Two major cases occur:

1. If the child goes to institutions hosting young children, such as nurseries:
 - The price of childcare is computed based on the household's resources.
 - Parents get a tax credit for their expenses for childcare.
2. If the child is cared for by a licensed childminder or by a childminder at the parent's home:⁴
 - In the case of the employment of a licensed childminder, parents are exempt of all social security contributions, and in the case of employment of a non-licensed childminder, of 50% of all social security contributions.
 - More benefits to help parents finance the childminder (*Allocation Garde d'Enfant à Domicile (AGED)* and *Aide à l'emploi d'une assistante maternelle agréée (AFEAMA)* before 2004 and *Complément de libre choix du Mode de Garde (CMG)* afterwards).
 - Tax credit for childcare expenses (after taking into account the potential benefits for childcare).

These different policies allow parents, especially mothers, to reconcile family and working life. Mothers are able to choose either to come back to their previous employer, or change employers, work full time or part time, or decide to have a long career break and take care of their child. These possibilities are of course also available to fathers, but for reasons that are not discussed in this paper, it is mostly mothers that are confronted to this choice. Our study focuses on the time a mother is not effectively working after giving birth, which is why it should be noted henceforth that, when we refer to *post-natal leave*, we mean the time out of work, from giving birth to going back to work. It is not the maternity leave in the legal sense. Of course this encompasses the statutory post-maternity leave, which mothers are legally entitled to, but can also be longer, as some mothers may decide to stay at home until their child goes to school (parental leave), for instance.

³ DRESS: Research Division of the French Ministry of Social Affairs and Health.

⁴ A licensed childminder is a professional who cares for children at home, but unlike the nanny, is certified by the state.

2.4 International comparisons

By comparing France with other European countries with different social protection systems, we note that France differs by certain characteristics (Table 1). The total fertility rate is high, especially in comparison with Germany (1.60) or Spain (1.34). The employment rate of women between the ages of 20 and 49 without children is comparable to that of Sweden or Spain but lower than Germany or the United Kingdom. However, in the latter two countries, the drop in the employment rate when the child is young is very important (−16 percentage points in Germany). Similarly, the proportion of part-time women explodes in Germany and the United Kingdom, but increases relatively little in France. The proportion of children under 3 years in formal care is close to 50% in France and Sweden, which is much higher than in the other countries considered. Although closer to Sweden in terms of fertility and employment behavior, the Swedish system is more generous regarding maternity/parental leave. This corresponds to 140–440 days for the mother (according to the sharing that is done between father and mother) with 80% of the salary in Sweden against 16 weeks with 100% of the salary in France followed by 6 months of parental leave for each parent remunerated at a flat rate (less than 400 euros for full-time parental leave). These institutional differences as well as differences in behavior or culture show that it is necessary not to draw conclusions for country B when studying country A. The present study focuses on France and the conclusions that are made concern only the French case. However, the variables that play a role in the labour supply behavior of young mothers may be the same in different countries, although the range of effects may be country-specific.

3 Framework

As discussed in the previous section, women, in France, have some flexibility on the duration of post-natal leave. It may be composed only of the statutory post-maternity leave or extended by a parental leave. For women who apply for parental leave, they have the choice between full-time parental leave or part-time parental leave (at least 16 h of work per week). The employer can not refuse full-time or part-time parental leave once the qualifying conditions are met.⁵ It is also possible for women for whom the working conditions are no longer suitable with family life, to change employers, in this case the parental leave is not applicable but they can negotiate with the new employer a part-time position or flexible hours of work. Given these different possibilities for returning to work, we decided to consider the following risks (% of the final sample between brackets, see Section 4 for more details):

- A mother may return to the same employer, full time (58.4%).
- A mother may return to the same employer, part time (13.5%).
- A mother may return to another employer, full time (11.8%).

⁵ We focus in this study on women who are eligible for parental leave.

Table 1 Fertility, employment rate and maternity leave in Europe

Total fertility rate	Employment rate 20-49 y.o.0 children	Employment rate 20-49 y.o.1 child <6 y.o.	Part time rate 20-49 y.o.0 children	Part time rate 20-49 y.o.1 child <6 y.o.	Child <3 y.o.in formal care arrangement (%)	Maternity leave duration (1st child)	Replacement rate of maternity leave	Parental leave duration (mother part) (1st child)	Replacement rate of parental leave	
Sweden	76.2	78.6	28.5	35.7	51.0	140-440 days ^a	80%	Included with maternity leave		
Germany	84.8	69.0	24.7	55.8	32.6	14 weeks	100%	12 months+(2 father)	67%	
France	74.0	70.5	21.1	27.6	48.9	16 weeks	100%	6 months (+6 father)	Flat rate	
Spain	71.9	67.7	20.8	26.0	39.3	16 weeks	100%			
United Kingdom	84.0	77.3	17.5	47.2	28.5	52 weeks	90% for 6 weeks and flat rate for 33 weeks			
Year	2016	2017	2017	2017	2016	2018	2018	2018	2018	2018

Source: Eurostat (11/09/2018) and Mutual Information System on Social Protection (MISSOC) (01/01/2018)

^aBetween 140 and 440 days depending on the sharing between the two parents

- A mother may return to another employer, part time (4.1%).⁶
- A mother has a second child without going back to work (0.6%).

We will focus on the determinants of the transitions listed above with the exception of the risk of “having a second child” which concerns too few women in our sample. More specifically, we will study which characteristics of firms (size, sector, remuneration offered...) and which personal characteristics (age, place of residence, occupational group, etc.) have a positive or negative influence on the speed and manner a young mother returns to work after the first birth. To answer these questions it is necessary to have detailed socio-demographic and professional data on a large sample of individuals. We decided to use administrative data called DADS-EDP.

4 Data and descriptive statistics

4.1 The DADS-EDP panel

The data used in this paper resulted from the merger of the DADS panel and the EDP dataset and is called “DADS-EDP”.⁷ The DADS-EDP panel covers the period from 1976 to 2010. These data are provided by the French national statistical institute (INSEE) and give information on a sample of the French population. The sample is composed of people born between the 1st and the 4th of October (only those born during an even year for the years 1967 to 2002 are included in the DADS-EDP panel). People born abroad, who never worked, who are self-employed or who work as civil servants of national public services are excluded from the data. Since 1967, the sample has gradually been enriched. Since 1991 and 1992, civil servants working in public institutions of an industrial and commercial nature are included in the panel as well as publicly-employed hospital staff (since 1984) and civil servants of territorial communities (since 1988). Unemployment benefit recipients were also included in the panel from 2002 and agricultural workers from 2003. Residents of overseas territories were included from 2004. The merged DADS-EDP data provides information on socio-demographic variables such as date of birth, date of wedding, place of residence, level of education, number and date of birth of children. Data on wages, hours worked, type of employment contract, the starting and closing dates of the period of paid work are available for each individual and for each year of the panel. We also know the size, the sector and the location of the firm the person is working in. This merged dataset, provided as is, unfortunately does not contain every variable from either the DADS nor the EDP.

⁶ We define part-time work using the variable *CE* of DADS-EDP: 1: Full time and 2: Part time.

⁷ *Déclaration Annuelle des Données Sociales* or Annual Declaration of Social Data, *Échantillon Démographique Permanent*. or Permanent Demographic Sample.

4.2 Variables

Our variables of interest, transition and duration of post-natal leave, are not available as such in the data, so we had to compute them. The raw data is in a spell format (one line for each job), so it is possible to compute the variables quite easily, for most cases. For the variable *transition*, we used information about the employer and the working time in the civil year before birth and civil year after birth. We can classify women according to whether they have made a change of employer and/or working time after birth. Calculating the “duration of post-natal leave” required a more complex procedure. Here are the steps to create this variable:

1. The start date and the end date of paid work are observed, as well as the date of the birth of the child. We could therefore deduce the time that elapsed between the date of the birth of the child and the date of return to work.
2. In the data, some women never exit their jobs even if they give birth. These women might still be considered in the company’s payroll software but left already, for example. For these women, we approximate the duration of post-natal leave using the reduction in hours worked between the civil year before the birth and the period around the birth (to do this we use the hours of work and the duration of pay variables). To control the results, or in the case of missing information on duration of pay, we divided the wage earned in the period around the birth by the hourly wage the year before to deduce the reduction of the working time during this period.⁸ We converted this reduction of working time around the birth into days and we subtracted 42 days (the legal duration of the pre-maternity leave) as we are only interested in the duration of post-natal leave.
3. Finally, there are some women for whom there are no exits from their job at the date of birth of the child (as in case 2) but for whom an exit takes place during the statutory maternity leave (70 days). For these women we computed the post-natal leave duration using the method described in point 2 (for the period surrounding the birth) to which we added the number of days during which the mother is not paid by a firm after the end of the legal post-maternity leave.

It is possible to have measurement errors of post-natal leave duration because some transitions to unobserved states may occur. For example, a mother may go to live and work abroad after her maternity leave. In this case, she will no longer be registered in the DADS-EDP panel, she will be, according to our calculations, always on post-natal leave when in fact she is working abroad. These measurement errors are inherent in administrative data that collect very specific data. There is a risk of overestimation of the duration of post-natal leave and this can have an impact on the results of the study. With the increase in the use of administrative data in recent years, statistical methods have emerged to correct these possible measurement errors. For example, Honoré & Lleras-Muney (2006), Lee & Wilke (2009) and Arntz et al. (2014) use bounds analysis into the duration model framework to account for the uncertainty associated with unobserved true duration. Not taking these measurement errors into account can lead to approximate results.

⁸ We suppose that hourly wages do not evolve between the civil year before birth and the year of the birth.

In our case, the main unobserved transitions may be working for the state public sector, going to work abroad, being unemployed, in illness or die. We measured here a kind of upper bound of the true length. However, women who go abroad, die or become civil servants, have a limited probability of returning to our sample (for example, civil servants have a job for life in France). So we should have infinite periods of postnatal leave for these women. However, only 11.5% of mothers in our sample were censored (i.e. with infinite duration of post-natal leave) and more than 80% of them had a child in 2010, the last year of the sample. Thus, a large majority of mothers without observed exit in our sample are therefore very likely to be still on post-natal leave and unlikely to have gone to work for the public sector or abroad. In addition, for women for whom we observe a return in the DASD-EDP panel, the post-natal leave seems to be quite short, thus they are also unlikely to have been employed in the state public sector or abroad in the short period of time separating the statutory maternity leave and the date of return to work recorded in the panel. As explained in the next section, our sample is constituted of mothers that were quite well integrated into the labour market, and that they have the right to return to their previous job if they wish so, which reduces the risk of an unemployment period arriving immediately after the maternity leave. Finally, from a practical point of view, it is difficult to form uniform upper and lower bounds in our study, as in Arntz et al. (2014), because some of the data on post-natal leave are calculated from the dates reported in the database (accurate measurement) while other are estimated from the reduction of working time or wage (less accurate measurement). As the measure of the post-natal leave period is difficult and that it is possible that noises exist, our aim in this paper is to highlight the relationships that exist between our variables without trying to accurately estimate the magnitudes of the effects of covariate on return to work. For all of these reasons we have decided not to apply the bounds analysis method and to consider women for whom no return is observed as censored observations (consider that these women are still in post-natal leave) but we keep in mind that a bias on the magnitude of the effects can potentially be present.

Now that our variables of interest are defined, let us look at the explanatory variables we can use to explain mothers' behaviours. We considered a rich set of control variables; women's age, tenure until the birth of their child, as well as their pre-birth wage. We divided the annual wage the year before birth into three classes (less than 20 000€, between 20 000€ and 30 000 € and more than 30 000€). We added a dummy equal to 1 if the mother has already worked part-time in the past. Occupation is also included, again as a categorical variable divided into four levels: executives, intermediate occupations, clerks and blue-collar workers. The educational variable has a lot of missing values, so we chose not to use it. We also added another categorical variable for the sector the mother worked in before giving birth, divided into four levels: industry, construction, trade and services.

Another variable that might influence women's decisions is the size of the firms where they worked before giving birth. We considered firms with less than 11 employees, with less than 50 but more than 10 and firms with more than 49. We defined these three classes to take French legislation into account. Indeed, firms with more than 10 employees have to have staff representatives, and firms with more than 50 employees must set up an employee representative committee. We further added a binary variable to take the policy change of parental leave of 2004 into account. This

dummy equals to 1 if the birth took place in 2004 or later, and 0 otherwise. A marriage dummy is introduced in order to control for the family situation (we have access only to the information of the marriage, unmarried women living with a partner are not indicated). Finally, we created a variable measuring the distance between the city of work and the city of residence for each women, the year before birth. To do this, we used the geographical coordinates provided by INSEE for each municipality. This will allow us to test the hypothesis that women who have a long commute will be more inclined to reduce their labour supply or to change to an employer that might be closer to their place of residence.⁹

Macroeconomic variables included are the national GDP growth rate¹⁰ and the unemployment rate at the French department level¹¹ which control for the general state of the economy and the labour market. However, we do not have information on the availability of childcare facilities at the local level neither on the level of subsidies for which each family is eligible. These lack of data might not be an issue in the specific case of France, since, as explained in Section 2, childcare facilities are very common in France, and according to Givord & Marbot (2015), childcare subsidies seem to have a limited effect on the labour supply of mothers in France.

4.3 Descriptive statistics

Our sample is restricted to women in metropolitan France who gave a first birth between 1995 and 2010 and who worked full time for at least 12 months at the same firm during the year before giving birth.¹² The second condition makes it possible to have a relatively homogeneous pre-birth sample of women in terms of attachment to the labour market and only covers mothers who can access parental leave. We removed public servants because accounting for hours and wages does not allow for an adequate deduction of exit time from the labour market.¹³ We suppressed observations where data the year before birth seemed to be wrong (hourly wages less than 6€ and annual hours less than 1600, as we focus only on women working full time the year before birth), which amounts to 1210 observations. We removed women for whom the data needed for the study were missing such as the sector, occupational categories or distance from home to work (114 observations). We further removed women who gave birth to a child during the 42 first days of a year (768 observations) because they may have started their pre-maternity leave in the

⁹ The distance we computed is the great circle distance, and it might actually be a bad proxy or commuting time. Indeed, it is entirely possible to live close to one's working place and take very long to get there because of lack of public transportation or too much traffic. However, with this data, this is the best proxy we could come up with.

¹⁰ Source: World Bank (downloaded: 14/06/2016).

¹¹ Source: INSEE (downloaded: 31/10/2016).

¹² Since individuals living in overseas departments are considered only since 2004, only part of our analysis period, we have decided not to include them in the analysis. They represent in the period 2004-2010 only 265 observations.

¹³ In our data, we observe that civil servants often have a number of hours of work or wages automatically reported, this mean that we do not observe a reduction in working time or/in wages in the year of the child's birth. We decided to remove these women from the sample rather than assigning them the duration of the statutory maternity leave, as there is no way we could check this.

Table 2 Age at which women have their first child

	Min	1st quartile	Median	Mean	3rd quartile	Max
Age	19.0	27.0	29.0	29.7	32.0	46.0

Source: DADS-EDP

civil year preceding the birth. They may therefore have a reduction in earnings and hours worked in the civil year preceding the birth, which may impact the approximation of post-natal leave. Finally, we suppressed women who had a post-natal leave duration of 0 day (1205 women). We think that this situation can occur in companies that have implemented the full maintenance of the salary for mothers on maternity leave, preventing us from correctly approximating the post-natal leave because we do not observe a reduction in working time or salary the year of birth.¹⁴ The final sample is thus composed of 8371 women.¹⁵

Table 2 presents the age of mothers at the birth of their first child. The average age of childbearing is 29.7. In France, Volant (2017) shows that the average age varied over the period from 1989 to 2010 between 25.9 and 28 years and nearly 42% of the children born (in rank 1, 2 or 3) in 2010 have a mother aged between 27 to 32. In our sample this number is 50%. This difference can be explained by the presence in our sample of women who are relatively well integrated into the labour market. We have women who have been in full-time employment for at least 1 year in the same firm. These characteristics may not be relevant to younger mothers, which move our age distribution to the right.

Figure 1 shows the distribution of the duration of the post-natal leave in the sample (without censored mothers), i.e. the number of days between the birth of the child and the return to work. Our definition of post-natal leave therefore also includes possible parental leave. The distribution's mode is located around 85 days, which is slightly longer than the statutory duration of post-maternity leave in France (70 days, see Section 2). There is also a small bump around the first birthday of the child. However after the child's first birthday, the number of women still in post-natal leave (in full time) decreases quickly.

Table 3 shows some characteristics of the different transitions on which our study will focus (only for completed spells). The top row shows the proportion of mothers who transitioned to the different states. For instance, 58.4% of the women in the sample returned back to full time work for their previous employer, while around 16% changed their employers. Almost 18% returned to part time work. In all, around 70% of young mothers returned to their previous employer. The total of the first row is not 100% because 11.5% of mothers in our sample are censored. What is striking is that post-natal leave duration, tenure and experience have very large standard deviations, which suggest very wide distributions for these variables, as shown in Fig. 2. The average duration of postnatal leave is statistically different in each

¹⁴ We did not find any particular characteristics associated with the wrong approximation of post-natal leave (post-natal leave of 0 day). This seems to be independent of the sector of the firm or occupational categories.

¹⁵ As the panel was enriched in 2003, we have between 150 and 400 individuals between 1995 and 2002 and between 680 and 850 after that date.

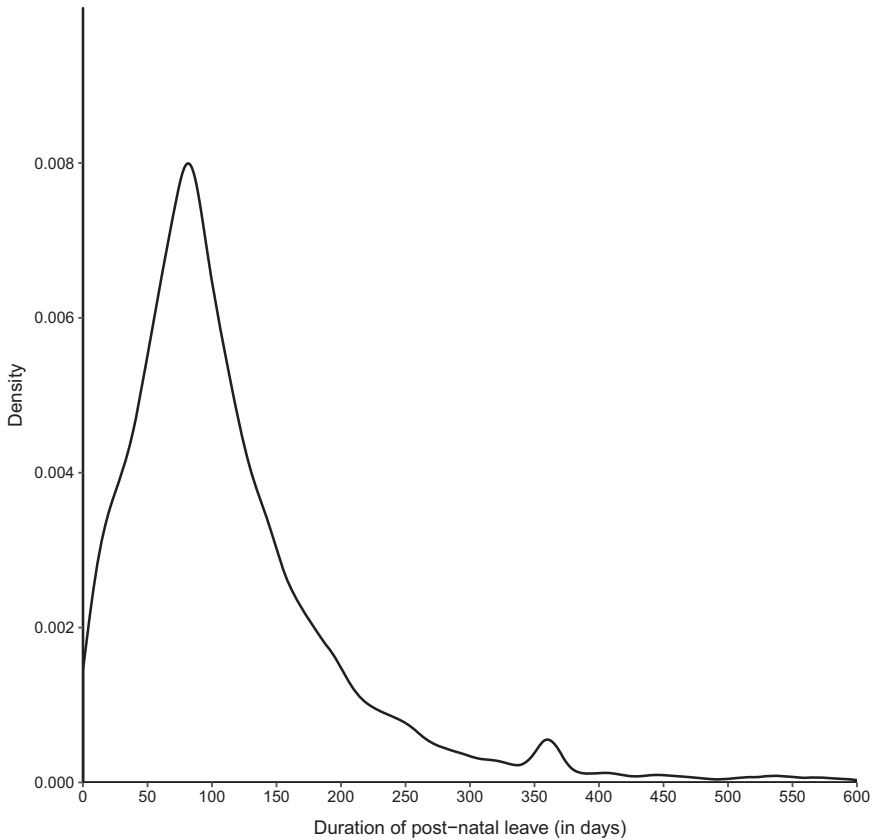


Fig. 1 Distribution of the duration of completed post-natal leave, Source: DADS-EDP

transitions. It appears that the duration of post-natal leave is lower when women decide to return to the same employer. It is also these women who have more important professional experiences and tenure. Age of mothers is, for all risks, around 29–30. Mothers who return back to full time work for the same employer are those that have the highest average wage the year before the birth. The share of women living in the capital region (*Île de France*) is higher among women who change employers after birth (for a full time job), certainly reflecting a greater job mobility in this region. 60.1% of the mothers who return back to full time work for the same employer had their child in or after 2004 against 49.3% for those who return to part-time work at another employer. Since this reform, women seem to return back more often for the same employer.¹⁶ For each transitions, less than 10% of mothers are blue collar worker. The proportion of clerks is more important among mothers who return back to part-time work at another employer. Very few mothers work in the construction sector, but an important part of mothers work in services sector. The proportion of mothers in the trade sector is higher among mothers who came back in part-time at another employer than among women who return back in full time at the

¹⁶ 2004 is the year were the CLCA was introduced, as explained in Section 2.

Table 3 Mother's characteristics by observed transition

	Full time same employer	Full time another employer	Part time same employer	Part time another employer
Proportion	58.4	11.8	13.5	4.1
Post-natal leave (in days)	106.9 ^{★Ⓞ} (95.8)	166.6 [Ⓞ] (198.8)	132.0 ^{★*} (112.3)	225.1 ^{★*} (322.1)
Age	29.7 ^{★Ⓞ} (4.0)	29.0 [Ⓞ] (3.9)	30.6 ^{★*} (4.3)	29.4 [Ⓞ] (4.3)
Tenure (days)	1155.5 ^{★Ⓞ} (811.4)	976.7 [Ⓞ] (730.3)	1218.2 ^{★*} (879.1)	1030.9 [Ⓞ] (770.6)
Experience (days)	2064.3 ^{★Ⓞ} (1205.9)	1898.5 [Ⓞ] (1162.1)	2196.2 ^{★*} (1322.2)	1969.1 [Ⓞ] (1286.4)
Annual wage t-1	20121.4 ^{★Ⓞ} (8411.7)	19494.9 [Ⓞ] (8158.2)	19516.7 [Ⓞ] (8037.9)	17669.2 ^{★*} (6026.7)
Part-time in the past(%)	59.7	61.8	61.7	61.4
Married (%)	39.9	39.3	37.8	36.3
Ile de France (%)	26.5 [★]	32.0 [Ⓞ]	26.1 [★]	27.7
Post-reform CLCA	60.1 [★]	53.4 [Ⓞ]	59.4 [★]	49.3 ^{★Ⓞ}
<i>Occupation (%)</i>				
Executive	12.1	11.4	11.8	11.2
Intermediate occupation	33.9 [Ⓞ]	33.7 [Ⓞ]	31.1 [Ⓞ]	24.8 ^{★Ⓞ}
Clerk	45.6 [Ⓞ]	46.3 [Ⓞ]	48.4 [Ⓞ]	55.6 ^{★*} [Ⓞ]
Bluecollar worker	8.4	8.6	8.8	8.4
<i>Activity sector (%)</i>				
Industry	18.8 [★]	15.5 [*]	16.6	15.9
Construction	1.7	1.6	1.7	2.0
Trade	22.3 [Ⓞ]	24.6	23.2	28.0 [*]
Service	57.2	58.3	58.5	54.2
<i>Firm size (%)</i>				
≤10 employees	17.6 [★]	22.3 ^{★Ⓞ}	17.4 [★]	27.4 ^{★Ⓞ}
>11 et < 50	19.9	21.6 [Ⓞ]	17.9 [★]	21.3
≥50	62.4 [★]	56.1 ^{★Ⓞ}	64.7 [★]	51.3 ^{★Ⓞ}

Source: DADS-EDP. Notes: For continuous variables, standard deviations are given in brackets. Firm variables concern the firm before birth. Tenure and experience are measured at the first day of the civil year of the birth

*significantly different from the risk "Full time at the same employer" at the 5% level

★significantly different from the risk "Full time at another employer" at the 5% level

Ⓞsignificantly different from the risk "Part time at the same employer" at the 5% level

°significantly different from the risk "Part time at another employer" at the 5% level

same employer. The share of mothers working in large firms is higher among women who return back at the same employer. Larger companies offer certainly more opportunities for mothers to take up their jobs on a part-time basis or to have more flexible hours of work. This might be much harder for smaller firms, which have less human resources at their disposal. The existence of employee representative

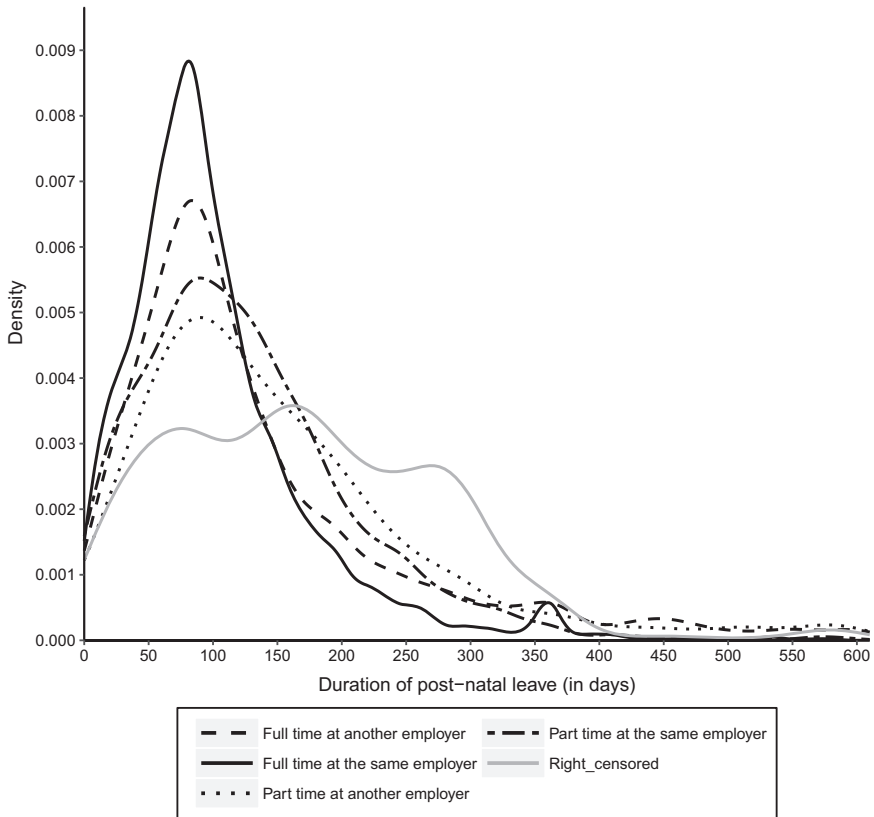


Fig. 2 Distribution of the duration of post-natal leave by transition, Source: DADS-EDP

committees or at least representatives of the staff may also foster more family-friendly situations in larger companies.

Before moving to the econometric part, we represented on Fig. 3 the cumulative incidence functions without any covariates. In other words, it represents the probability to fail in one risk on or before time t while taking into account the competing risks. The competing risks affect the probability of occurrence of an event which explain why it is important to take the presence of the other risks into account. We observe in Fig. 3 that the cumulative probability of occurrence of the risk “full time at the same employer” is much more important than the three others risks. Each risk occurs relatively soon after birth except the risk “part time in a different employer” for which the cumulative incidence function grows much more slowly.

5 Econometric analysis

We will now briefly present the model used in this article. The exposition follows Kleinbaum and Klein (2005), as well as Fine and Gray (1999) and Arntz et al. (2017). We refer the interested reader to these texts for more details.

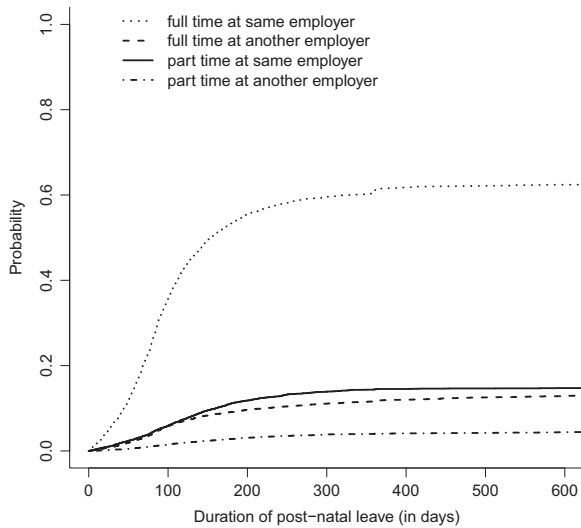


Fig. 3 Cumulative incidence functions, Source: DADS-EDP

A woman enters maternity leave for one reason only, but could then exits maternity leave in different ways. Young mothers are exposed to these risks during post-natal leave, so we are interested in the duration of the post-natal leave after the birth of their first child and on which variables influence the different risks. Because of data limitations, we do not know if a woman that never came back to work has moved out of the country, had a leave that ended after 2010 (the last year of observation) or died. These observations are thus considered as censored (see Section 4.2). Only 11.5% of observations are censored.

Classic duration models, like the Cox PH model, study a single risk considering people making other transitions as censored observations. However, considering the other risks as censored can lead to biased estimates if the risks are not independent. To overcome this shortcoming, we estimate a competing risks model based on the cumulative incidence curve (CIC). The CIC represents the probability of occurrence of risk r (with r one of the risks belonging the set of risk, recorded as R) before time t .

An assumption that is required by the CIC is that the overall hazard be the sum of the individual hazards for all risk types. This assumption is satisfied if the competing risks are mutually exclusive and if they can only occur once. Fine and Gray (1999) propose a model which links the impact of covariates on the cumulative incidence function via the subdistribution hazard. The subdistribution hazard λ'_s represents the instantaneous probability for a mother to suffer the event r in an infinitesimal small time interval, noted δt . The subdistribution hazard function for risk r is defined as follows:

$$\lambda'_s(t, X) = \lim_{\delta t \rightarrow 0} \frac{Pr(t \leq T^r < t + \delta t | T^r > t \text{ or } T^{r'} \leq t, r' \neq r, X)}{\delta t} \tag{1}$$

The conditioning in (1) means that no other event r' or no event at all have occurred at time t . The model developed by Fine and Gray (1999) is shown below:

$$\lambda_s^r(t, X) = \lambda_{s,0}^r(t) \exp(X_i^T \gamma^r) \quad (2)$$

This model is very similar to cox PH model. The difference comes from the fact that here the subdistribution hazard function $\lambda_s^r(t)$ is used instead of the *standard* hazard function λ^r . γ^r represents the risk-specific vector of parameters to estimate.

To model the post-natal duration as well as the risks the mothers are exposed to, we estimate Eq. (2), using the R programming language. We use the `finegray()` as well as the `coxph()` functions from the survival package (Therneau, 2015b). We also used the `cmprsk` package (Gray, 2014), as Arntz et al. (2017) did, to check our results.

We tested the robustness of our results using alternative estimates. First of all, to allow for individual heterogeneity we included an individual random effect in Eq. (2). We used the `finegray()` and `coxme` package (Therneau, 2015a) to estimate this model. Finally, we use the package `crrSC` (Zhou and Latouche, 2013) to estimate the model by clustering the observations by French departments and by sector. This accounts for the situation in which failure times may be correlated within a cluster. For instance, one could imagine that failure times in the Bas-Rhin, a French department culturally close to Germany, and with its own social security scheme are quite different from the failure times of a region in southern France. We also performed the analysis by sector clusters to take into account different branch agreements that may exist and that may impact the duration of the post-natal leave.

6 Results and discussion

Table 4 shows the estimation results of the competing risks regression (Eq. (2)). We do not present the estimation results by clustering by French department or sector and nor with unobserved heterogeneity because the results are very similar to those presented in Table 4.¹⁷ Tenure has been converted to years. The reported coefficients are exponentiated, which allows us to present the results as odds ratios. This means that if a coefficient is greater than 1, the variable increases the risk of occurrence of the event studied and will have the opposite effect if the coefficient is less than 1. Since it is not very informative to comment the results in terms of subdistribution hazard, we have decided to represent, for the variables with significance level, the marginal effect, over time, of a variation of a covariate. To do this, we estimated the probabilities predicted by the model for a reference individual and then we modified the value of the variable of interest.¹⁸ It is important to note that our results are descriptive and do not allow to prove causal relationships between our variables. However, they make it possible to emit a certain number of potential explanations which would be interesting to test using more adapted methods.

The age variable decreases the subdistribution hazard of both full time risks by around 2 to 4%, while increasing the hazard by 6% to return to the same employer

¹⁷ The results of other models are available upon request.

¹⁸ See Appendix for a description of the reference mother.

Table 4 Fine and Gray competing risks regression results (hazard ratios)

	Full time same employer	Full time another employer	Part time same employer	Part time another employer
<i>Personal characteristics</i>				
Age	0.985***	0.963***	1.056***	1.002
Married	1.059*	0.994	0.960	0.899
Ile de France	0.896***	1.310***	0.936	1.127
<i>Professional characteristics</i>				
Tenure	1.025***	0.909***	1.014	0.925***
Part time in the past	0.880***	1.036	0.995	0.955
Distance work/ home at t-1	0.999***	1.001**	1.000	1.001*
<i>Annual wage at t-1</i>				
Annual wage < 20 K	Ref	Ref	Ref	Ref
Annual wage ∈[20 K, 30 K[1.090**	1.058	0.945	0.766
Annual wage ≥30 K	1.411***	1.086	0.693**	0.377***
<i>Occupation</i>				
Executives	Ref	Ref	Ref	Ref
Intermediate occupation	1.052	1.080	0.874	0.523***
Clerk	0.964	0.982	0.960	0.692
Blue collar worker	0.794***	1.165	0.995	0.626
<i>Firm size at t-1</i>				
≤10	Ref	Ref	Ref	Ref
≥11 et < 50	1.121**	0.914	1.013	0.759*
≥50	1.181***	0.767***	1.232**	0.639***
<i>Activity sector at t-1</i>				
Industry	ref	ref	ref	ref
Construction	0.925	1.065	1.221	1.190
Trade	0.824***	1.203*	1.142	1.202
Service	0.872***	1.133	1.157	0.997
<i>Parental leave legislation</i>				
Post-reform CLCA	0.848***	0.731***	0.908	0.695***
<i>Economic environnement</i>				
GDP growth	0.942***	1.061***	0.979	1.193***
Local unemployment rate	0.972***	0.995	1.012	0.976

Source: DADS-EDP. Significance level: *** $p < 1\%$, ** $p < 5\%$, * $p < 10\%$ (H_0 : exp(coefficient) = 1)

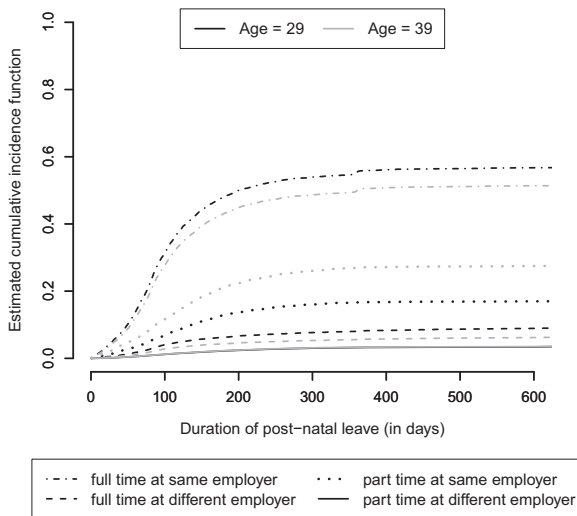


Fig. 4 Age effect on cumulative incidence functions

part time. On the Fig. 4, we compare the cumulative incidence functions estimated for the reference individual with an individual with identical characteristics except the age which is 10 years higher. Age greatly increases the likelihood of returning to a part-time job for the same employer as early as the first months of post-natal leave. On the other hand, the age decreases the risks to return to work full time (at the same or at another employer) but the effect seems very weak before 100 days. There are several possible explanations, for example, younger mothers tend to return more often to full time work to limit the losses in their wages due to human capital depreciation. It is also possible that newer generations are more attached to full time work than older generations. Another reason could arise from the risk of discrimination on the part of employers. Indeed, a woman who takes a long postnatal leave or who decides to work part-time after a birth can be considered by her employer as not invested enough in her work. This can slow down the salary progression of the mother or simply prevent her from having promotions. This type of discrimination is even more penalizing if the mother is young and has not the time to make progress in her career.

Being married at the time of birth only increases the risk of returning full-time to the same employer. This result perhaps reflects a better division of labour between men and women in married couples that allows women to reconcile their work in full time and family life. This may also reflect the fact that the specialization of married couples takes place before the birth of a child. Thus, married women who have a child, have already decided at the time of marriage that they would invest in the labour market. On the contrary, married women who have decided to specialize more in domestic life may already do so before the birth of the child.

Living in Île de France, the capital region, decreases the risk of returning to the same employer full-time while increasing the hazard of changing employer in a full-time basis (see Fig. 5). This variable does not have an effect on the return to part-time employment. It is possible that people living in the capital region have much more

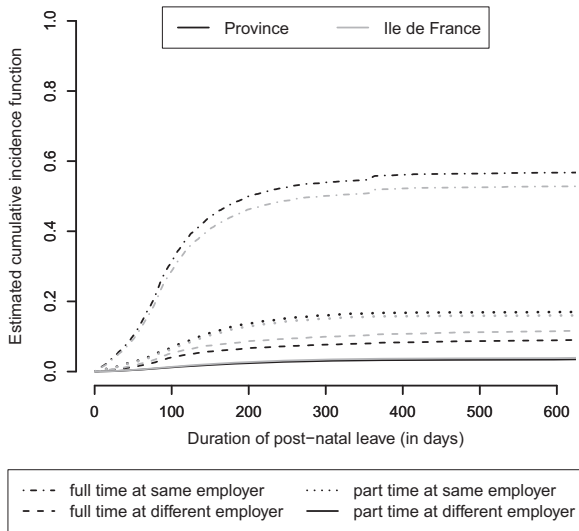


Fig. 5 Regional effect on cumulative incidence functions

job opportunities than those in the rest of the country. It is then easier for the former to find new employers which are potentially more family friendly.

As for the professional characteristics, tenure strongly increases the hazard to return to the same employer in full-time but decreases the hazard of changing employers (Fig. 6). Mothers that have been working in the same firm for a long time also tend to return to their previous employers, most probably as it is a way for these mothers to signal their attachment to their previous employer (or to avoid having to prove their worth again in a new firm), which is a result that is also found in Arntz et al. (2017) or Fitzenberger et al. (2016). They also have accumulated more firm specific human capital and switching firms would cause human capital to be wasted, at least in part.

Unsurprisingly, for mothers that worked part-time in the past, the subdistribution hazard of returning full-time to the same employer decreases. This could be explained by the fact that women who have worked part-time in the past are women who are less attached to the labour market.

The distance from home to work, while significant, has a very small effect as we can see on Fig. 7. The probabilities of transition are very close to 0, and this might come from the fact that distance as such does not matter, but rather, the time one takes to go to work. It would be very interesting to analyze the impact of this variable on job transitions after giving birth, but another data source would be needed for that. One possibility would be to use a routing system such as OSRM, but this is not possible via the secured system we have to use to access the data.¹⁹ The very slight decrease associated with the risk “full-time at the same employer” can be explained by the greater hours constraints for mothers with longer ways to go to work. This may encourage them to take longer leave to take care of their child or to look for a closer employer.

¹⁹ <http://project-osrm.org/>.



Fig. 6 Tenure effect on cumulative incidence functions

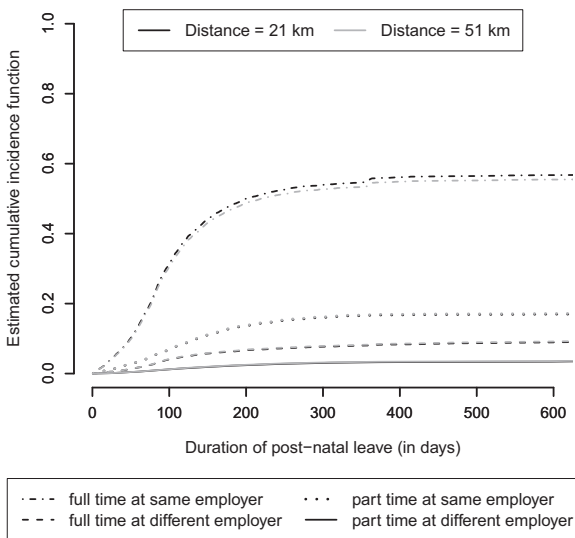


Fig. 7 Distance effect on cumulative incidence functions

The pre-birth annual wage is the variable that has the largest effect (see Fig. 8). Compared to women in the reference category, the subdistribution hazard of returning full time to the same employer for women earning more than 30 K€ annually is 41% higher and the subdistribution hazard to go work part-time for the same employer or for another employer 31% and 62% lower respectively (Table 4). We can see in the Fig. 8, that the probability of returning full time at the same employer is close to 50% after 200 days of post natal leave for the reference woman

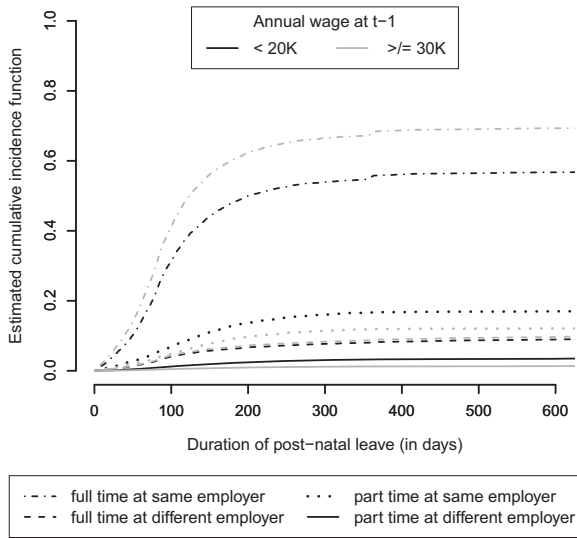


Fig. 8 Wage effect on cumulative incidence functions

against more than 60% for a woman with the same characteristics and an annual wage higher than 30 K. The effect is much less important for the risks “another employer”. Employers may pay high wages to their female employees to encourage them to return to work within their company. The opportunity cost is also high for women with high wages (often, educated women) to reduce their labour supply, the loss of salary being strong. Of course one would need to investigate this closely, by asking young mothers what is the primary reason to decide to go back to their previous employers, which is outside the scope of this study. The effect of wages on the speed of return to work for mothers had already been put forward by Leibowitz et al. (1992) or Arntz et al. (2017).

The occupational category plays a limited role in the probability of returning to work for mothers, only two coefficients are significant. Being a blue collar worker decreases the subdistribution hazard of getting back to full time work for the same employer by 21% as compared to the reference category of executives just like being in an intermediate occupation reduces the risk of getting back to part time at another employer compare to an executive.

Firm size is another important predictor (Fig. 9). As in Arntz et al. (2017), larger firms tend to have their employees return, either in full time or part time. It could be easier for larger companies to offer part-time jobs. Indeed, in smaller firms, even if the law forces the employer, during the parental leave, to accept a request for part-time work, it is possible that pressure or organizational reasons prevent the mother from actually choosing her desired working hours. The presence of work councils, defending the rights of the staff, can also facilitate part-time returns. Our results are in the same line as Domingo and Marc (2012) who showed that in France, the size of the firms matters for the return to employment of mothers.

In our basic model, the sector seems to play a limited role in the return to employment of mothers in France. However, when looking at the estimation results

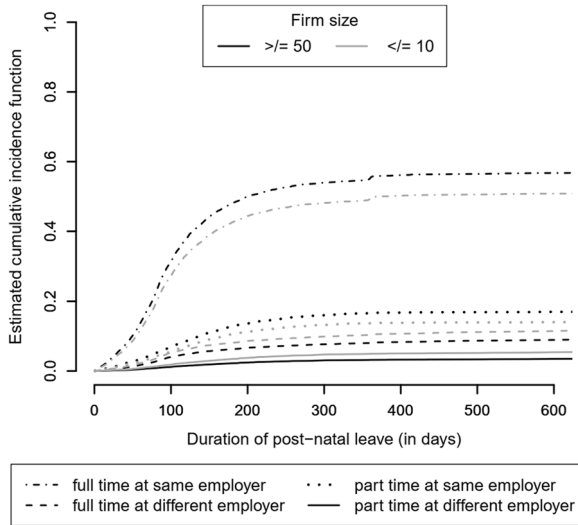


Fig. 9 Firm size effect on cumulative incidence functions

clustered by sector, we see that the coefficients are the same but almost all coefficients become significant. It is possible that the presence of industry-specific policies or agreements can influence the labour supply of mothers. More in-depth studies of different branch policies should be carried out to understand the effect of the industry on returning to work for mothers.

Having a child after 2004 seems to reduce the risk of returning full time (see Fig. 10). The reform of the CLCA, which opened a 6-month allowance for parents of a child, may have encouraged parents to take parental leave, which slowed down the return to work.

Macroeconomic variables, such as GDP growth and the unemployment rate (at the departmental level) were also included. GDP growth decreases the subdistribution hazard of returning working full time at the same employer by 6% while increasing the subdistribution hazard of changing employers full time by 6%. It also increases the subdistribution hazard of part-time work at another employer by 19%. Unlike Arntz et al. (2017), we found that high unemployment rates decrease the hazard of returning full time to the previous employer, but we arrive at the same conclusion as Arntz et al. (2017) concerning GDP; higher GDP levels are associated with returns to part time work rather than full time work at the same employer. Less uncertainty about the state of the economy can incite women to look for another job which can allow them to reconcile more easily family life and professional life. Conversely, poor economic conditions can lead to uncertainties in terms of sustainability of jobs and encourage mothers to return to their job quickly to prove their commitment to the company.

One of the limitations of our data is that it does not contain information on the activity or the income of the partner, if present. These elements are likely to have an impact on the way women return to work. However, according to INSEE data, around 90% of one year old children live in a household with a couple (Chardon & Daguet, 2009). Also, for men aged 30–49, the employment rate is around 87% and

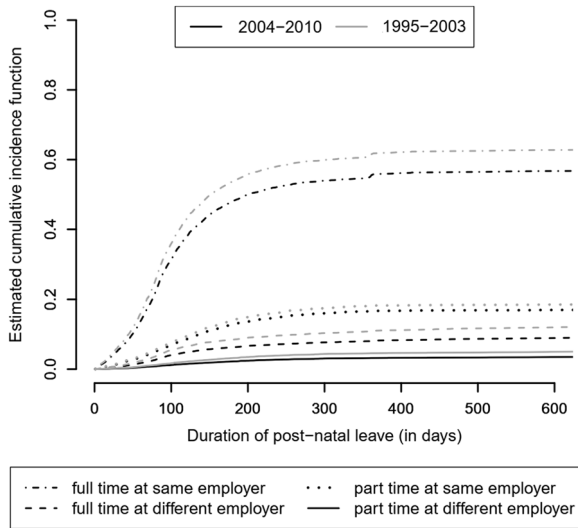


Fig. 10 Decade effect on cumulative incidence functions

only 4% of them work part time (Guedj, 2013). This means that women in our sample are most likely in a couple, with a partner that works full time, and assuming assortative mating, a phenomenon that exists for France according to Frémeaux & Lefranc (2017), with a similar education level and background as the mothers. This facts help mitigate the lack of information on the partner.

Our analysis was carried out on a specific sub-group of women (those already highly integrated in the labour market and who may have access to parental education leave) and the results presented in this article can not be generalized to all women living in France. It would therefore be interesting to extend this study to all women, however, the data used in this study does not allow adequate follow-up of women who are civil servants and women with low labour force participation.

7 Conclusion

Women who end their post-natal leave (including parental leave) can make different transitions back to a job: returning to the same employer or changing employer and working on a part time or on a full time basis. Results from a competing risks model show that it is not the same women who perform each of these transitions. With this model, we show how individual and professional variables affect the probability of occurrence of each transition. If we compare our result to the results of Arntz et al. (2017), we see that in both France and Germany, the post-birth transitions in the labour market seem to be influenced, in part, by the same variables. This does not mean, however, that the duration of post-natal leave and the proportion of mothers working part time are the same in both countries.

Individual variables such as age play a role, however, these are essentially job-related variables prior to birth that seem to matter. Thus, working in a large firm will increase the incidence of returning to work at the same employer. It is possible that

large firms have a greater ease to offer part-time positions or have family friendly arrangements. The wage will positively impact the probability of getting back to full time work. It is therefore possible that wage policies or the flexibility of duration of work within firm play a role on labour supply behavior of mothers. We have also observed, after taking into account clustering, differences in mothers' behaviors according to their firm's sector, which can also reflect the different types of policies applied in different sectors, via, for example, branch agreements. Companies therefore seem to have some leeway regarding mothers' labour supply behavior. A better knowledge of these determinants could thus limit the costs for the employer of the post-natal leave taken by the women of their company (Alewell & Pull, 2002).

Analyzing the impact of branch agreements, wage policies or the presence of work councils could allow a more in-depth analysis of the determinants of return to work for mothers. The evaluation of different measures adopted in industries or firms could thus make it possible to find more effective policies which allows to reconcile family and professional life. It could thus be envisaged to reform support for parents but also to create incentives to change the behavior of employers. Finally, the question of wages seems to be a central question concerning the return to work of mothers. Mothers with high wages have a lot to lose financially from full-time work to PreParE (the new paid parental leave). It would also be interesting to evaluate the effect of an increase in this allowance on the employment of mothers but also to evaluate the effect on fathers. More generally, results such as the ones we found might help individuals make choices that align better with their preferences, as well as help decision makers draft new policies.

From a methodological point of view, it could be interesting to use another source of information as survey data. This would be especially useful if these two sources, survey and administrative, could be merged. From the survey data, it would be possible to have information such as the health of the children, commuting times, ability to choose working hours, etc. However, matching survey data with an administrative source can be very challenging, especially if a common identifying variable is missing.

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Compliance with ethical standards

Conflict of interest The authors declare they have no conflict of interest.

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8 Appendix

Table 5.

Table 5 Characteristics of the reference person used in section Results and Discussion

Age	29
Married	No
Ile de France	No
Tenure (year)	3
Part-time in the past	Yes
Distance work/home at t-1	21
Annual wage t-1	≥30 K
Occupation	Clerk
Firm size at t-1	≥50
Sector	Service
Post-reform CLCA	Yes
GDP growth	1.5
Local unemployment rate	8.3

We used the rounded sample mean for continuous variables and the most represented modality for categorical variables.

References

- Alewel, D., & Pull, K. (2002). The international regulation of maternity leave: leave duration, predictability, and employer-co-financed maternity pay. *International Business & Economics Research Journal*, 1, 45–59.
- Arntz, M., Dlugosz, S., & Wilke, R. A. (2017). The sorting of female careers after first birth: a competing risks analysis of maternity leave duration. *Oxford Bulletin of Economics and Statistics*, 79(5), 689–716.
- Arntz, M., LO, S. M. S., & Wilke, R. A. (2014). Bounds analysis of competing risks: a non-parametric evaluation of the effect of unemployment benefits on migration. *Empirical Economics*, 46(1), 199–228.
- Asai, Y. (2015). Parental leave reforms and the employment of new mothers: quasi-experimental evidence from Japan. *Labour Economics*, 36, 72–83.
- Chardon, O. and Daguët, F. (2009). Enfants des couples, enfants des familles monoparentales. des différences marquées pour les jeunes enfants. *Insee Première* 1216.
- Davies, R., & Pierre, G. (2005). The family gap in pay in Europe: a cross-country study. *Labour Economics*, 12, 469–486.
- Domingo, P., & Marc, C. (2012). Trajectoires professionnelles des mères: quels effets des arrêts et réductions d'activité? *Politiques sociales et familiales*, 108, 87–96.
- Fine, J. P., & Gray, R. J. (1999). A proportional hazards model for the redistribution of a competing risk. *Journal of the American Statistical Association*, 94(446), 496–509.
- Finseraas, H., Hardoy, I., & Schone, P. (2017). School enrolment and mothers' labor supply: evidence from a regression discontinuity approach. *Review of Economics of the Household*, 15(2), 621–638.
- Fitzenberger, B., Steffes, S., & Strittmatter, A. (2016). Return-to-job during and after parental leave. *The International Journal of Human Resource Management*, 27(8), 803–831.
- Frémeaux, N. and Lefranc, A. (2017). Assortative mating and earnings inequality in France. IZA Discussion Papers 11084. Institute for the Study of Labor (IZA), 1–45.
- Gangl, M., & Ziefle, A. (2009). Motherhood, labor force behavior, and women's careers: an empirical assessment of the wage penalty for motherhood in Britain, Germany, and the United States. *Demography*, 46(2), 341–369.
- Givord, P., & Marbot, C. (2015). Does the cost of child care affect female labor market participation? An evaluation of a french reform of childcare subsidies. *Labour Economics*, 36, 99–111.
- Gray, B. (2014). *cmprsk: Subdistribution Analysis of Competing Risks*. R package version 2.2-7.
- Guedj, H. (2013). Le taux d'emploi des hommes et des femmes. Des écarts plus marqués en équivalent temps plein. *Insee Première* 1462.

- Gustafsson, S. S., Wetzels, C. M., Vlasblom, J. D., & Dex, S. (1996). Women's labor force transitions in connection with childbirth: a panel data comparison between Germany, Sweden and Great Britain. *Journal of Population Economics*, 9, 223–246.
- Gutiérrez-Domenèch, M. (2005). Employment after motherhood: a European comparison. *Labour Economics*, 12, 99–123.
- Honoré, B. E., & Lleras-Muney, A. (2006). Bounds in competing risks models and the war on cancer. *Econometrica*, 74(6), 1675–1698.
- Joseph, O., Pailhé, A., Recotillet, I., & Solaz, A. (2013). The economic impact of taking short parental leave: evaluation of a French reform. *Labour Economics*, 25, 63–75.
- Kleinbaum, D. G. and Klein, M. (2005). *Survival Analysis: A Self-Learning Text*. Springer Science and Business Media, LLC, 1–700.
- Lalive, R., Schlosser, A., Steinhauer, A., & Zweimüller, J. (2014). Parental leave and mothers' careers: the relative importance of job protection and cash benefits. *The Review of Economic Studies*, 81(1), 219–265.
- Lalive, R., & Zweimüller, J. (2009). How does parental leave affect fertility and return to work? evidence from two natural experiments. *The Quarterly Journal of Economics*, 124(3), 1363–1402.
- Lee, S., & Wilke, R. A. (2009). Reform of unemployment compensation in Germany: a nonparametric bounds analysis using register data. *Journal of Business & Economic Statistics*, 27(2), 193–205.
- Leibowitz, A., Klerman, J. A., & Waite, L. J. (1992). Employment of new mothers and child care choice: differences by children's age. *The Journal of Human Resources*, 27(1), 112–133.
- Lequien, L. (2012). The impact of parental leave duration on later wages. *Annals of Economics and Statistics*, (107-108), 267–285.
- Mahringer, H., & Zulehner, C. (2015). Child-care costs and mothers' employment rates: an empirical analysis for Austria. *Review of Economics of the Household*, 13, 837–870.
- Meurs, D., Pailhé, A., & Ponthieux, S. (2010). Child-related career interruptions and the gender wage gap in France. *Annals of Economics and Statistics*, 100, 15–46.
- Morrissey, T. W. (2017). Child care and parent labor force participation: a review of the research literature. *Review of Economics of the Household*, 15, 1–24.
- Ondrich, J., Spiess, C., Yang, Q., & Wagner, G. (2003). The liberalization of maternity leave policy and the return to work after childbirth in Germany. *Review of Economics of the Household*, 1(1), 77–110.
- Pailhé, A., & Solaz, A. (2007). Inflexions des trajectoires professionnelles des hommes et des femmes après la naissance denfants. *Recherches et prévisions*, 90(1), 5–16.
- Piketty, T. (2005). Impact de l'allocation parentale d'éducation sur l'activité féminine et la fécondité en france. *histoires Délelött familles, histoires familiales: les Cahiers Délelött l'INED*, 156, 79–109.
- Schönberg, U., & Ludsteck, J. (2014). Expansions in maternity leave coverage and mothers' labor market outcomes after childbirth. *Journal of Labor Economics*, 32(3), 469–505.
- Therneau, T. M. (2015a). *coxme: Mixed Effects Cox Models*. R package version 2.2-5.
- Therneau, T. M. (2015b). *A Package for Survival Analysis in S*. version 2.38.
- Volant, S. (2017). Un premier enfant à 28,5 ans en 2015: 4,5 ans plus tard qu'en 1974. *Insee Première*, (1642).
- Waldfogel, J. (1997). the effect of children on women's wages. *American Sociological Review*, 62(2), 209–217.
- Wilner, L. (2016). Worker-firm matching and the parenthood pay gap: evidence from linked employer-employee data. *Journal of Population Economics*, 29(4), 991–1023.
- Zhou, B. and Latouche, A. (2013). *crrSC: Competing risks regression for Stratified and Clustered data*. R package version 1.1.