Reconciling Work and Family Life:
The Effect of the French Paid Parental Leave

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ABSTRACT: In France, having more than two children has a causal negative impact on mothers' labour supply. The question addressed in this paper is whether the paid parental leave alter this effect. To address this issue, we focus on a reform that modified the conditions in which labour decisions are taken. In July 1994, the *Allocation parentale d'éducation* was extended to parents of two children (among which one is less than three years old). We show that after the reform, that is when families of two and more than two children have the same incentive to take a paid parental leave, having more than two children has no longer a negative effect on the participation probability of mothers. In addition, this is particularly true for women having no more than the school-leaving certificate, which happen to be the main recipients of the benefit.

Concilier vie professionnelle et vie familiale : l'effet de l'Allocation parentale d'éducation

Résumé : En France, avoir plus de deux enfants a un effet causal négatif sur l'offre de travail des mères. Cet article pose la question de savoir si le congé parental d'éducation rémunéré altère cet effet. Pour répondre à cette question, nous nous concentrons sur la réforme de 1994 qui a modifié les conditions dans lesquelles les décisions d'offre de travail sont prises. En juillet 1994, l'Allocation parentale d'éducation a été étendue aux parents de deux enfants (dont un de moins de trois ans). Nous trouvons qu'après la réforme, c'est-à-dire au moment où les familles de deux et plus de deux enfants ont la même possibilité de prendre un congé parental d'éducation rémunéré, avoir plus de deux enfants n'a plus d'effet négatif sur la probabilité d'activité des mères. Et cela concerne en particulier les femmes ayant un diplôme inférieur ou égal au baccalauréat, qui se trouvent être les principales bénéficiaires de la mesure.

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1 Introduction

In most developed countries where balancing work and family life is currently a key subject, conciliation policies are a major issue of family policy. In France, supporting parents' fertility decisions and mothers' labour supply is all the more important since France has faced since the seventies both a decrease in fertility[2] and a rise in women's participation in the labour market. On the one hand, family policies aiming at supporting fertility are important to reach and maintain a level that ensures generation renewal. On the other hand, supporting women's labour supply is desirable from an economic point of view since women's participation in economic activities is a strong factor of economic improvement for developed countries (*Conseil d'Analyse Economique*'s report on gender equality, 1999). Conciliation policies must solve the potentially conflicting trade-off between fertility and activity. The aim of this paper is to study whether the French paid parental leave is consistent with these two objectives, making it easier or not for parents, and especially for mothers, to work and to have the number of children they want. More precisely, supposing the causal effect of fertility on mothers' labour supply gives a proxy for the importance of conciliation difficulties, we study whether the French paid parental leave alters this effect.

The question addressed in this paper raises a major methodological issue: how can the causal effect of fertility on mothers' labour supply be measured? Fertility may affect mothers' labour supply, but labour supply may also affect fertility, and other observable or unobservable characteristics may affect both fertility and mothers' labour supply. It is thus delicate to provide unbiased estimates of the causal effect of fertility on mothers' labour supply. In an influential contribution, Angrist and Evans (1998) use the sex of the two eldest siblings as an instrumental variable to estimate the causal influence of having more than two children on mothers' participation in the labour market. American parents with same sex siblings have a higher probability of having a third child, and in that case, mothers' participation in the labour market is reduced. Their strategy relies on the argument that sex mix is randomly assigned and that it has an effect on participation only through its impact on the probability of having a third child. Using the same strategy on French Data, Moschion (2008) finds that having more than two children reduces significantly French mothers' participation probability and the number of hours they work per week when they are employed.

This negative causal impact of fertility on mothers' labour supply differs in time (Foley and York, 2005) and space[3]. These differences could result from cultural or institutional differences. Different family policies, helping more or less to balance work and family life, may partly explain these differences. Because fertility has a negative impact on mothers' labour supply, family policies having a positive effect on one of these two variables may have a negative effect on the second. For example, a policy that stimulates fertility may reduce

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[2] According to the INED (Sardon, 2006), the French total fertility rate has decreased between 1975 and 1990, and risen slightly since then: it was 2.47 in 1970 ; 1.95 in 1980 ; 1.78 in 1990 ; 1.87 in 2002 ; 1.88 in 2003 and 1.91 in 2004. In comparison, the average level for Europe 15 is respectively: 2.38; 1.82 ; 1.57 ; 1.50 ; 1.52 ; 1.55. Hence, the French total fertility rate is traditionally high, but with a level that stayed long below the generation renewal rate (2.1), as the other European countries, France is confronted with the ageing of its population. In 2006, the French total fertility rate was above two children per women, i.e. very close to the generation renewal rate.

[3] Whereas the impact of having more than two children on labour supply is significantly negative in the United States (Angrist and Evans, 1998) and in France (Moschion, 2008), it is insignificant in Great Britain (Iacovou, 2001) and in Canada (Ezzaouali, 2003). Comparing French and American results, it appears that the effect of fertility on mothers' participation probability is higher in France.

mothers' labour supply. The idea that family policies may alter the link between fertility and mothers' labour supply is supported by Bernhardt (1993) and more recently by Del Boca and al. (2005). The negative correlation between fertility and mothers' labour force participation may not come from a direct effect of childbearing, but rather from the process of caring for and raising children (Bernhardt, 1993). Thus, if family policies help parents to better combine professional and family responsibilities, the negative impact of fertility on mothers' labour supply could be reduced. Brewster and Rindfuss (1996) argue that "the negative association between fertility and labour force participation can be expected to diminish as the conflict between work and family responsibilities is reduced- whether by a change in the nature of work life, shifts in the social organization of childcare, or a combination of the two". In this context, we believe that assessing the effect of the French paid parental leave on the terms of the trade-off between fertility and activity is relevant.

To our knowledge, the question of the link between family policies and the causal effect of fertility on mothers' labour supply has not been addressed in the literature. Related to our research question, two types of studies can be distinguished. A first set of studies uses cross-country analysis to evaluate how family policies alter the correlation between fertility and mothers' work (Brewster and Rindfuss, 2000, Thévenon, 2007) but they focus on correlations and not on causal effects. A second type of studies measures the effect of family policies on fertility and/or mothers' activity (Piketty, 2005, Laroque and Salanié, 2005) but they do not study its effect on the interaction between fertility and mothers' activity. Using the sex of the two eldest siblings as an instrumental variable, we study whether the French paid parental leave alters the negative impact of having more than two children on mothers' participation in the labour market.

To measure the effect of the French paid parental leave, we focus on a reform that modifies the conditions in which fertility and mothers' labour supply decisions are taken, but does not change anything else. Before July 1994, only parents with at least three children were eligible to the *Allocation parentale d'éducation*. In July 1994, it was extended to parents of two children[4]. This extension has entirely modified the financial incentives of parents with two children who stop working or reduce their hours worked: if the second child is born before July 1994, his parent receives no benefit, whereas if he is born after, he receives a monthly benefit until his third birthday. As this modification was introduced in one go, it constitutes an exogenous shock that enables us to grasp how the extension of the *Allocation parentale d'éducation* to parents of two children modified the terms of the choice between fertility and activity for mothers of two children.

The main contribution of this paper is to estimate the interaction effect between the two regimes of the *Allocation parentale d'éducation* and the causal effect of having more than two children on mothers' labour supply. More precisely, we examine if by reducing the treatment differences between families with two and more than two children, the reform also reduced the negative effect of having more than two children on mothers' activity[5]. We focus on mothers having at least two children for several reasons. Firstly, conciliation problems increase with the number of children. Secondly, the 1994 reform of the *Allocation parentale*

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[4] More recently, in 2004, the whole family policy was reorganised. For a presentation and an analysis of this reform, the reader can refer to Mahieu (2005).

[5] This is the type of exercise conducted by Martin (1998). She opposes the period before 1962 when family policies where particularly generous towards families having two children and the period after 1962 when they were less. She shows that this evolution of family policies was accompanied with an evolution in women's activity rate: the activity rate of women having two children came closer to that of women having one child whereas it moved away from that of women having three children. However, without using instruments to compute unbiased estimates of the effect of fertility on mothers' labour supply, she cannot be sure that family policies account for these evolutions.

d'éducation modified the situation of parents of two children relative to parents of more than two children. Lastly, insofar as we will use the sex of the two eldest siblings as an instrumental variable to measure the causal effect of fertility on mothers' labour supply, the scope of the analysis is restricted to mothers with at least two children. As a result, we estimate the effect of fertility on mothers' labour supply for mothers with at least two children and policy implications are limited to this sample.

We find that before the extension of the *Allocation parentale d'éducation*, when the number of children increased from two to more than two, mothers significantly reduced their labour market participation. After the reform, that is when parents of two and more than two children are in the same position to take a paid parental leave, having more than two children (relative to having two) no longer has a negative effect on the participation probability of mothers. In addition, this is particularly true for women having no more than the school-leaving certificate, which happen to be the main recipients of the benefit. Using the birth of twins as an instrumental variable, we also show that by increasing the treatment differences between families with one and those with more than one child, the reform increased the negative effect of having more than one child on mothers' labour supply. Our results suggest that the extension of the *Allocation parentale d'éducation* extended the incentives to withdraw from the labour market to mothers of two children. This reform thus had negative consequences in terms of balancing professional and family life.

The paper is organised as follows. The next Section provides a short discussion of related literature and Section III describes the data. Section IV shows some descriptive statistics. Section V presents the model used in the regressions. Section VI presents the results. Last section concludes.

II Related literature

Two types of studies emerge from the literature that evaluates the impact of family policies on fertility and mothers' labour supply. First, some studies estimate the effect of family policies on fertility on the one hand, and on mothers' activity on the other hand. The economic literature notably studied the impact of parental leaves[6].

The French paid parental leave was created in 1985. It is a monthly benefit served to parents who reduce or interrupt their activity from the child's birth to his third birthday at the most. The benefit can either be full-rate if the parent completely stops working or cut-rate if he works part time[7]. The device is completely egalitarian in theory since fathers as mothers can benefit from it. However, in practice the recipients are mostly mothers: in 2005, 97% of recipients were women. Since the benefit is low and independent of the previous wage, as men earn generally more than their spouses, when couples wish to benefit from the paid

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[6] For example, Ronsen and Sundström (1999) study the parental leave device of Sweden, Norway and Finland between 1972 and 1992. They argue that the effect of parental leave policies on mothers' activity substantially depends on the characteristics of the leave (length of the leave, amount of the benefit, part-time possibilities…). Marc (2004) points out that the effect of the French parental leave on mothers' labour supply also depends on employment conditions of eligible mothers.

[7] In 1997, the full rate benefit was about 460 euros per month, 300 euros if she worked half time (at the most) and 230 euros if she worked between 50% and 80% of the time (Afsa, 1998). As a benchmark, using the French Labour Force Survey of 1997, we find that the average wage of employed mothers who were potential recipients of the benefit at that time (with at least two children among which one is aged less than three) was 1087 euros per month.

parental leave and have to decide whether the recipient should be the mother or the father, they find it financially optimal in most cases that the recipient be the mother (Boyer, 2004).

Piketty (2005) uses the French Labour Force Surveys (1982-2002) and the 1999 Study of Family History survey to measure the impact of the *Allocation parentale d'éducation* on women's labour supply and fertility. He uses the extension of the *Allocation parentale d'éducation* to the second child in July 1994 as a natural experiment to capture the effects of this policy on fertility and women's participation in the labour market. This reform may have had considerable effects, all the more since the take-up rate among mothers with two children became rapidly extremely important: by the end of 1997, more than 40% of mothers with two children (of whom one is less than three years old) received the benefit, and more than 30% received a full-rate benefit (Piketty, 2005).

In terms of fertility, the effect of the extension of the *Allocation parentale d'éducation* are hardly measurable and rather moderate: according to Piketty (2005), the reform could explain at the most 20-30% of the total increase in French fertility observed between 1994 and 2001. On the contrary, the effect on women's work is highly significant. The extension of the *Allocation parentale d'éducation* has induced in three years an important decline in the labour supply of mothers with two children (of whom one is less than three years old): out of 220 000 full rate recipients of the *Allocation parentale d'éducation* for the second child, between 50% and 70% would not have interrupted their activity at the second birth if they had not benefited from the paid parental leave. This additional withdrawal movement was particularly concentrated on low skilled mothers. Also, mothers who benefited of the *Allocation parentale d'éducation* for their second child withdrew more willingly from the labour market when having a third child than others, this excess of interruption being close to 50 000 since 1997.

Using French Labour Force Surveys of 1997, 1998 and 1999, Laroque and Salanié (2005) provide maximum likelihood estimators based on a discrete choice model. They estimate that the extension of the *Allocation parentale d'éducation* explains about half of the 7% increase in the number of births observed in the second half of the 1990s and caused a substantial reduction in the labour supply of eligible women. Choné, Le Blanc and Robert-Bobée (2004) estimate that the suppression of the *Allocation parentale d'éducation* would increase women's employment rate by 4 percent points.

The results of these studies clearly indicate that the French paid parental leave has a negative effect on mothers' labour supply. In these studies however, the question of the interaction between fertility and mothers' labour supply and particularly the effect of fertility on mothers' labour supply and the fact that the 1994 reform may have changed it is not addressed. The objective of this paper is to study whether the negative causal effect of fertility on mothers' labour supply could be due to the fact that since the creation of the *Allocation parentale d'éducation*, parents of three children at least were eligible to the benefit and that until July 1994, they were the only ones to be. In other words, we wonder if this negative effect is due to an intrinsic effect of the number of children or to the incentives of the *Allocation parentale d'éducation*.

Other studies try to identify if family policies help to balance work and family life, in the sense that they reduce the correlation between fertility and mothers' labour supply. They study if when, at the country level, the correlation between fertility and mothers' activity becomes less negative, or even positive[8], this could be attributed to the success of specific family policies. Brewster and Rindfuss (2000) synthesise European and American researches on the link between fertility and women's work, and on the impact that various policies may

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[8] The development in the 1990's of a positive correlation between fertility and mothers' labour supply at the national level has been emphasized by several authors (i.e. Bernhardt, 1993; Rindfuss and Brewster, 1996).

have on this relationship. They focus on the reversal of the correlation between fertility and mothers' labour supply at the country level: fertility rates tend to be higher in the countries where the participation rate of women in the labour market is also high. According to the authors, it suggests that in some countries, women succeeded in combining family and professional responsibilities, and in others they did not. Thévenon (2007) studies for the OECD countries the link between different family policies and their performances in terms notably of fertility and women's work. He confirms that a high participation rate of women in the labour market is not contradictory with a high fertility, but that it depends on family policies.

These results suggest that in step with implemented family policies, the link between fertility and mothers' activity varies. However, by using cross-country analysis to evaluate how family policies may alter the link between fertility and mothers' work, these studies do not demonstrate causal relationships. First, because historical and cultural differences between countries may explain both that different policies are implemented and that fertility and mothers' labour supply behaviours differ. In this context, it is hard to establish a causal link between family policies and fertility-labour supply behaviours. To avoid this issue, we focus on France and use a quasi-natural experiment: the 1994 reform of the paid parental leave. Second, these studies focus on the correlation between fertility and mothers' labour supply behaviours rather than on the causal effect. Their results are thus delicate to interpret. Mothers with more children are also the ones who have a lower activity rate. But because fertility and activity decisions have common determinants, it is extremely delicate to separate the true effect of fertility on activity from 'correlated' effects. Do mothers having more children have a lower activity rate because fertility affects negatively their labour supply or because they share common characteristics and preferences? Because we use an exogenous and random source of fertility variation, we can disentangle the correlation and identify precisely the causal effect of fertility on mothers' labour supply.

III Data description

The data used in this paper are from the 9 French Labour Force Surveys (LFS) conducted each year between 1990 and 1998 by the French Statistical Office (Insee). The sample of the LFS is representative of French metropolitan population aged fifteen and more (*N*=135 000, sampling rate=1/300). For each respondent, we know his birth date, sex, family situation, diploma and participation in the labour market. We also have for each household, the number, sex and birth date of each child living in the housing.

Other databases such as the European Community Household Panel or the Families and employers survey give these informations. However, the LFS has the advantage of containing a huge number of observations, which is a necessary condition to obtain precise and robust instrumental variable estimates of the effect of fertility on mothers labour supply and study the heterogeneity of this effect across sub-samples. This is also the reason why we pile up the 9 surveys of the period 1990-1998. The general censuses of 1990 and 1999 could have been an alternative from the point of view of the number of observations. We chose to use the LFS that contains more data on labour market participation (the number of hours worked for example) and is conducted each year.

The selection of the period 1990-1998 is the result of a trade-off between trying to have the maximum number of observations because the instrumental variable method is data demanding and trying to isolate the effect of the extension of the *Allocation parentale d'éducation* from other changes or reforms that may have affected the effect of fertility on

mothers' labour supply. As a result, 1990-1998 is the largest time span we can use[9]. We do not use previous years because between 1989 and 1990, the LFS was modified, and we do not use subsequent years because the very important reform on working time reduction (*Réforme des 35 heures*) was announced in June 1998 (the LFS was carried out in March 1998).

We focus on women in couple aged 21 to 35 with at least two children and at least one child aged less than three at the time of the survey (N = 23407). The sample is restricted to women that have a spouse who were a priori the only ones concerned by the reform (single mothers who raise a young child benefit from a higher benefit since 1976). The benefit being intended only for mothers having at least two children among which one is less than three years old, our sample is restricted to them. More precisely, we keep mothers having two children whose second child is less than three and mothers having three children or more whose third child is less than three. Therefore the sample selection is not made on the total number of children which would bias our sample, but on the age of children. We select mothers having at least three children according to the age of the third child rather than the age of the last child, because if the third and the last child have a large age difference, the mother's labour supply at the time when the last child is less than three gives us no information on the impact that had the switch from two to more than two children on her labour supply.

As Angrist and Evans (1998), because we have information only on children who still live with their parents, we restrict the sample to mothers aged 21 to 35. This prevents us from underestimating the total number of children at the time of the survey and from introducing errors on the rank of siblings. Women who are more than 35 years old potentially have of-age children, who have a higher probability to leave outside the parental home, and thus be outside of the survey. Keeping mothers older than 35 would increase the risk of introducing measurement errors on the instrumental variable, the sex of the two eldest siblings. Selecting mothers aged 21 to 35 having at least two children is not completely neutral and we check that selecting the larger sample of mothers aged 21-40 does not alter the results.

IV Descriptive statistics

Table 1 gives some descriptive statistics. Among all women having at least two children (among which one is aged less than three), 30% had a third child. In this sample, a little more than 50% of families had same sex eldest siblings and a little more than 51% of first births were boys, which is consistent with national statistics. About 0.9% of second births were twins. We present in the second part of table 1 socio-demographic characteristics. In our sample, mothers are in average 30 years old and had their first child at about 23 and a half years old. 37% of mothers in the sample have no diploma and about 20% have more than the school-leaving certificate. Compared to the general population, the mothers in our sample had their first child younger and are less qualified. The average age at maternity (first child) was 26 in 1990 and 27.2 in 1998 (Ined). In the period 1990-1998, among women aged 21 to 35, 30% had no diploma and 24% had a higher diploma than the school-leaving certificate (LFS, 1990-1998). These features are not independent of the research question and may result from either the selection of mothers according to the number of children or to their age (considering that they have at least two children). To test if our results depend on the fact that we keep only young mothers, our results will be compared with the ones obtained on the sample of mothers

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[9] Piketty (2005) stops in 1997, but to compare the effect of having more than two children according to the fact that mothers had their second child before or after July 1994, we also keep 1998 so that our sample contains enough mothers who had their second child after the reform and had a third child.

aged 21 to 40. At all events, our results concern only mothers who have at least two children and cannot be generalised to the whole population. However, because the number of French mothers with three children dramatically decreased in the last thirty years, the study of the transition from two to more than two children is particularly interesting (Breton and Prioux, 2005).

TABLE 1 - *Descriptive statistics, women aged 21-35 with at least two children and at least one child aged less than three*

| Variable | Means and (standard deviations) | |
	All	With a spouse
Fertility characteristics		
Number of children	2,31 (0,50)	2,31 (0,50)
Women with more than two children [1]	0,295 (0,456)	0,294 (0,456)
Women whose 1st child was a boy [1]	0,513 (0,500)	0,514 (0,500)
Women whose 2nd child was a boy [1]	0,512 (0,500)	0,511 (0,500)
Women whose 1st and 2nd child were boys [1]	0,264 (0,441)	0,264 (0,441)
Women whose 1st and 2nd child were girls [1]	0,238 (0,426)	0,238 (0,426)
First two children are same sex [1]	0,503 (0,500)	0,502 (0,500)
2nd birth was a twin [1]	0,009 (0,096)	0,009 (0,097)
Sociodemographic characteristics		
Age	30,1 (3,2)	30,2 (3,1)
Age at 1st birth	23,6 (3,4)	23,7 (3,4)
No diploma [1]	0,370 (0,483)	0,359 (0,480)
Diploma <= school leaving certificate [1]	0,436 (0,496)	0,442 (0,497)
Diploma > school leaving certificate [1]	0,194 (0,395)	0,199 (0,399)
Labour supply characteristics		
Labour market participation [1]	0,559 (0,497)	0,556 (0,497)
Average hours worked per week	25,7 (17,8)	25,5 (17,8)
Labor income per month (in Francs)	6889 (15882)	6883 (16028)
Number of observations	24704	23407

SAMPLE: women aged 21-35 with at least two children and one of the three first children aged less than three.
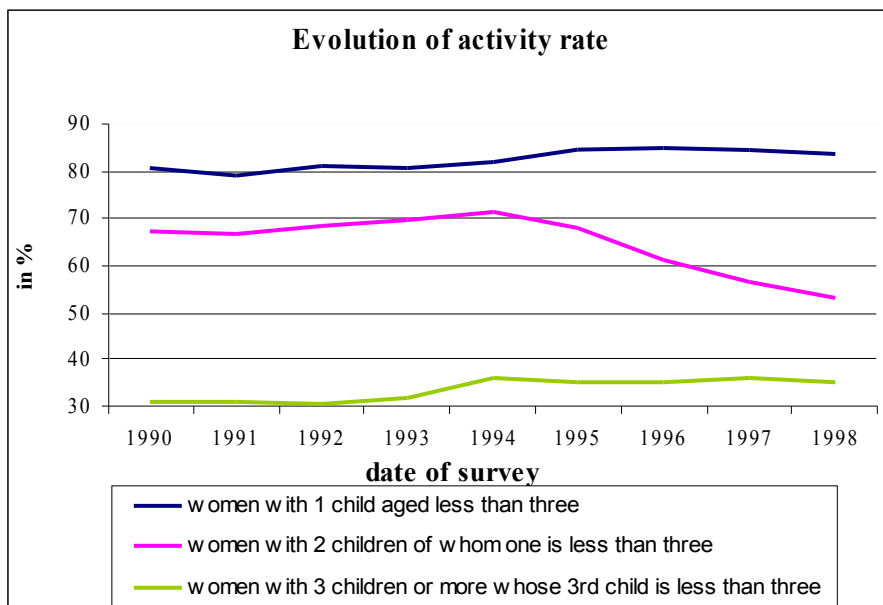
NOTE 1: these are proportions.

The third part in Table 1 gives some labour supply characteristics. We call "labour market participation rate" the percentage of mothers in our sample that are working or unemployed. Piketty (2005) uses employment rates. We prefer to use here activity rates, i.e. we integrate unemployed. The objective is to study how the reform modified the effect of having more than two children on working decisions. Yet, an unemployed woman has a priori decided to work, which is not the case of an inactive woman. Even though the frontier between the two situations is rather vague and some inactive women should actually be part of the actives, it seems more relevant to us to consider activity rates rather than employment rates which would lead us to consider the actual employment status of mothers rather than the decision they took. We thus distinguish mothers who chose to work and thus not to benefit from the *Allocation parentale d'éducation*, from inactive mothers who are likely to receive the benefit. This is consistent with the rules of eligibility to the *Allocation parentale d'éducation* according to which unemployment benefits are not compatible with the parental leave benefit. As a result, unemployed cannot be eligible for the parental leave benefit. The labour market participation rate in our sample is about 56%. When they are employed, mothers in our sample work about 25 and a half hours per week and earn about 6900 francs (1050 euros) per month. No important differences are to be noted between the whole sample and the sample of mothers with a spouse.
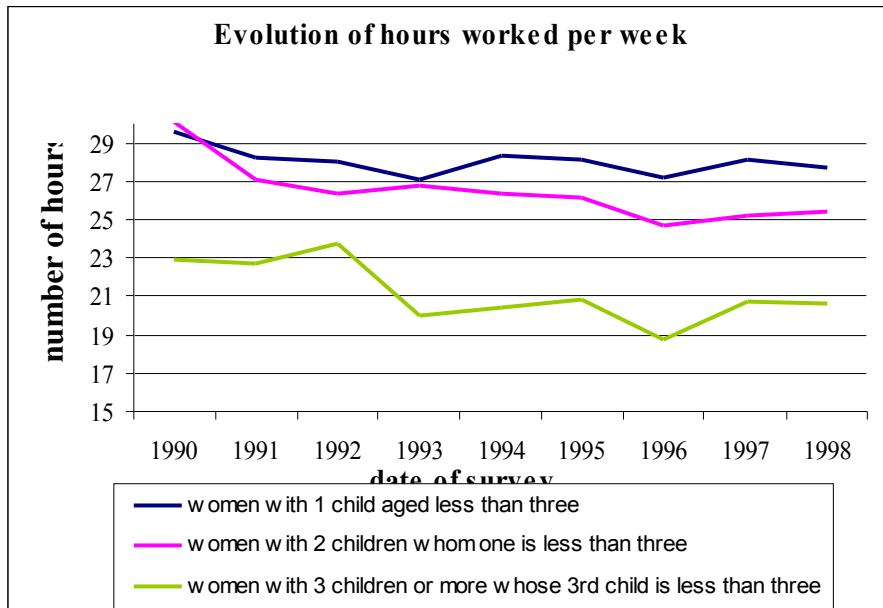
The evolution of mothers' activity rates and hours worked per week according to the number of children is given in Figure 1.

FIGURE 1 - *Annual evolution of activity rates and average hours worked per week by mothers according to the number of children*

Evolution of activity rate

SAMPLE: mothers with a spouse aged 21-35 and with at least one of the three first children aged less than three.

SOURCE: labour force surveys 1990-1998, Insee.

Evolution of hours worked per week

Legend:
- women with 1 child aged less than three
- women with 2 children whom one is less than three
- women with 3 children or more whose 3rd child is less than three

SAMPLE: Employed mothers with a spouse aged 21-35 and with at least one of the three first children aged less than three.

SOURCE: labour force surveys 1990-1998, Insee.

The activity rate of mothers having one child aged less than three and that of mothers having three children or more (of whom one is less than three) evolve in the same way between 1990 and 1998. We particularly notice that they do not decrease in 1994-1995. On the opposite, the activity rate of mothers having two children (of whom one is less than three) falls between 1994 and 1998 by more than 17 points, whereas it was increasing between 1990 and 1994. Only mothers concerned by the reform experience a fall in their activity rates, and this exactly at the time the reform was implemented. As a consequence, the activity rate of mothers having two children comes closer to that of mothers having three children or more (the difference between activity rates decreases from 37 to 20 points in the period), whereas it moves away from that of mothers having one child (the difference between activity rates increases from 13 to 30 points in the period).

The evolution of hours worked is not as clear but we observe the same type of evolution: whereas the average number of hours worked by mothers having two children comes closer to that of mothers having three children or more (the difference decreases from 7 to 4.5 hours in average), it moves away from that of mothers having one child (the difference increases from -0.5 to 2 hours in average). Moreover, during the critical period 1993-1995, whereas hours worked by mothers of one and three children increased slightly, hours worked by mothers of two children decreased. These descriptive statistics show that mothers' labour supply decreases as the number of children increases, and that this correlation between fertility and mothers' labour supply varied with the 1994 reform. This is consistent with the idea that the negative effect of having more than two children on mothers' labour supply could to a certain extent come from the *Allocation parentale d'éducation*.

V Model

The model used in this paper is inspired from Angrist and Evans (1998). We estimate a two-stage linear probability model where the second-stage equation links labour supply variables to the endogenous explanatory variables. Two labour supply variables are considered: the first one is a dummy indicating whether the mother participates in the labour

market or not (it is equal to one if the mother works or is unemployed), and the second one indicates, when she works, the number of hours worked per week. The endogenous explanatory variables are interaction variables between *'more than two children'*, which is a dummy equal to one if the mother has three children or more, and a dummy that indicates whether the second child is born before July 1994 or not and thus if his mother can have benefited or not from the paid parental leave for her second child.

Labour supply variables y_i are linked to endogenous explanatory variables ($x_i * ape2_i$ and $x_i * (1 - ape2_i)$), to the sex of the two eldest children s_{ji} and to other covariates w_i by the following equation:

$$y_i = \alpha'_0 w_i + \alpha_1 s_{1i} + \alpha_2 s_{2i} + \alpha_3 ape2_i + \beta_1 x_i * ape2_i + \beta_2 x_i * (1 - ape2_i) + \varepsilon_i \qquad (1)$$

The dummy *'ape2'* equals one if the second child is born after July 1994. While in our sample all mothers with at least three children can have benefited from the *Allocation parentale d'éducation* for their third child[10], mothers whose second child is born before July 1994 cannot have benefited from the *Allocation parentale d'éducation* for their second child whereas mothers whose second child is born after July 1994 can have.

The interaction variable between *'more than two children'* (x_i) and *'ape2'* equals one if the mother had had a third child and that the second is born after July 1994. The coefficient β_1 gives the effect of switching from two to more than two children on the labour supply of mothers who could benefit from the *Allocation parentale d'éducation* for their second child. We compare this coefficient with that of the interaction variable between *'more than two children'* (x_i) and *'1 - ape2'* which equals one if the mother had had a third child and that the second is born before July 1994. The coefficient β_2 gives the effect of switching from two to more than two children on the labour supply of mothers who could not benefit from the *Allocation parentale d'éducation* for their second child. The dummy variable *'ape2'* is also included alone in the regressions. The coefficient associated with this variable (α_3) gives the direct effect of the reform on the labour supply variables.

The variables s_{ji} denote the sex of the child of parity j. It is equal to one if the child is a boy, zero if it is a girl. The other covariates are age, age at first birth, age difference between the two first siblings (in months), immigrant status, year fixed effects and diploma. The age at first birth and the time interval between the first and second birth are correlated with the probability of having a third child (Breton and Prioux, 2005). An early first birth and a short time interval between the two first births may come from a desire to have many children. Young mothers may have a particular profile in terms of background, level of diploma, nationality… The inclusion of these two variables captures some of the unobservables that may affect the probability to have a third child and to participate in the labour market. The immigrant status variable is a dummy indicating whether the woman is French born or not. The year-fixed effects are dummies for each year in our sample. They are introduced to control for the fact that the economic situation of the different years may affect outcomes. The level of diploma is introduced with 5 dummies indicating whether the mother has no diploma, a diploma lower than the school-leaving certificate, the school-leaving certificate, a diploma obtained two years after the school-leaving certificate, a diploma obtained more than two years after the school-leaving certificate.

To correct for the endogeneity of fertility decisions and obtain unbiased estimates of the causal effect of fertility on mothers' labour supply, we use second equations which link the

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[10] The *Allocation parentale d'éducation* was created the 1st of January 1985. Mothers whose third child is born after this date could receive the benefit for their third child. In our sample, mothers were surveyed from 1990 and mothers with three children have a third child aged less than three, who is thus born after the 1st of January 1985.

endogenous explanatory variables to the instruments. The instruments are interaction variables between a dummy equal to one if the two eldest siblings are same sex, and the dummies *'1-ape2'* and *'ape2'* that indicates if the second child is born before or after July 1994. The first-stage regressions connecting endogenous explanatory variables to the instruments ($ss_i * ape2_i$ and $ss_i * (1 - ape2_i)$) are:

$$x_i * ape2_i = \pi'_0 w_i + \pi_1 s_{1i} + \pi_2 s_{2i} + \pi_3 ape2_i + \gamma_1 ss_i * ape2_i + \gamma_2 ss_i * (1 - ape2_i) + \eta_i \quad (2)$$

$$x_i * (1 - ape2_i) = \pi'_4 w_i + \pi_5 s_{1i} + \pi_6 s_{2i} + \pi_7 ape2_i + \gamma_3 ss_i * ape2_i + \gamma_4 ss_i * (1 - ape2_i) + \upsilon_i \quad (3)$$

The interaction variable between *'same sex'* and *'ape2'* equals one if the mother had same sex eldest siblings and that the second child is born after July 1994. In equation (2), the coefficient γ_1 gives the effect of having same sex eldest siblings on fertility for mothers who could benefit from the *Allocation parentale d'éducation* for their second child. We compare this coefficient with that of the interaction variable between *'same sex'* and *'non ape2'* in equation 3 which equals one if the mother had same sex eldest siblings and that the second is born before July 1994. The coefficient γ_4 gives the effect of having same sex eldest siblings on fertility for mothers who could not benefit from the *Allocation parentale d'éducation* for their second child.

The *'same sex'* variable is a combination of the sex of the two eldest siblings[11]. As shown in table 1, the probability to have a boy is 0.51. Thus *'same sex'* is slightly correlated with the sex of each child. Having boys or girls could have specific effects on the probability to have a third child if parents have a preference for boys or girls. It could also have a direct effect on mothers' labour supply if parents raise boys and girls differently for example. Or the sex of each child could be correlated with other determinants of mothers' participation in the labour market than the probability to have a third child. We introduce s_{ji} in all regressions to control for specific effects of the siblings' sex and correct for potential bias due to omitted variables.

The use of a two-stage linear probability model is justified by the fact that fertility decisions are endogenous. Thus, ordinary least squares provide biased estimates of the effect of fertility on mothers' labour supply. Comparing directly the labour supply of mothers with three children or more with that of mothers with two children would lead to confuse the effect of fertility on labour supply decisions with the fact that mothers who chose to have three children or more have specific characteristics that may explain both their fertility and activity decisions. Because some of these characteristics may be unobservable, adding control variables in ordinary least squares regressions is insufficient to eliminate completely the endogeneity bias.

To provide unbiased estimates of the effect of fertility on mothers' labour supply, we would like to compare the labour supply of each mother in the situation where they have two children with their labour supply in the situation where they have more than two. The problem is that the counterfactual is not observed: if a mother has two children, we do not observe what would have been her labour supply if she had more than two, and if she has more than two, we do not observe what would have been her situation if she had two. The use of the sex of the two eldest siblings as an instrument for *'more than two children'* is a solution to this issue. The idea is that the sex of the two eldest siblings is randomly assigned and affects the individual decision of fertility of each mother but has no direct effect on her activity decision. Thus our sample is randomly divided in two groups: the group of mothers with same sex eldest siblings have a higher probability to have a third child than the group of mothers with different sex eldest siblings. As a result, the fact that the proportion of mothers who have a third child is higher in the group of mothers with same sex eldest siblings is independent of individual characteristics, even unobservable. This difference in proportion is used to identify

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[11] It can actually be written: $ss = s_1 s_2 + (1 - s_1)(1 - s_2)$

the causal effect of fertility on mothers' labour supply: the effect is negative if, in average, in the group of mothers' with same sex eldest siblings, mothers' labour supply is lower. This method relies on the assumption that if mothers' with different sex eldest siblings' had had same sex eldest siblings', their fertility and activity decisions would have been in average identical to those observed in the same sex eldest siblings' group. When the number of observations is large and the instrumental variable is exogenous, this assumption is verified.

Since the linear probability procedure is the simplest one to use, it is recommended". Another argument pleads in favour of linear probability models since no assumptions on the residuals are necessary and according to Heckman and Macurdy (1985), the use of a two-stage linear probability model is justified when one considers simultaneous equations where the instrument, the endogenous variable and the dependant variable are dummies. Angrist and Evans (1998) as well as Conley (2004) use a model of this type to estimate the impact of fertility on women's labour supply.

VI Results

VI.1 The effect of having same sex eldest siblings on fertility

We report in Table 2 the results of the estimation of equation (2) in the two first columns and equation (3) in the third and fourth columns. Complete results (including estimates for other covariates) are reported in Appendix 1. Mothers whose second child is born before July 1994 represent 77% of our sample. In regressions where other covariates are included, the effect of having same sex eldest siblings on fertility equals 0.028 when the second child is born before July 1994 and it equals 0.022 when the second child is born after July 1994. In other words, having same sex eldest siblings increases the probability to have a third child by 2.8 percent points for mothers who could not benefit from the *Allocation parentale d'éducation* for their second child, and by 2.2 percent points for mothers who could benefit from the *Allocation parentale d'éducation* for their second child.

TABLE 2 - *Ordinary least square estimates of the effect of having same sex eldest siblings on the probability to have a third child*

Dependant variable:	More than 2 children			
	2nd child born >= 1994		2nd child born < 1994	
Same sex * 2nd child born >= 1994	0,022*** (0,006)	0,022*** (0,006)	0,000 (0,000)	-0,003 (0,005)
Same sex * 2nd child born < 1994	0,000 (0,000)	-0,000 (0,000)	0,033*** (0,007)	0,028*** (0,005)
Other covariates	No	Yes	No	Yes
N	23407	23407	23407	23407
R²	0,0413	0,0520	0,1180	0,4764

Levels of significance: *: 10% **: 5% ***: 1%

SAMPLE: women with a spouse aged 21 to 35 with at least two children and one of the three first children aged less than three.

NOTE: standard errors (in parentheses) are adjusted for potential serial correlation. Other covariates are age, age at first birth, age difference between the two first siblings (in months), diploma, immigrant status, year fixed effect and sex of first and second child. Main effect for the Allocation parentale d'éducation (variable '*ape2*') is included in the equation.

Both coefficients are significant at the 1% level and the difference between them (0.006, standard error 0,008) is not statistically significant. Thus, the effect of *'same sex'* on the probability of having more than two children is not different according to the second child's date of birth: the reform has not modified the exogenous fertility shock.

The quality of instrumental variable estimates depends on the quality of instruments. In the regressions of endogenous explanatory variables ($x_i * ape2_i$ and $x_i * (1 - ape2_i)$) on the two instruments ($ss_i * ape2_i$ and $ss_i * (1 - ape2_i)$) with no other covariates, the Fisher statistics are respectively 356 and 806. In the literature, the validation criterion that has emerged is that the Fisher statistic in the regression of the endogenous explanatory variable on the instrument should be strictly higher than 10 (Bound, Jaeger and Baker, 1995). Thus our instruments are powerful and explain well the endogenous explanatory variables.

Our results are consistent with Angrist and Evans (1998) and Breton and Prioux (2005) who also find that the probability to have more than three children is significantly higher when the two eldest children are same sex. However, the magnitude of these effects differ slightly: on American data, Angrist and Evans (1998) find that in the nineties, the probability to have a third child is about 7 points higher when the two eldest children are same sex, and on French data, Breton and Prioux (2005) find that this difference is about 4.5 points. These differences may come from cultural differences on the one hand, and the fact that here we distinguish the effect of having same sex eldest siblings according to the second child's date of birth. On the LFS, Moschion (2008) finds that the global effect of having same sex eldest children on the probability to have a third child is about 4 points[12] which is rather close to Breton and Prioux (2005).

To further explore the effect of the sex of the two eldest siblings on fertility, we analyse separately more and less graduated mothers (Table 3). Less graduated mothers are mothers with the school leaving certificate at the most, and more graduated mothers are mothers with a higher diploma than the school leaving certificate.

TABLE 3 - *Ordinary least square estimates of the effect of having same sex eldest siblings on the probability to have a third child according to mothers' level of diploma*

Dependant variable:	More than 2 children							
Subsamples:	Less graduated mothers				More graduated mothers			
	2nd child born >= 1994	2nd child born < 1994	2nd child born >= 1994	2nd child born < 1994	2nd child born >= 1994	2nd child born < 1994	2nd child born >= 1994	2nd child born < 1994
Same sex * 2nd child born >= 1994	0,024*** (0,007)	0,024*** (0,007)	0,000 (0,000)	-0,004 (0,006)	0,016 (0,012)	0,016 (0,012)	0,000 (0,000)	0,003 (0,009)
Same sex * 2nd child born < 1994	0,000 (0,000)	0,000 (0,000)	0,040*** (0,008)	0,029*** (0,006)	0,000 (0,000)	0,000 (0,000)	-0,001 (0,016)	0,022* (0,012)
Other covariates	No	Yes	No	Yes	No	Yes	No	Yes
N	18744	18744	18744	18744	4663	4663	4663	4663
R²	0,0426	0,0531	0,1197	0,4898	0,0364	0,0460	0,1065	0,3994

Levels of significance: *: 10%   **: 5%   ***: 1%

SAMPLE: women with a spouse aged 21 to 35 with at least two children and one of the three first children aged less than three.

NOTE: standard errors (in parentheses) are adjusted for potential serial correlation. Other covariates are age, age at first birth, age difference between the two first siblings (in months), diploma, immigrant status, year fixed

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[12] In this paper, the sample is not restricted to mothers with children aged less than three.

effect and sex of first and second child. Main effect for the Allocation parentale d'éducation (variable '*ape2*') is included in the equation.

Less graduated mothers are mothers with the school leaving certificate at the most, and more graduated mothers are mothers with a higher diploma than the school leaving certificate.

SOURCE: labour force surveys 1990-1998, Insee.

Having same sex eldest siblings increases the probability to have a third child for less graduated mothers only. The effect is negligible for more graduated mothers. For less graduated mothers, the effect of '*same sex*' on fertility is not different according to the second child's date of birth: it equals 0.024 if he is born after July 1994 and 0.029 if he is born before. The effect of the sex of eldest siblings on the probability of having more than two children is not different according to whether the mother could benefit from the *Allocation parentale d'éducation* for her second child or not.

VI.2 Instrumental variable estimates of the effect of fertility on mothers' labour supply

We report in Table 4 the results of ordinary least square and two-stage least square estimations (equation 1). Complete results (including estimates for other covariates) are reported in Appendix 2. The activity rate of mothers in our sample is higher among mothers who had their second child before July 1994 (56.4%) than after (52.6%); and when they work, the average number of hours worked per week is higher (26.3 against 23). These results are consistent with Piketty (2005).

TABLE 4 - *Ordinary least square and Two-stage least square estimates of the effect of having more than two children on labour supply*

Dependant variable:	Labour market participation		Hours / week	
Estimation technique:	OLS	2SLS *Same sex*	OLS	2SLS *Same sex*
More than 2 children * 2nd child born >= 1994	-0,174*** (0,028)	-0,276 (0,602)	-6,71*** (2,46)	-52,49 (41,44)
More than 2 children * 2nd child born < 1994	-0,337*** (0,009)	-0,518** (0,245)	-10,90*** (0,61)	-16,19 (14,93)
N	23407	23407	10669	10669

Levels of significance: * : 10%   ** : 5%   *** : 1%

SAMPLE: women with a spouse aged 21 to 35 with at least two children and one of the three first children aged less than three.

NOTE: standard errors (in parentheses) are adjusted for potential serial correlation. Other covariates are age, age at first birth, age difference between the two first siblings (in months), diploma, immigrant status, year fixed effect and sex of first and second child. Main effect for the Allocation parentale d'éducation (variable '*ape2*') is included in the equation.

SOURCE: labour force surveys 1990-1998, Insee.

The first line of table 4 gives the coefficient of the interaction variable between '*more than 2 children*' and '*ape2*', and the second line gives the coefficient of the interaction variable between '*more than 2 children*' and '*non ape2*' for the different estimation techniques and different labour supply variables. Ordinary least square estimates show that whatever the date of birth of the second child, mothers who have more than two children participate less in the labour market than mothers with two children; and if they are employed, they work less hours per week. If the second child is born after July 1994, the effects of

fertility on labour supply variables are weaker, but still significant at the 1% level. After the reform, mothers with more than two children work less than mothers with two children (the difference in activity rates being 17.4 percent points and the difference in hours worked being 6.71); but these differences were higher before the reform (33.7 percent points in activity rates and 10.90 in hours worked). These estimates do not characterize the evolution of the causal effect of fertility on mothers' labour supply but only the evolution of the correlation. The reform resulted in a reduction of the correlation between having more than two children and mothers' labour supply. This confirms the graphic analysis: every thing else equal, the labour situation of mothers with two children and mothers with more than two children was closer after the reform than before.

Instrumental variable estimates (second and fourth column) produce the causal effect of fertility on mothers' labour supply when *'same sex'* is used as an instrument. They show that the effect of having a third child on labour market participation is stronger when the second child is born before the reform than after. If the second child is born before July 1994, having a third child has a significant negative impact on mothers' working probability (-51.8 percent points) whereas if the second child is born after, the impact of a third birth on mothers' working probability is not significant. However, the difference between the estimates is not statistically significant[13]. The effect of having a third child on hours worked is insignificant before and after the reform, but the estimates are imprecise. The insignificance of the results on hours worked may come from the fact that the sample of employed mothers is too small to identify the effect of fertility on hours worked or it may be that fertility has no causal effect on hours worked either because when mothers are employed, they do not chose to work less when they have a third child or because the number of hours worked is controlled by employers[14].

Mothers who had their second child after the extension of the benefit do not reduce their labour supply when switching from two to more than two children. In other words, when a mother could benefit from the *Allocation parentale d'éducation* for her second child, the birth of a third child did not cause additional withdrawal from the labour market. Thus, before the reform, mothers reduced their labour supply when they had a third child, whereas after the reform, they reduced it from the birth of the second child. Consequently, the participation decision of mothers with at least two children seems to be highly influenced by financial incentives giving them the opportunity to quit the labour market to raise their young children. This is consistent with Piketty's (2005) result indicating that among the 220 000 mothers who benefited from the full rate benefit for their second child at the end of 1997, at least 35% (and probably more than 50%) would not have stopped working without this new financial incentive.

VI.3 Has the reform caused the decrease in the effect of fertility on mothers' labour supply?

In this section, we consider other explanations that may account for these results. On the one hand, the drop in activity rates of mothers' with two children from 1994 could result from specific modifications in their socio-economic characteristics. For example, if their average education level had decreased in this period relatively to that of other mothers; or, if mothers with two children had always been less graduated than others, but that the effect of the

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[13] The difference between the two coefficients is 0.518-0.276=0.242 with a standard error of $(0.245^2+0.602^2)^{0.5} = 0.650$. As a result, the difference is not statistically significant.
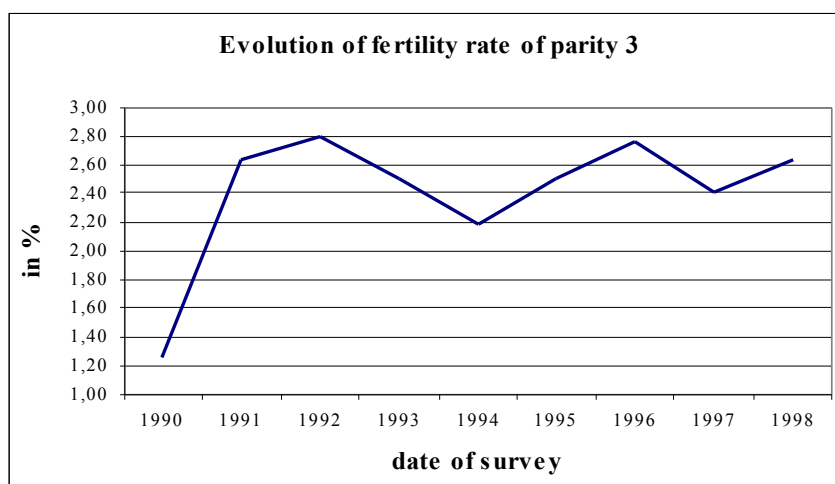
[14] Piling up the LFS between 1990 and 2002, Moschion (2008) finds that having more than two children negatively affects the number of hours worked by employed mothers. The insignificance of the results here may thus be due to the limited number of observations and the fact that we interact the endogenous explanatory variable with dummies indicating whether the second child is born before or after July 1994.

diploma on the activity probability had increased in the period. Piketty (2005) finds that this is not the case and individual characteristics are included in our regressions to eventually control for such effects.

On the other hand, as we produce instrumental variable estimates, in order to attribute the decrease in the effect of having more than two children on mothers' labour supply to the reform, some assumptions need to be verified for our method to hold. In particular, we want to make sure that the reform has not modified the preferences and characteristics of mothers according to the sex of their eldest siblings. If the reform had altered the effect of having same sex eldest siblings on the probability of having a third child (preference modification), this change could be the cause of the decrease in our estimates after the reform. In what sense could the reform have changed parents' preferences as for the sex mix of their siblings? Intuitively the story could be that as before July 1994, only mothers with three children or more can benefit from the *Allocation parentale d'éducation*, mothers could be incited to have a third child. In this case, the financial incentive would have created opportunistic behaviours consisting in having a third child. This behaviour should then be logically less dependant on the sex of the two eldest siblings before than after the reform, when there is no more financial incentive to have a third child. But, according to Table 2, we observe the opposite evolution: the effect of *'same sex'* on the probability to have a third child is insignificantly higher before 1994 than after. This is confirmed by the definition of instrumental variable estimator: $\beta = \text{cov}$ (dependant variable, instrument) / cov (endogenous explanatory variable, instrument). As a result, if the decrease in the effect of fertility on labour supply variables (β) came from a first-stage effect, we should have observed an increase in the effect of the sex of eldest siblings on fertility (denominator), which is not the case. The reform does not seem to have modified parents' preferences.

The financial incentive to have a third child, relative to having two, disappears in 1994. If there had been opportunistic fertility behaviours, we would then observe a decline in fertility rates of parity three from 1995 among two children mothers (whose youngest child is less than three). According to Figure 2, this is not the case: we observe a quite important decrease in 1994 but that was initiated since 1993 and that reverses in 1995. It can consequently not be attributed to the extension of the *Allocation parentale d'éducation*.
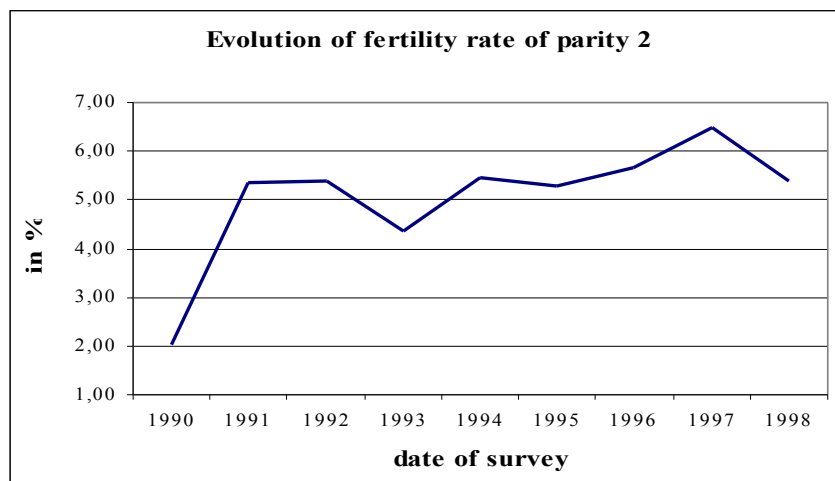
FIGURE 2

SAMPLE: mothers with a spouse aged 21-35 with at least two children and one of the three first children aged less than three.

READING: the fertility rate of parity three gives the proportion of mothers in the sample that had a third child a given year. In 1995, among mothers with a spouse aged 21-35 with two children, 2.5% had a third child.

SOURCE: labour force surveys 1990-1998, Insee.

Symmetrically, the extension of the paid parental leave to mothers with two children could have created opportunistic behaviours consisting in having a second child. In this case, we would observe an increase of second births among mothers with one child from 1995. As shown in figure 3, this is not the case. Apart from lower levels in 1990 and 1993 and a higher level in 1997, the fertility rate of parity 2 is stable. As a result, the reform did not modify fertility behaviours. It thus seems reasonable to suppose that the populations of mothers having a second child before and after the reform are identical.

FIGURE 3

SAMPLE: mothers with a spouse aged 21-35 with at least one child and one of the two first children aged less than three.

READING: the fertility rate of parity two gives the proportion of mothers in the sample that had a second child a given year. In 1995, among mothers with a spouse aged 21-35 with one child, 5.3% had a second child.

SOURCE: labour force surveys 1990-1998, Insee.

Besides, we checked that there are no differences in demographic characteristics between mothers having same sex siblings and those having different sex siblings, before and after the reform. The results in Table 5 show that even though mothers' characteristics have evolved between the two periods, this evolution has been identical for mothers having same sex siblings and those having different sex siblings. The *'same sex'* instrument can be used before and after the reform: its effect on the probability to have more than two children and on labour supply is not explained by differences in mothers' individual characteristics.

TABLE 5 - *Differences in means for demographic variables by 'same sex' for mothers that could benefit from the Allocation parentale d'éducation for their second child*

	Age	Age at first birth	Time span between the first 2 births	French natives	Age at the end of studies	Diploma	2nd birth after 1994	Number of children	3rd child
SS	29,99 (0,062)	24,74 (0,064)	44,12 (0,520)	0,90 (0,006)	19,35 (0,090)	0,24 (0,008)	1,00 (0,00)	2,06 (0,005)	0,061 (0,005)
DS	30,07 (0,060)	24,76 (0,063)	45,12 (0,513)	0,90 (0,006)	19,33 (0,103)	0,24 (0,008)	1,00 (0,00)	2,04 (0,004)	0,039 (0,004)
Diff	-0,081 (0,086)	-0,019 (0,090)	-0,994 (0,731)	0,001 (0,008)	0,022 (0,137)	0,005 (0,012)	0,00 (0,00)	0,024*** (0,006)	0,022*** (0,006)

Levels of significance: *: 10%   **: 5%   ***: 1%

Differences in means for demographic variables by 'same sex' for mothers that could not benefit from the Allocation parentale d'éducation for their second child

	Age	Age at first birth	Time span between the first 2 births	French natives	Age at the end of studies	Diploma	2nd birth after 1994	Number of children	3rd child
SS	30,23	23,47	40,71	0,90	18,41	0,19	0,00	2,41	0,38
	(0,033)	(0,034)	(0,255)	(0,003)	(0,053)	(0,004)	(0,000)	(0,006)	(0,005)
DS	30,17	23,38	41,63	0,90	18,41	0,19	0,00	2,37	0,35
	(0,033)	(0,036)	(0,270)	(0,003)	(0,055)	(0,004)	(0,000)	(0,006)	(0,005)
Diff	0,063	0,089*	-0,920**	-0,005	-0,002	-0,005	0,000	0,034***	0,033***
	(0,047)	(0,050)	(0,371)	(0,004)	(0,077)	(0,006)	(0,000)	(0,008)	(0,007)

Levels of significance: *: 10% **: 5% ***: 1%

VI.4 Robustness

We check our results with a falsification test on fathers. As the conciliation burden rests mostly on women, having more than two children should not affect the labour supply of fathers. Before as after, we should not find a negative effect of having more than two children on their labour supply. This is confirmed in Table 6: whether their second child is born before or after the reform, the instrumental variable estimates show that the effect of having more than two children on fathers' labour supply is never significantly negative.

TABLE 6 - *Ordinary least square and Two-stage least square estimates of the effect of having more than two children on labour supply, sub sample of fathers*

Dependant variable:	Labour market participation		Hours / week	
Estimation technique:	OLS	2SLS Same sex	OLS	2SLS Same sex
More than 2 children * 2nd child born >= 1994	-0,023*	0,168	2,50**	-32,03
	(0,013)	(0,182)	(1,27)	(24,22)
More than 2 children * 2nd child born < 1994	-0,002	0,131*	-0,95**	-11,33
	(0,02)	(0,071)	(0,38)	(10,20)
N	18522	18522	16967	16967

Levels of significance: *: 10% **: 5% ***: 1%

These results are complementary with those obtained for mothers: when the second child is born before the reform and that having more than two children has a negative impact on mothers' labour market participation, the effect on fathers' labour market participation is significantly positive. An explanation to this result could be that before the reform, having a third child incites mothers to withdraw from the labour market, and to compensate for the income loss, fathers increase their participation in the labour market. This hypothesis is supported by the fact that when the second child is born after the reform and that having more than two children has no impact on mothers' labour market participation, the effect on fathers' labour market participation is also insignificant.

OLS estimates also provide interesting results. When the second child is born before the reform, fathers that had a third child did not withdraw from the labour market but some reduced their hours worked. When the second child is born after the reform, some of the fathers that had a third child withdrew from the labour market, but when they are active, they increased their hours worked. These results may come from a generation effect: it may be that the idea of parents' role is changing, and that whereas before it was unconceivable for fathers to interrupt their professional careers when they had a child, it has now become for some of those who have at least three children a possibility.

When the extended sample of mothers aged 21-40 is considered, the first stages, ordinary least squares and two-stage least squares results are confirmed and statistical significance levels are identical. For example, we find that having more than two children reduces significantly mothers' labour market participation by 51.5 percentage points when the second child is born before the reform (the effect is 51.8 on the 21-35), and that the effect is insignificant when he is born after (as on the 21-35).

When using employment rates rather than activity rates, results are significantly different. In this case, we study the employment status of mothers (employed vs. unemployed or inactive) rather than their working decision. We find that having more than two children has no significant effect on mothers' employment probability, whatever the date of birth of the second child. This result implies that their eligibility to the paid parental leave does not alter the causal effect of fertility on mothers' employment. Employment status implies not only mothers' choice to work but also employers' decision to hire them, and this is exactly what differentiates them from unemployed mothers. Employers have no reason to change their employment behaviour after the reform. Thus, finding no difference before and after the reform seems consistent. Moreover, the fact that the effect is insignificant means that when mothers exogenously switch from two to more than two children, they are not less employed. This may indicate that employers do not discriminate mothers of three or more children compared with mothers of two children.

VI.5 Does the effect of fertility on mothers' labour supply vary according to mothers' level of diploma?

Another way to check that the negative effect of the third child on mothers' labour supply really comes from the incentives induced by the *Allocation parentale d'éducation*, is to study the evolution of this effect according to the fact that the second child is born before or after July 1994 on subpopulations. The *Allocation parentale d'éducation* is particularly incentive for some categories of mothers. For example, Afsa (1998) puts forward the fact that the recipients of the *Allocation parentale d'éducation* are mostly low educated women. Consequently, we should find that if the *Allocation parentale d'éducation* explains the negative effect of the third child on mothers' labour supply, on these subpopulations, this

effect should be significantly negative for mothers who had their second child before 1994, whereas it should be non significant for mothers who had their second child after 1994. On the opposite, for more educated mothers, who benefit less from the *Allocation parentale d'éducation*, the effect of the third child on their labour supply should be insignificant whatever the date of birth of their second child.

Results according to mothers' education level are presented in table 7. For all sub-samples and labour supply variables, OLS estimates of the effect of fertility on mothers' labour supply decrease when mothers had their second child after the reform. For less graduated mothers, having a third child decreases the probability of labour market participation by 35 percent points if the second child is born before the reform, whereas it decreases only by 21 percent points if he is born after. These effects are both significant at the 1% level. For more graduated mothers, the effect of a third birth which is significant at the 1% level if the second child is born before the reform becomes insignificant if he is born after.

TABLE 7 - *Ordinary least square and Two-stage least square estimates of the effect of having more than two children on labour supply according to mothers' level of diploma*

Dependant variable:	Labour market participation				Hours / week			
Subsamples:	Less graduated mothers		More graduated mothers		Less graduated mothers		More graduated mothers	
Estimation technique:	OLS	2SLS Same sex	OLS	2SLS Same sex	OLS	2SLS Same sex	OLS	2SLS Same sex
More than 2 children * 2nd child born >= 1994	-0,210*** (0,030)	-0,722 (0,671)	-0,061 (0,059)	1,527 (2,025)	-9,36*** (3,58)	-96,15 (70,67)	-5,42 (3,31)	-19,14 (50,20)
More than 2 children * 2nd child born < 1994	-0,350*** (0,010)	-0,788*** (0,278)	-0,286*** (0,021)	1,078 (1,001)	-11,17*** (0,75)	-8,64 (16,55)	-10,07*** (1,07)	-35,30 (37,53)
N	18744	18744	4663	4663	7462	7462	3207	3207

Levels of significance: *: 10%   **: 5%   ***: 1%

SAMPLE: women with a spouse aged 21 to 35 with at least two children and one of the three first children aged less than three.

NOTE: standard errors (in parentheses) are adjusted for potential serial correlation. Other covariates are age, age at first birth, age difference between the two first siblings (in months), diploma, immigrant status, year fixed effect and sex of first and second child. Main effect for the Allocation parentale d'éducation (variable '*ape2*') is included in the equation.
Less graduated mothers are mothers with the school leaving certificate at the most, and more graduated mothers are mothers with a higher diploma than the school leaving certificate.

SOURCE: labour force surveys 1990-1998, Insee.

Instrumental variable estimates give unbiased estimates of the causal effect of fertility on mothers' labour supply. Having same sex eldest siblings increases significantly the probability to have a third child for less graduated mothers only (Table 3). Within this context, the question is whether the instrumental variables estimates of the effect of having more than two children on a mother's labour market participation depend on mothers' education. The results in table 7 indicate that this is the case. When we focus on the sub-sample of more graduated mothers, we do not find any significant effect of fertility on mothers' labour supply. In contrast, when we focus on the sub-sample of less graduated mothers, some of the effects are negative and significant. Overall, the effect of fertility on mothers' labour supply measured using 'same sex' as an instrumental variable is significant only when the sex of the two eldest siblings affects the probability to have a third child (which

is in the less graduated case)[15]. These findings are consistent with the assumption that the sex of the two eldest siblings affects a mother's labour supply only insofar as it affects her fertility.

More precisely, the estimates show that among mothers having no more than the school-leaving certificate, having more than two children significantly reduces labour market participation for the ones who could not benefit from the *Allocation parentale d'éducation* for their second child whereas it is insignificant for those who could benefit from it, even though the difference between the estimates (which equals 0.066 with a standard error of 0.726) is not statistically significant. It is particularly interesting to notice that when the second child is born before July 1994, the effect on low educated mothers is higher than that on the full sample (-0.788 against -0.518 and standard deviations are close). As anticipated, the effect of having more than two children on mothers' labour supply is significantly negative precisely when mothers with more than two children have specific incentives to quit the labour market. The results on hours worked are very imprecise. They confirm the results in table 4, and no heterogeneity in effects according to mothers' level of education can be put forward.

VI.6 The effect of fertility on mothers' labour supply when twin birth at the second pregnancy is used as an instrument

These results are also comforted when the same procedure is followed with the instrument *'twins-2'*[16] (Table 8). In this case, the fertility shock is produced by the birth of twins at the second pregnancy: *'twins-2'* equals one if the second birth is twin, zero otherwise. As before, we construct an interaction variable between *'twins-2'* and *'ape2'* which equals one if the mother had twins at the second pregnancy and that the second is born after July 1994. The interaction variable between *'twins-2'* and *'non ape2'* equals one if the mother had twins at the second pregnancy and that the second is born before July 1994. These interactions variables are used as instruments for the endogenous explanatory variables: *'more than two children' * 'ape2'* and *'more than two children' * 'non ape2'*.

The instrumental variable estimates on labour market participation confirm the results we had with *'same sex'*. Having more than two children significantly reduces mothers' labour market participation only when the second child is born before the reform (-0.319), whereas the effect is insignificant if he is born after. Moreover, here the difference between the two coefficients (which equals 0.222 with a standard error of 0.076) is statistically significant. Insofar as the results are similar with two instruments that provoke two different fertility shocks, the evolution of the effect of fertility on mothers' labour supply cannot be explained by the evolution of parents' observable characteristics or preferences as a result of the reform. There is no reason why after the reform, the characteristics of parents with same sex siblings should be modified the same way as parents who had twins. It is hardly plausible that the observed evolution of the effect of having more than two children on mothers' labour supply comes in fact from a change in the first-stage effect, namely the effect of *'same sex'* (resp. *'twins-2'*) on the probability of having a third child. Using *'twins-2'* instrument, the estimates on the average number of hours worked are more precise and indicate that a mother reduces significantly her hours worked when having a third child only if she could not benefit from the *Allocation parentale d'éducation* for her second child, although with a difference of 7.17 and a standard error of 5.84, the difference between the two coefficients is not statistically significant.

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[15] Because the sex of the two eldest siblings does not affect the fertility decisions of higher educated mothers, the results reported here cannot be interpreted as an evidence that having more than two children has no effect on high educated mothers' labour supply.

[16] Because the birth of twins is correlated with some individual characteristics of mothers, we only use this strategy to back up our initial results obtained with *'same sex'*.

The dichotomisation of the sample between high / low graduated (Appendix 3) provides interesting results: higher educated mothers have also been affected by the reform since when their second child is born before 1994, having more than two children reduces significantly their activity. But this effect (-0.232) is lower than that on lower educated (-0.338). Coherently with previous results, if their second child is born after 1994, fertility has no effect on their labour supply. For less graduated mothers, we find that having more than two children has a significant negative effect on hours worked if they had their second child before 1994. When they remained in the labour market, more educated mothers did not modify their hours worked whereas less educated did.

TABLE 8 - *Ordinary least square and Two-stage least square estimates of the effect of having more than two children on labour supply*

Dependant variable:	Labour market participation		Hours / week	
Estimation technique:	OLS	2SLS Twins-2	OLS	2SLS Twins-2
More than 2 children * 2nd child born >= 1994	-0,174*** (0,028)	-0,097 (0,061)	-6,71*** (2,46)	0,70 (5,07)
More than 2 children * 2nd child born < 1994	-0,337*** (0,009)	-0,319*** (0,046)	-10,90*** (0,61)	-6,47** (2,89)
N	23407	23407	10669	10669

Levels of significance: *: 10%   **: 5%   ***: 1%

SAMPLE: women with a spouse aged 21 to 35 with at least two children and one of the three first children aged less than three.

NOTE: standard errors (in parentheses) are adjusted for potential serial correlation. Other covariates are age, age, age at first birth, age difference between the two first siblings (in months), diploma, immigrant status, year fixed effect and sex of first and second child. Main effect for the Allocation parentale d'éducation (variable '*ape2*') is included in the equation.

SOURCE: labour force surveys 1990-1998, Insee.

VI.7 The effect of having more than one child on mothers' labour supply

The reform decreased the differences in incentives to quit the labour market between mothers' with two and mothers' with more than two children. Symmetrically, the reform increased the differences between mothers' with one and mothers' with more than one child. To enlarge our result, we evaluate the consequences of the extension of the *Allocation parentale d'éducation* on the behaviour of mothers with one and more than one child (table 9). In the period 1990-1998, mothers with one child could not benefit from a paid parental leave, whereas from 1994, mothers with two children could benefit from the *Allocation parentale d'éducation*. As a result, in the period 1990-1994, mothers with one and two children had no particular incentive to quit the labour market, whereas from 1994, mothers with one and two children were confronted with different incentives. As before, if the *Allocation parentale d'éducation* causes the negative effect of fertility on mothers' labour supply, we should observe an increase of the negative effect of having more than one child on mothers' labour supply if they had their second child after July 1994. Here, we study the impact of switching from one to more than one child on mothers' labour supply. The sample is constituted of mothers who have at least one child and whose first child (if they had only one) or second child (if they had more than one) is less than three. As before, the sample is not selected on the total number of children which would bias our sample, but on the age of

children : as long as the second child is less than three, mothers in our sample can have more than two children.

The results of OLS estimations show that the negative effect of having a second child is lower if the second child is born before the reform than if he is born after. For example, the birth of a second child reduces the probability of mothers' labour market participation by 16.3 percent points if the second child is born before the reform and by 31.5 percent points if he is born after.

TABLE 9 - *Ordinary least square and Two-stage least square estimates of the effect of having more than one child on labour supply*

Dependant variable:	Labour market participation		Hours / week	
Estimation technique:	OLS	2SLS *Twins-1*	OLS	2SLS *Twins-1*
More than 1 child * 2nd child born >= 1994	-0,315*** (0,008)	-0,399*** (0,070)	-8,19*** (0,48)	-9,24** (3,94)
More than 1 child * 2nd child born < 1994	-0,163*** (0,006)	-0,271*** (0,049)	-3,94*** (0,35)	-0,08 (2,69)
N	37217	37217	21723	21723

Levels of significance: *: 10%   **: 5%   ***: 1%

SAMPLE: women with a spouse aged 21 to 35 with at least one child and one of the two first children aged less than three.

NOTE: standard errors (in parentheses) are adjusted for potential serial correlation. Other covariates are age, age at first birth, diploma, immigrant status, year fixed effect.

SOURCE: labour force surveys 1990-1998, Insee.

To identify the causal effect of having more than one child, we use a shock on the second birth, namely twin birth at the first pregnancy. We build two interaction variables: the first one between *'more than one child'* and *'ape2'* equals one if the mother had had a second child and that he is born after July 1994[17]; the second one between *'more than one child'* and *'non ape2'* equals one if the mother had had a second child and that he is born before July 1994. The variable *'more than one child'* is instrumented by the variable *'twin-1'* in two-stage least squares estimations. The coefficients of the two interaction variables give the effect of having more than one child on mothers' labour supply (compared to having only one) in two different context: whether mothers could (or not) benefit from the *Allocation parentale d'éducation* for their second child[18]. The comparison of these two coefficient gives the evolution of the effect of having more than one child on mothers' labour supply.

Instrumental variable estimates show that the effect of having more than one child on mothers' labour supply is higher after the reform: before the reform, having a second child caused a reduction of 27.1 percent points in labour market participation and had no effect on hours worked; after the reform, the reduction was 39.9 percent points in labour market

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[17] This interaction variable equals zero if she could not benefit from the *Allocation parentale d'éducation* for her second child, that is if her second child is born before July 1994 or if she only has one child.

[18] The only difference with the previous exercise is that instead of having four modalities (having two children and the second is born before July 1994, having two children and the second is born after July 1994, having three children or more and the second is born before July 1994, having three children or more and the second is born after July 1994), we have only three : having one child, having two children or more and the second is born before July 1994, having two children or more and the second is born after July 1994. As a consequence, so that the effect of the *Allocation parentale d'éducation* can be identified, we remove the variable 'ape2' from the covariates. Thus, every coefficient can be interpreted relatively to the situation where mothers had only one child.

participation and 9.24 in hours worked. The difference between the estimates (which equals 0.128 (0.085) for labour market participation and 9.16 (4.77) for hours worked) are statistically significant for hours worked (at the 10% level). As a result, the reform has worsened the consequences of second births on mothers' labour supply, in terms of labour market participation and in terms of hours worked.

When the sample is separated according to mothers' level of diploma (Appendix 4), differences appear. For less graduated mothers, the reform has moderately increased the negative effect of a second birth both on mothers' participation and on hours worked (the effect on labour market participation increases slightly and the effect on hours worked remains insignificant when the second child is born after the reform). The main change appears for more graduated mothers: when their second child is born before the reform, his birth had no consequences on mothers' labour supply; on the contrary, when the second child is born after the reform, his birth significantly decreased mothers' labour market participation (at the 1% level) and hours worked (at the 5% level). This result is quite counterintuitive: because the benefit is quite low, the change in graduated mothers' behaviour seems unexpected. As a result, it seems however that the low benefit offered to mothers with two children affected their behaviour.

VII Conclusion

This paper evaluates the consequences of the French paid parental leave in terms of balancing work and family life for mothers by measuring how the reform of 1994 alters the effect of the number of children on mothers' activity. The extension of the *Allocation parentale d'éducation* modified the impact of fertility on mothers' labour supply. First, the negative impact of switching from one to two children on mothers' labour supply increased for less graduated mothers and quite importantly for more graduated mothers. The negative effect of fertility on mothers' labour market participation remains higher for less graduated however. Second, the reform created the same incentives for mothers with two and mothers with more than two children. As a result, the negative effect of having more than two children disappears when the second child is born after July 1994. In particular, after the reform, less graduated mothers do not reduce their labour supply anymore after the birth of a third child; and more graduated mothers do not withdraw from the labour market after the birth of a third child.

Consequently, whereas before 1994, mothers mainly reduced their labour supply when they had a third child, since 1994, withdrawals occur for the second birth. Precisely, before the reform, more graduated mothers possibly reduced their labour market participation after the birth of a third child; after the reform, they reduced their labour market participation and also their hours per week as soon as a second child is born. Concerning less graduated mothers, before the reform, they reduced their labour market participation after the birth of a second and a third child; whereas after the reform, all the reduction in their labour market participation occurred after the birth of a second child.

The effect of the number of children on mothers' labour supply thus seems to be partly indirect and come from financial incentives. The effect of having more than two children on mothers' labour supply is significantly negative precisely when only mothers with more than two children are eligible to the paid parental leave. Also, the negative effect of having more than one child on mothers' labour supply is higher precisely when mothers with more than one child are eligible to the paid parental leave. When they are exclusively directed towards mothers with three children or more, mothers withdraw from the labour market after the third birth; but when they are also directed towards mothers with two children, working

adjustments occur from the second birth. As a result, the *Allocation parentale d'éducation* does not help mothers to balance work and family life, which supposes that mothers keep on working while taking care of their children, but rather favours an alternation between professional and family life for eligible mothers.

Family policy is characterized by a set of measures whose effect as a whole is hardly measurable. Using the 1994 reform of the paid parental leave, we isolate the impact of this specific measure on the effect of fertility on mothers' labour supply. Our results suggest that every other measure equal, the paid parental leave strongly affects the effect of fertility on mothers' labour supply. The results are thus conditional on the set of measures that characterize French family policy: the effect of the paid parental leave would certainly differ if for example the supply of child care for young kids was different. This is why cross country analysis would be hardly interpretable: if the effect of fertility on mothers' labour supply differs, how can the contribution of the different elements of family policy be disentangled?

The effect of fertility on labour supply could vary not only with the characteristics of the eligible population to the paid parental leave but also with the characteristics of the device. The methodology used in this paper could also be used to assess how the characteristics of the paid parental leave (duration, amount of the benefit) alters the effect of fertility on parents' labour supply and thus the possibilities of combining family and professional responsibilities. For example, since the 1st of July 2006, parents of three children and more can chose a paid parental leave restricted to one year but that is better compensated (750 euros). It would be particularly interesting to evaluate if this new possibility facilitates the combination of professional and family responsibilities.

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APPENDIX 1 - *Ordinary least square estimates of the effect of having same sex eldest siblings on the probability to have a third child*

Dependant variable:	*More than 2 children*	
	2nd child born >= 1994	2nd child born < 1994
Same sex * 2nd child born >= 1994	0,022*** (0,006)	-0,003 (0,005)
Same sex * 2nd child born < 1994	-0,000 (0,000)	0,028*** (0,005)
Age		
21-25	-0,012*** (0,003)	-0,908*** (0,010)
26-30	-0,005*** (0,002)	-0,453*** (0,005)
31-35	ref.	ref.
Age at 1st birth	-0,002*** (0,000)	-0,104*** (0,001)
Age difference between the two first births	-0,002*** (0,000)	-0,009*** (0,000)
Diploma		
No diploma	0,006** (0,003)	-0,017* (0,009)
Diploma <= school leaving certificate	-0,002 (0,003)	-0,055*** (0,009)
School leaving certificate	-0,004 (0,003)	-0,050*** (0,010)
School leaving certificate + 2 years	0,004 (0,003)	-0,040*** (0,010)
Diploma > school leaving certificate + 2	ref.	ref.
Year fixed effects		
1990	-0,028*** (0,004)	-0,165*** (0,011)
1991	-0,028*** (0,004)	-0,175*** (0,010)
1992	-0,028*** (0,004)	-0,172*** (0,010)
1993	-0,028*** (0,004)	-0,162*** (0,011)
1994	-0,028*** (0,004)	-0,175*** (0,010)
1995	-0,033*** (0,004)	-0,108*** (0,009)
1996	-0,038*** (0,005)	-0,043*** (0,007)
1997	-0,026*** (0,006)	0,003 (0,007)
1998	ref.	ref.
Immigrant status	-0,004 (0,003)	-0,037*** (0,008)
Sex of the first child	-0,001 (0,014)	-0,002 (0,004)
Sex of the second child	0,002 (0,014)	0,002 (0,004)
Allocation parentale d'éducation	0,033*** (0,004)	-0,286*** (0,008)
Number of observations	23407	23407

Levels of significance: *: 10% **: 5% ***: 1%

S<small>AMPLE</small>: women with a spouse aged 21 to 35 with at least two children and one of the three first children aged less than three.

N<small>OTE</small>: standard errors (in parentheses) are adjusted for potential serial correlation. Other covariates are age, age at first birth, age difference between the two first siblings (in months), diploma, immigrant status, year fixed effect and sex of first and second child. Main effect for the Allocation parentale d'éducation (variable '*ape2*') is included in the equation.

S<small>OURCE</small>: labour force surveys 1990-1998, Insee.

APPENDIX 2 - *Ordinary least square and Two-stage least square estimates of the effect of having more than two children on labour supply*

Dependant variable:	Labour market participation		Hours / week	
Estimation technique:	OLS	2SLS Same sex	OLS	2SLS Same sex
More than 2 children * 2nd child born >= 1994	-0,174*** (0,028)	-0,276 (0,602)	-6,71*** (2,46)	-52,49 (41,44)
More than 2 children * 2nd child born < 1994	-0,337*** (0,009)	-0,518** (0,245)	-10,90*** (0,61)	-16,19 (14,93)
Age				
21-25	-0,171*** (0,017)	-0,337 (0,223)	-11,85*** (1,19)	-16,32 (11,92)
26-30	-0,050*** (0,009)	-0,133 (0,112)	-4,96*** (0,53)	-7,33 (6,25)
31-35	ref.	ref.	ref.	ref.
Age at 1st birth	0,001 (0,002)	-0,018 (0,026)	-1,14*** (0,10)	-1,67 (1,42)
Age difference between the two first births (months)	0,001*** (0,000)	-0,001 (0,002)	-0,068*** (0,010)	-0,114 (0,120)
Diploma				
No diploma	-0,264*** (0,012)	-0,267*** (0,014)	2,88*** (0,67)	2,49** (1,25)
Diploma <= school leaving certificate	-0,185*** (0,012)	-0,195*** (0,019)	2,97*** (0,63)	2,43* (1,48)
School leaving certificate	-0,090*** (0,012)	-0,100*** (0,018)	2,63*** (0,67)	2,04 (1,26)
School leaving certificate + 2 years	-0,015 (0,013)	-0,022 (0,016)	1,55** (0,66)	1,56 (1,14)
Diploma > school leaving certificate + 2	ref.	ref.	ref.	ref.
Year fixed effects				
1990	-0,018 (0,016)	-0,051 (0,048)	-1,04 (0,92)	-2,76 (2,82)
1991	-0,026* (0,016)	-0,061 (0,050)	-3,35*** (0,93)	-5,05* (2,77)
1992	-0,020 (0,015)	-0,054 (0,049)	-3,75*** (0,94)	-5,48* (2,85)
1993	-0,010 (0,016)	-0,043 (0,047)	-4,00*** (0,93)	-5,71** (2,74)
1994	0,005 (0,015)	-0,030 (0,050)	-3,99*** (0,94)	-5,65** (2,60)
1995	0,011 (0,015)	-0,012 (0,037)	-3,23*** (0,88)	-4,76** (2,13)
1996	0,008 (0,014)	-0,004 (0,030)	-3,43*** (0,79)	-4,89*** (1,64)
1997	0,013 (0,013)	0,011 (0,020)	-1,10 (0,75)	-1,93* (1,06)
1998	ref.	ref.	ref.	ref.
Immigrant status	0,119*** (0,010)	0,112*** (0,014)	-0,054 (0,730)	-0,365 (0,800)
Sex of the first child	-0,001 (0,006)	-0,002 (0,006)	0,523 (0,337)	0,427 (0,357)
Sex of the second child	-0,008 (0,006)	-0,008 (0,006)	-0,014 (0,336)	0,065 (0,353)
Allocation parentale d'éducation	-0,190*** (0,011)	-0,240*** (0,077)	-5,51*** (0,67)	-5,46* (3,30)
Number of observations	23407	23407	10669	10669

Levels of significance: * : 10%   ** : 5%   *** : 1%

SAMPLE: women with a spouse aged 21 to 35 with at least two children and one of the three first children aged less than three.

NOTE: standard errors (in parentheses) are adjusted for potential serial correlation. Other covariates are age, age at first birth, age difference between the two first siblings (in months), diploma, immigrant status, year fixed effect and sex of first and second child. Main effect for the Allocation parentale d'éducation (variable '*ape2*') is included in the equation.

SOURCE: labour force surveys 1990-1998, Insee.

APPENDIX 3 - *Ordinary least square and Two-stage least square estimates of the effect of having more than two children on labour supply according to mothers' level of diploma*

Dependant variable:	*Labour market participation*				*Hours / week*			
Subsamples:	Less graduated mothers		More graduated mothers		Less graduated mothers		More graduated mothers	
Estimation technique:	OLS	2SLS *Twins-2*	OLS	2SLS *Twins-2*	OLS	2SLS *Twins-2*	OLS	2SLS *Twins-2*
More than 2 children * 2nd child born >= 1994	-0,210*** (0,030)	-0,142* (0,075)	-0,061 (0,059)	-0,067 (0,097)	-9,36*** (3,58)	-3,83 (7,59)	-5,42 (3,31)	3,47 (6,75)
More than 2 children * 2nd child born < 1994	-0,350*** (0,010)	-0,338*** (0,049)	-0,287*** (0,021)	-0,232** (0,118)	-11,17*** (0,75)	-7,82** (3,38)	-10,07*** (1,07)	-2,05 (5,33)
N	18744	18744	4663	4663	7462	7462	3207	3207

Levels of significance: *: 10%   **: 5%   ***: 1%

SAMPLE: women with a spouse aged 21 to 35 with at least two children and one of the three first children aged less than three.

NOTE: standard errors (in parentheses) are adjusted for potential serial correlation. Other covariates are age, age at first birth, age difference between the two first siblings (in months), diploma, immigrant status, year fixed effect and sex of first and second child. Main effect for the Allocation parentale d'éducation (variable '*ape2*') is included in the equation.
Less graduated mothers are mothers with the school leaving certificate at the most, and more graduated mothers are mothers with a higher diploma than the school leaving certificate.

SOURCE: labour force surveys 1990-1998, Insee.

APPENDIX 4 - *Ordinary least square and Two-stage least square estimates of the effect of having more than one child on labour supply according to mothers' level of diploma*

Dependant variable:	*Labour market participation*				*Hours / week*			
Subsamples:	Less graduated mothers		More graduated mothers		Less graduated mothers		More graduated mothers	
Estimation technique:	OLS	2SLS *Twins-1*	OLS	2SLS *Twins-1*	OLS	2SLS *Twins-1*	OLS	2SLS *Twins-1*
More than 1 child * 2nd child born >= 1994	-0,364*** (0,010)	-0,458*** (0,089)	-0,178*** (0,015)	-0,286*** (0,110)	-7,88*** (0,60)	-7,88 (5,57)	-8,81*** (0,80)	-11,15** (5,37)
More than 1 child * 2nd child born < 1994	-0,185*** (0,008)	-0,304*** (0,055)	-0,101*** (0,011)	-0,136 (0,102)	-3,30*** (0,41)	-3,26 (2,79)	-5,40*** (0,63)	3,83 (4,57)
N	28388	28388	8829	8829	14968	14968	6755	6755

Levels of significance: *: 10% **: 5% ***: 1%

SAMPLE: women with a spouse aged 21 to 35 with at least one child and one of the two first children aged less than three.

NOTE: standard errors (in parentheses) are adjusted for potential serial correlation. Other covariates are age, age at first birth, diploma, immigrant status, year fixed effect.
Less graduated mothers are mothers with the school leaving certificate at the most, and more graduated mothers are mothers with a higher diploma than the school leaving certificate.

SOURCE: labour force surveys 1990-1998, Insee.