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Does the Cost of Child Care Affect Female Labor Market Participation ? An Evaluation of a French Reform of Childcare Subsidies

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Does the cost of child care affect female labor market participation? An evaluation of a French reform of childcare subsidies*

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Abstract

This study evaluates the impact of an increase in childcare subsidies on the use of paid childcare and the participation rate of mothers of preschool children. We use a natural experiment provided by the PAJE, a French reform in family allowances introduced in 2004. This reform temporarily creates discrepancies in the childcare subsidies received by families according to the year of birth of the children. We apply a difference-in-differences strategy on exhaustive French fiscal data that provide information on gross income as well as on the use of paid childcare services between 2005 and 2008. We use the fact that the new policy results in a significant increase in the use of paid childcare services. The effect on the labor force participation of mothers is significant but of a smaller magnitude. It is higher for mothers of large families, but does not correspond to full-time employment.

Keywords: Mother's labor supply, Child care subsidy, Difference-in-Differences
JEL Classification: D13, H24, H31

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1 Introduction

Policies that help to balance family and work have been considered as the most efficient way of increasing the female participation rate in OECD countries (see for instance Jaumotte, 2003). Childcare may represent a substantial cost and it is seen as an obstacle to labor force participation. The international literature generally confirms the link between women's labor supply and childcare costs, although the estimates are spread across a rather wide range (see for instance Blau and Tekin, 2007 for a review of studies using US data). One challenge for the identification of the impact of childcare costs on participation of mothers lies in its endogeneity. Recent literature thus tries to isolate exogenous variation in childcare costs to identify labor supply responses. For instance, recent papers use the introduction of universal subsidized childcare spaces (Havnes and Mogstad, 2011 in Norway, Lefebvre and Merrigan, 2008 for the province of Quebec in Canada). They find a large impact of the availability of such childcare facilities on labor participation of mothers with children of preschool age, which can be long-lasting (Lefebvre et al., 2009). Conversely, the introduction of policy programs that reduce work incentives for parents, such as long parental leaves, or "cash-for-care" programs, has a large negative impact on female participation (see Piketty, 2003 for France and Schøne, 2004 for Norway). Additionally, career breaks for childraising appear to have an impact on wages, but the durability of this effect is still controversial (Lequien, 2012, Lalive and Zweimuller, 2009).

The impact of childcare cost on the use of childcare facilities and the mother's decision to participate are likely to vary with the characteristics of households as well as with the institutional context. In the United States, evidence suggests that low-income households and single mothers are the most responsive to a change in childcare costs (for instance Gathmann and Sass, 2012, Tekin, 2007). In most European countries, childcare facilities are highly regulated and subsidized, but characterized by a high rationing of demand. Compared to other OECD countries, France has an intermediate position in terms of childcare facilities. A publicly funded preschool system guarantees free and high quality childcare for all children above the age of three. However, parents of younger children face a shortage of infant and toddler care. If public low-priced nurseries do exist for younger children, the number of slots is much lower than the demand. Public nurseries are complemented by a system of private qualified childminders. In this case, the cost is partly subsidized by family allowances and childcare subsidies but it can nevertheless be prohibitive for some low-income families. The scheme of childcare subsidies is highly nonlinear, being divided into several brackets, which introduces nontrivial disincentive effects. Besides, it depends on the total household income (thus including the mother's income) and the actual amount of childcare subsidy varies when parents choose to participate in the labor force. The identification of the impact of childcare subsidies is thus blurred by selection effects. As far as we know, very few empirical studies evaluate the impact of these subsidies on the participation rate of French women (one noticeable exception being Choné et al., 2004).

This paper provides new insights on this issue. It evaluates the impact of childcare subsidies on the participation rate of mothers of young children and on the use of paid childcare. In order to deal with endogeneity issues, it uses a quasi-experiment created by a 2004 reform of the French system of family allowances that substantially increases childbearing and childcare subsidies. The new scheme concerned all families with a child born after 1 January 2004, while families with a child born prior to this date were still covered by the old scheme. For a period of a few years, some families with young children were under the old scheme of childcare subsidies while others were under the new one. A simple model of labor force participation helps to clarify the effects of these schemes, and the changeover from one to the other, on the participation deci-

sions of mothers. A difference-in-differences strategy is then used to estimate the impact of the reform, using an exhaustive fiscal dataset. This dataset provides information on yearly earnings of households as well as on the use of paid childcare by families. The results suggest a positive if small impact of the increase in childcare subsidies on the use of paid childcare as well as on the participation rate of mothers of young children. The results suggest that the changeover from one childcare subsidy scheme to another has impacted the labor force participation of mothers of large families through part-time employment. It has induced some one-child mothers (whose participation rate was already high) to increase the level of their participation in the labor force. The estimated impact of the reform is slightly higher on the use of paid daycare than on the participation rate. This suggests that the rise in childcare subsidy led to a substitution of paid care for informal care. The reform has had no detectable impact on the labor force participation of fathers.

The following section presents the French system of childcare and the changes introduced by the 2004 reform. It also proposes a simple structural model for female participation that helps to illustrate the endogeneity issues arising from the childcare subsidies scheme and the impact of the reform of childcare subsidies. Section 3 presents the identification strategy and the data, while section 4 presents the results. Finally, section 5 concludes.

2 Background and Conceptual Framework

2.1 French childcare policy and the PAJE reform

The French family policy for children between two or three years old and six years old is based on free full-day preschool programs. In 2009, 100% of three-year-old children and 20% of two-year-old children were enrolled in non-compulsory preschool programs ("école maternelle"). These preschools (which provide a state mandated curriculum) are completely free of charge for families. Most of the paid childcare for children between 3 months old (the end of maternity leave) and 3 years old is provided by qualified childminders, who care for children in their own homes. They are regulated by the state and must be certified; they are also regularly inspected and must attend professional training classes. The cost of this form of daycare is set privately, through agreement between the provider and the family. In 2007, the average cost for full-time daycare varied across counties depending on the local density of slots: the gross cost (before subsidies and tax cuts) was on average 477 euros in counties with more than 41 places per 100 children under 3, and 653 euros in those with less than 18 places (Blanpain, 2009). The number of slots available corresponds to around one third of young children in 2007. Additionally, publicly funded nurseries provide high quality childcare for children as young as three months. As the cost is quite modest for low-income families (it is a function of the parents' wage: for one child, it is generally 0.6% of their monthly wages for each day of care)[1] for a high quality of service, such nurseries are regarded as the number one childcare option by French families. However, the supply is much less than the demand. On average, the number of slots is 14 per 100 children aged 3 or less, but may be as low as 4 per 100 children in some French counties.

Several public programs alleviate the financial burden of child care for families. This alleviation consists of direct subsidies and tax credits. Firstly, a monthly subsidy is provided for low-income families with young children whatever daycare system is used, and even if the child is cared for at home by his parents. This so-called "base subsidy" amounted to 165 euros per month

[1]The average cost is 166 euros a month for households whose standard of living is under 1,100 euros and 393 euros if their standard of living is higher than 2,300 euros a month, see (Blanpain, 2009). It can be far higher for high-income families. These figures do not take into account tax credits, and local subsidies.

in 2005, provided that the total family income lay below a set threshold. This threshold was around 24,000 euros in 2003 for one-child double-income families (it increases with the number of children in the family, see Table A.1 in the Appendix A for details). It is reduced by 30% in the case of single-income couples compared to double-income families (or single-parent ones). In addition, an extra subsidy ("childcare subsidy") is given to families which employ a qualified childminder or an in-home nanny. This subsidy ranged from 155 to 362 euros per month in 2005 depending on family income, family size and age of children (see Table A.2). Families are also exempted from the bulk of social security contributions for the wage of a qualified childminder. Lastly, all households which use paid childcare can claim a tax credit of up to 50% at the end of the civil year for their childcare expenses.

These subsidies and tax cuts were introduced on different timetables, and prior to 2004 families faced a complex system. To put an end to this situation, a single desk system for both allowances and social security declarations (for families hiring a qualified childminder) was created in 2004. The new system, called "PAJE "(*Prestation d'accueil du Jeune Enfant*: literally "benefit for the care of young children"), aims at alleviating the administrative burden for families and creating a streamlined system for all childcare subsidies. All families with a child born after 1 January 2004 benefit from these services until the sixth birthday of this child (the birth of a child in 2004 or after entitles the whole family to enter the new system instead of the old one). This measure was announced in principle on 29 April 2003 at the conclusion of a roundtable on family policy - *"Conférence sur la Famille"* - and was officially implemented by the law 2003-1199 of 18 December 2003. Dedicated public centers for maternal and infant support systematically provide information to all families with newborn or small children. Families affected by the new measure were thus aware of the amount of subsidy they could claim; this information was also provided by the French family benefits office.

The PAJE reform sharply increases childcare subsidies, and reduces the number of income brackets (from four to three). The reform is especially generous toward median-income families. Figure 1 presents the scheme of the subsidies under the new and old systems according to the household income for a double-income family with one child (see Appendix A for details). Having a child born in 2004 rather than 2003 may increase the childcare subsidy claimable in 2005 by as much as 350 euros a month. The final subsidy may cover the bulk of the cost of paid daycare, but families are required to contribute at least 15 % of the cost of their childcare. Aside from these subsidies, the program also extends the entitlement to parental leave (a total or part-time stay-at-home subsidy) to one-child families; it was previously restricted to large ones. This subsidy might counteract the impact of the increase in childcare subsidies, as it might disincentivize mothers to work. However, this parental leave has a maximum duration of six months for one-child families (whereas the maximum duration is three years for larger families).

The new scheme of subsidies results in an increase in the amount of childcare subsidy a household can claim. This increase affects all households, and is very substantial for some of them. To illustrate this, we simulate the amount of childcare subsidy a household can claim, under the new and the old schemes respectively. We use the distribution of incomes in 2005, for families having their first child in 2006. Using the earnings of families with no children in 2005 (but with a child in 2006) allows us to avoid the impact of one birth on labor market participation. According to this simulation, the new scheme dramatically increases total childcare subsidies on a yearly basis for medium-earnings households (between the sixtieth and eightieth percentiles of the distribution of income in 2005, see Figure A.1). These households could claim 1,600 euros per year under the old scheme, whereas the corresponding amount is nearly 5,000 euros per year

under the new one. This is mostly due to the rise in the base subsidy threshold, which benefits some families who did not get this childcare benefit before the reform. The increase also appears impressive for low-income families. Finally, one can evaluate the change in the average net cost of paid childcare for households using a qualified childminder. For the sake of comparison the average gross cost of a full-time qualified childminder in 2005 was 6,180 euros (515 euros a month, according to Blanpain, 2009).

2.2 Childcare reform and labour supply

A simple labor market participation model helps to illustrate the expected impact of the new scheme of childcare subsidy and to motivate the empirical analyses. The model highlights the fact that families face very different cost reductions depending on their income, as the childcare subsidies scheme is highly nonlinear. As the scheme relies on the total income of households and also favors dual-income couples compared to single-income couples, the mother's decision to participate in the labor force is highly endogenous. The model helps to clarify these effects.

More specifically, let us consider a family with a small child eligible for childcare subsidy. For the sake of simplicity it is assumed that only the mother arbitrates between participation in the labor force, which entails using paid daycare, and staying at home to take care of the child. According to standard theories of labor supply, the mother will choose to participate in the labor force, or not, depending on a maximization of a utility function $U(L, C)$ that depends on consumption (C) and the utility derived from staying at home ("Leisure" $L = 1 - P$, where P is participation in the labor market), subject to a budget constraint. Mothers differ in particular in their individual preferences for staying at home, as well as in their expected earnings on the labor market. The budget constraint depends on the male earned income, as well as on childcare subsidies. It integrates the earned income of the mother if she chooses to work outside the house, net of the gross cost of the paid daycare. The model concentrates on the discrete decision to participate, not on the amount of time spent at work, and P is thus a dummy. This is consistent with the childcare subsidy scheme, as it dramatically varies between double and single income families, whatever level of working time is provided by household members.

The participation in the labor force of a mother depends notably on her expected earning in the labor market, any individual preference for staying at home and her spouse's income. Under mild assumptions it can be shown that for given levels of both individual preference for staying at home and spousal income, there exists a critical value such that it is optimal for the mother to participate if her expected earnings are greater than this level. For a given value of individual preference for staying at home, this "reservation-wage-like value" is an increasing function of the spouse's income almost everywhere. However, the nonlinear subsidy scheme may alter the decision to participate in a non-trivial way. A working mother may benefit from a childcare subsidy, but the amount is conditional on the total income of the family, with several brackets. For a given level of spouse's income, two mothers with closely similar values of expected earnings may receive different amounts of childcare subsidy (because the total income of one household crosses into a higher bracket under the childcare scheme while the other does not) and thus face different incentives to participate in the labor force. In addition to this childcare subsidy, all families with a small child benefit from a "base subsidy," provided that their total income is under a set threshold. This threshold is much lower for single-income couples than for dual-income households. Unlike childcare subsidy, the base subsidy may increase the financial incentives to participate of some mothers. These different effects are illustrated in the Figure 2 (left panel) which uses a simplified labor supply model calibrated with the actual subsidies scheme (for details of calculation see the Appendix C) and represents the optimal choice of a

mother depending on her spouse's income and her own expected earning in the labor force. The grayed area corresponds to the value of incomes such that participation is the optimal choice for a mother. The subsidy depends on the position of the *sum* of the mother's and father's incomes (respectively w and R) relative to the thresholds T_1, T_2, T_3 corresponding to the scheme of childcare subsidies. Crossing a threshold triggers a sharp decrease in the amount of childcare subsidy a family may receive and thus changes the financial incentives. This is illustrated by the line defined by $w + R = T$. By contrast, the threshold corresponding to the base subsidy for single-income families (T_{SI}) has reverse effects. Indeed, the reservation rate of a mother sharply drops around this threshold (since just above this threshold single-income households do not benefit from the base subsidy but double income families do).

This simple model provides several keys for analyzing the impact of the reform of the childcare subsidies scheme, in which both the amount of the childcare subsidies and the thresholds are raised. As illustrated in Figure 2 (right panel), the expected impact should be a decrease in the reservation wage almost everywhere. The dark gray area corresponds to the value of household income where participation is optimal under the new scheme while it was not under the old one (for a given level of preference for staying at home). This highlights the fact that the magnitude of the reform varies markedly depending on both incomes.

Several remarks are called for. The effect of the reform depends on a number of factors that are not observable. The participation decision especially depends on the joint distribution of the male and female income, the potential wage and the individual preference for staying at home: only the first of these components is observable. The potential wage is indeed observed only for women who decide to participate, and the average observed wage of working mothers depends on this endogenous decision. A second related point is that using the scheme for the identification of the impact of subsidies (comparing medium and high-income families respectively under new or old schemes for instance) would produce biased estimates. The fact is that the scheme is related to the total income of the household, something that is endogenous to the labor force participation decision of a mother. Besides, we cannot use a control group based on the sole observation of the spouse's income. Even in the very simplified model considered for Figure 2, it is impossible to characterize the households that are the most likely to change their choices about working because of a reform merely from the observation of spousal incomes.The relation is not deterministic (and the profile is expected to change depending on individual preferences for staying at home). Finally, this simple model neglects the effect of the French tax system. The French personal income tax system can distort the labor force participation choices of women, as it favors single-income couples compared to double-income ones (see Laroque and Salanié, 2002, for a complete description of the tax and benefit system and the related incentives).[2] However, the tax schedule was stable over the period under study. We may thus expect the disincentive effects to be the same for households from one year to another.

These remarks will guide our identification strategy. In order to evaluate the impact of the new childcare subsidy scheme on labor force participation, we will compare mothers in families that fall under the new scheme versus families that fall under the old one. These groups are defined by the birth year of their children, as the new scheme applied to all families with a child born in 2004 or after.

[2]As the progressive income tax is computed at the household level, the marginal tax rate of the income tax for dual-income families is higher than for single incomes ones.

3 Data and Empirical Strategy

3.1 Data

We use the exhaustive administrative database of income tax returns, which is available from 2005 to 2009. This database provides us with accurate information on the gross income of each household member,[3] as well as on the household composition (in particular, the number of children and the birth year of each member of the household). The individual income (which can be earned income or unemployment benefit) yields a measure of participation in the labor force: we consider a person as participating in the labor force when his/her yearly income is not null. Aggregated data at the household level provide an estimate of the amount of childcare subsidies a family is eligible for. Besides, we have information on the use of childcare services. As childcare expenses are partially refunded by a tax credit, households report their yearly outlay on childcare expenses on their tax returns. This variable includes all childcare services outside the home and thus mixes expenditure for both nurseries and qualified childminders. It represents the amount paid by the household *net* of childcare subsidies - meaning that a rise in subsidies mechanically results in a decrease in the expenditure reported on the income tax return.

Finally, we add information on the supply of paid daycare, using an annual dataset on the number of daycare places (provided by the French Ministry of Social Affairs). We have information on the number of nurseries and childcare providers per 100 children (ages 0-3 years old) at the county level (French "départements ").

We define as labor force participants all those who declared any type of earned income or unemployment benefit during the year. We also consider more precise definitions of employment, using information on wages received. We do not have access to the amount of working time or to hourly wage rates. We will use measures that provide indirect information on working time. We evaluate in particular whether a mother has declared less than half the yearly minimum wage or less than the minimum wage. This necessarily corresponds to annual part-time working time, as minimum wage applied to all employees in every working situations.

As we are primarily interested in the participation rate of mothers of young children, we restrict the sample to households including a woman aged 20-55 and whose youngest child is 0, 1, 2, or 3 years old. This represents around 6% of all French households. Using our main definition, the yearly labor force participation rate of French women aged 20-55 in a couple is around 77% on average (see Table B.2).[4]

The participation rate of mothers of young children (younger than three years old) is lower by 3 points, however. It also varies strongly with family size. If the first child has no impact on the labor market participation of women, the participation rate of mothers of three children or more drops by 20 points compared to women without any children, from 82% to 62%. The participation rate of mothers of young children is 75%, but only 54% if a woman has three children with one under three years old. This is partly explained by subsidies providing incentives to parents (in fact mothers) to stay at home, and by a tax system which is favorable to single-income families. Both these elements discourage the labor force participation of mothers

[3] In France, the members of a household are likely to declare their income separately - this is for example the case of unmarried couples. That is why tax data usually give information at the level of the "tax household", defined by a unique tax return. But here we may rely on a complementary database - local residence tax data - which allows us to reconstruct households when separate tax returns are filled.

[4] The definition of participation differ from the usual ILO definition that corresponds to participation at one given date. Using the French LFS, the ILO participation rate of women aged 20-55 in a couple is 76.1% at the first quarter of 2005 (see Appendix B).

of young children. Piketty (2003) for instance shows that in 1994, the extension of the stay-at-home subsidy to two-child families (it was previously restricted to families with three children or more) resulted in a drop in the participation rate of affected mothers by at least 10 percentage points. By contrast, the participation rate of fathers is very high and does not change with the family size and the age of children. It is lower for men in childless households. This might be due to the fact that men usually wait for a stable job before having their first child, but also to the fact that in our sample men in childless households are older (and thus more often past the retirement age) than men in households with children. According to our definition of labor force participation (having declared any earned income or unemployment benefit during the year), most of the impact of childbearing on participation is observable for mothers of a one-year-old child and mothers of a two-year-old child (Figure B.1). The age of children is in fact measured at the end of the corresponding year. The mothers of children born during the current year (the so-called "mothers of a 0-year-old child") have usually worked before the birth. Thanks to the public preschool system, a large share of the mothers of children aged at least three do participate. Maternity leave allowances are included in the earned income. As as consequence, mothers are considered as employed during the sixteen-week legal paid maternity leave. This explains why the participation rate of mothers of 0-year-old children is so high and why this participation rate is lower for mothers of a two-year-old child than for mothers of a one-year-old child. As we base our estimation on changes over time, this measurement error due to maternity leave should not affect our results on the impact of the reform of childcare subsidies, provided that the distribution of births over the calendar months is not affected by the reform (which seems plausible).

We observe a positive trend over the period in the participation rate of mothers (Figure Ba), as well as on the proportion of households declaring paid daycare (Figure Bb). Over the same period, the participation rate of fathers appears stable. It varies almost not at all with time or with the age of children (Figure Bc). Fathers' earnings do not vary either (Figure Bd). The participation rates of mothers of respectively one-year-old and two-year-old children have evolved in the same way since 2006. Interestingly however, we observe that the participation rate of mothers of a two-year-old child increases more from 2005 to 2006 than the corresponding figure for mothers of a one-year-old child. In 2005, families with a two-year-old child still depended on the old (less generous) system of childcare subsidies while those with a one-year-old child were already under the new one. In 2006, all these families depended on the new system. The mothers who are under the new system should have more incentive to participate. Our identification strategy relies on this intuition.

3.2 Identification Strategy

We estimate the impact of the introduction of a more generous childcare subsidy schedule on the participation rate of mothers of young children, on their wage, and on their use of paid childcare services, using a difference-in-differences strategy. The introduction of the new schedule of childcare subsidies creates a discrepancy in the amount of the subsidies according to the age of the youngest child. All families with a child born in 2004 or later benefit from the new schedule, while others are still under the old one. In order to evaluate the impact of the policy, we restrict our main analysis to households with a one-year-old or two-year-old child (which are those most affected by childcare costs according to previous descriptive results). To take into account the systematic gap in our outcome variables (respectively participation rate, use of childcare services and mother's wage) between mothers of a one-year-old child and a two-year-old child, we compare the change in the outcome variable between 2005 and 2006 for these two populations (see

Table 1).[5]

Our base specification uses parents of a child aged one year and those of a child aged two for the period available in our data which is the closest to the reform (2005-2006). The direct impact of the change in childcare subsidies is indeed most likely to be observed for these populations. For younger children (those born during the current year), we cannot distinguish between labor force participation before and after the birth. All parents of a child aged three years benefit from free preschool services and the impact of childcare subsidies is less detectable. Using periods close to the reform reduces the probability of capturing the potential feedback effect of the policy on the birth rate in the estimate. Some families may have chosen to have another child thanks to the decrease in the childcare cost, but it is unlikely that this effect was immediate. The technical details of the reform (specifically the precise schedule) were not known before the end of 2003. We also perform alternative specifications which are set out below (see subsection 8).

The underlying assumption is that even if the distribution of unobservables that might alter the choice to participate may be different between the populations of mothers of a one-year-old child and mothers of a two-year-old child, these differences are stable over time. Similarly, some determinants of participation may have changed over the period, but in the same way for both populations. Their effects are expected to be neutralized by the difference-in-differences estimator.

If this identification assumption holds, then a change in the behavior of households with a two-year-old child between 2005 and 2006 which exceeds the change in behavior observed for households with a one-year-old child between the same years can be attributed to the new scheme of child subsidies.

In practice, we control for certain variables that might have an impact on participation rates and whose distribution may have changed over time in different ways within the subsamples. In particular, we use the male income (dummies for the quintiles of male income) and the local number of daycare places (number of nurseries and childcare providers per 100 children under three years old) as a proxy for the cost of paid daycare. We use the level observed the year before in order to prevent reverse effects. We also control for demographic characteristics (number of children aged eighteen or less, aged six or less and under three years old in the family, twins dummy, single-parent-family dummy, women's age brackets, and couples' age difference brackets). Descriptive statistics are presented in Appendix B.

As we use exhaustive data, these variables are not expected to vary greatly over the different subgroups because of sample variation. One cannot exclude, however, that the composition of these subsamples changed if the reform had an impact on the birth rate, and that this effect is specific to some types of households (for instance, those which are more financially constrained). We discuss this point below.

Formally, our assumption states that conditional upon these covariates, the average participation rate (respectively the use of paid childcare services and the female earnings) of mothers of a young child of age a at year t can be additively broken down into a yearly impact and an age effect. In practice, estimates can be obtained simply by standard OLS, using:

[5]This differs slightly from the usual design of a difference-in-differences estimator: usually it compares the change before and after the introduction of a program with the temporal change observed for a control group (which is not affected by the program). In our case we compare the former with the temporal change observed for a group which benefits from the program in both periods.

$$Y_{it} = \alpha + \beta_a \mathbb{1}_{a_i=2} + \beta_t \mathbb{1}_{t=2006} + \delta \mathbb{1}_{a_i=2,t=2006} + X_{it}\beta + u_{it} \quad (1)$$

where t denotes the year (t=2005 or 2006) and a the age of the youngest child (a=1 or 2). The impact of the policy is captured by δ.

4 Results

4.1 Main Results

Basic statistics provide a first insight into our difference-in-difference estimates (see Table 2). The participation rate of mothers of a two-year-old child is 1.6 points higher in 2006 than in 2005, an increase much greater than the 0.5 point change observed in the same period for mothers of a one-year-old child. Overall, this suggests an increase of 1.1 percentage points in the participation rate of mothers of young children. We also observe an overall increase of 1.5 points of paid childcare use.

When controlling for observable characteristics, our estimates suggest that the reform of the subsidy schedule results in an increase in the participation rate of mothers of young children by one percentage point (Table 3). This effect is slightly larger if we narrow the focus to the employment rate. The impact on average wages (conditional on working) is negative, which is consistent with a decrease in the reservation wage of mothers (see section 2.2).

The impact on mothers' employment comes about through an increase in the use of paid childcare (see Table 4), as the reform alleviates the cost of this daycare for families. We see that the effect is greater by 50% than the effect on participation. This is probably because the reform has induced a substitution of formal paid daycare for informal care (by relatives or "black-market" childcare providers) for women who were working anyway. The reform also decreases the average amount of declared daycare cost by 11%. This decrease reflects, at least partly, the fact that our amount of declared childcare cost is an amount after deduction of subsidies: a rise in subsidies mechanically results in a decrease in this amount. As suggested by descriptive evidence, fatherhood has no impact on labor force participation of men. The reform does not change this situation.

Table 3 also suggests that the participation rate of mothers increases with the quintiles of male income. This positive correlation can be explained by the high level of homogamy (also known as assortative mating) in France. Marriage is more frequent between individuals who are similar to each other in terms of socio-economic status and/or qualification level. Because of similar levels of education, a man with a high income frequently has a spouse with high potential earnings, who is thus more likely to participate in the labor force.

Results vary dramatically with family size. The program does not appear to affect the average participation rate of one-child mothers (see Table 5 and Figure 3). By contrast, according to our results the use of paid daycare increases by 1.6 percentage points for these households (Figure 4). This again could result from a substitution of formal for informal care. The absence of effect on participation seems consistent with the fact that French mothers do not change their employment status after the first child. The participation rate of mothers of one child is indeed

very close to the participation rate of women without any children.

A closer look at the "intensity" of participation (Table 6) reveals that the overall null impact of the PAJE reform on the labor force participation of one-child mothers results from two opposite effects. We do indeed observe a 0.8 point increase in the proportion of one-child mothers who declare earnings greater than the minimum wage. By contrast, the proportion of one-child mothers who declare lower earnings decreases (by 0.2 percentage point, significant at 5%). Annual earnings lower than the minimum wage correspond to employment which is not full-year or not full-time. While very few women stop working after the birth of their first child – even before the reform –, some tend to reduce their working time to take care of their children. Our results suggest that because of the decrease in childcare cost induced by the reform, some of these mothers chose to keep their full-time occupations.

Results for large families are diametrically opposed. The participation rate of mothers of three children increases by 1.6 percentage points, from an initial level of 42%. This comes about mostly through an increase in the proportion of low-earnings mothers (less than one half of the minimum wage level), in contrast to what is observed for smaller families. This suggests that the reform did induce mothers of large families to participate to the labor force, but mostly in part-time jobs.

The contrast is also noticeable with respect to the estimated impact on the use of paid childcare. For these large families, the impact on the use of childcare is somewhat smaller at the extensive margin (1.2 percentage points), but our results suggest an increase at the intensive margin: the average amount increased by 2.9% (significant at 5%) – despite the rise in subsidies which tends to decrease these childcare expenses net of subsidies (see section 3.2). Even before the reform, stay-at-home mothers in large families were more likely to use paid daycare for small amounts of time (so as to dispose of a little more spare time, for instance), all the more so as the thresholds corresponding to the scheme of childcare subsidies increase with the family size. The reform apparently increased this difference.
All in all, for all families on average, the policy results in an increase in both mothers' full-time employment and non-regular employment (with a reduced number of working hours). The reform increased the proportion of mothers earning more than the minimum wage by 0.7 percentage point (from an initial level of 11%) and that of mothers earning less than half the minimum wage by 0.3 percentage point (from an initial level of 12%). For intermediate earnings, the positive impact for two-child families is offset by a negative impact on one-child families.

4.2 Discussion

Placebo tests Our identification strategy relies on a common trend assumption about the change in the participation rate of mothers of a child aged one vs mothers of a child aged two. We cannot check our assumption directly, but we can check whether it holds for more recent periods. Specifically, we perform a so-called "placebo" test and use an identification strategy which is similar to that of our main specification, but using periods that are not affected by the reform. We thus estimate the effect of a "counterfactual" reform that never happened, and we expect to find a null effect. In most cases, we do observe a null effect on this estimate (Figures 3 and 4). However, using years 2006-2007, we observe a positive impact for two-child families, and to a smaller extent we make the same observation using the whole sample. This might simply be due to an idiosyncratic shock. Indeed, as the dataset is exhaustive, and the sample size very large, the estimates are very precisely derived. Still, this positive effect could challenge our main identification assumption. This assumption might fail if the composition of the group of mothers

changed over time – something that may be the case, for instance if the reform increases the fertility rate. We discuss this below.

Alternative control group and heterogeneous effects Another test of our identifying assumption is performed using an alternative control group to try to detect temporal change in outcomes between 2005 and 2006. Specifically, the change in outcomes for families whose youngest child is two years old in 2005 or in 2006 are compared with families whose youngest child is *three* years old in 2005 and 2006. These children were all born before the introduction of the reform. The results appear similar to those obtained in our main specification (see Table 8). We can also provide estimates for subsequent years. Applying a difference-in-differences strategy to years 2006 and 2007, and families with children two or three years of age, yields an estimate of a slightly different effect, as it measures the impact on mothers with a three-year-old child. Results suggest that the reform has had hardly any positive impact on the labor force participation of these mothers, but still a significant positive impact on the use of paid childcare. These results are consistent with the existence of free preschool services. All children who turn three during a calendar year are entitled to start free full-day preschool at the beginning of the month of September of that year. As all parents of a child aged three benefit from this free preschool care, the increase in childcare subsidies should not make a difference to the *yearly* labor force participation. As families do not dispose of such free daycare facilities for the first three quarters, the increase in childcare subsidies may however have had an impact on the use of formal paid daycare.

Composition bias due to a change in the fertility rate The new system that provides generous incentives to families, as well as an extension of a short parental leave to one-child families, may have an effect on fertility. Such effects have been documented in the literature. Using a reform extending the duration of the paid parental leave, Lalive and Zweimuller (2009), for instance, present evidence of such an effect for Austria. Cohen et al. (2013) also provide evidence of a financial impact of child subsidy on fertility. No clear evidence exists for France. Laroque and Salanié (2008) show evidence of the impact of the French tax scheme on fertility but Piketty (2003) does not conclude that the introduction of the three-year "stay-at-home" subsidies created in 1993 have had a substantial impact on the fertility rate. As far as we know, the impact of the introduction of the Paje on the fertility rate has not been studied yet. According to official statistics, the fertility rate is stable over the period, but slightly increases in 2006.[6]

A simple model helps to form an idea of the potential magnitude of the bias induced by such a change in the fertility rate. Such bias may arise because the composition of the population of parents of a young child aged one in 2006 (thus born in 2005) might be different from the corresponding population of parents in 2005 (whose child was born in 2004). More specifically, let us suppose that the financial incentives provided by the PAJE reform induce some working women to have more children than previously planned.

For the sake of illustration, let assume that we observe in our sample a proportion q_a of mothers of young children with high attachment to the labor force, women with high level of participation rate whatever the level of the financial incentives.We denote by a (respectively b) the average participation rate of mothers with high (respectively low) attachment to the labor force. If the reform has had any fertility effect, we expect this proportion to change by Δq_a^t compared to the period before the reform. We will assume that this change is constant after

[6] see http://www.bdm.insee.fr/bdm2/affichageSeries.action?request_locale=en&codeGroupe=1504&idbank=000067678

2005: $\Delta q_a^t = \Delta q_a$ constant for $t \geq 2005$[7] but for obvious reasons in the first year of the reform this change is not of the same magnitude: $\Delta q_a^{2004} = \alpha \Delta q_a$ with $\alpha \in [0, 1]$, more plausibly in the first half of this interval. A back-of-the-envelope calculation helps to arrive at a rough evaluation of the extent of the potential composition bias. In our main estimate (years 2005 and 2006), the bias due to this composition effect using the years 2005 and 2006 is $(2\alpha - 1)\Delta q_a(a - b)$. If the difference in the participation rate of the two subsamples of mothers $(a - b)$ is high, even a small change in the composition effect could have a noticeable effect on the estimator. Using the period after (years 2006 and 2007) for the "placebo" estimate, we obtain: $(1 - \alpha)\Delta q_a(a - b)$. Both biases are proportional, the factor of proportionality depending on the celerity with which families have reacted to these incentives (namely the α). With $\alpha = 0.5$ (short anticipation of the reform), the bias in our main estimate is null. With a plausible $\alpha = 0.25$ (consistent with the fact that while the PAJE was announced in principle in the second quarter of 2003, the schedule of subsidies was not known before the end of 2003), the bias in our main estimate is around $-2/3$ of the estimate obtained using the two subsequent years. This means that our main estimates would underestimate the true impact of the reform by 0.2 percentage point.

5 Concluding remarks

This paper analyzes the impact of a program to increase childcare subsidies that came into effect in France in 2004. Using a difference-in-differences strategy, we find that the substantial rise in subsidies (the cost decreased by approximately 50% on average) increased the use of paid childcare. The participation of mothers did not react to the same extent, however. Moreover, the seemingly low elasticity of labor force participation by mothers to childcare subsidies has to be related to rationing in the market for childcare. As the demand for childcare places largely exceeds current supply, price effects on utilization rates and participation decisions can be low (see Boca and Vuri, 2007). In a rationed childcare market, the labor market participation of mothers reacts more to an increase in the number of childcare spots than to a decrease in their cost (for a discussion see Wrohlich, 2006). The limited impact of the large increase in childcare subsidies may be compared to the substantial increase in mothers' participation rate that resulted from the introduction of universal, highly-subsidized childcare in Quebec in the late 1990s Lefebvre and Merrigan (2008). For France, descriptive evidence suggests that the adjustment from the supply side was modest at least in the short term. We observe, however, an increase in the slots offered by qualified childminders from 29 slots per 100 children in 2004 to 33 slots per 100 children in 2007.

The long-term impact of the reform may be different from the short-run effect empirically measured here. As childminders negotiate their remuneration privately with the parents, it is likely that the increase in the demand for childcare induced by the subsidies has had an inflationary impact on this pay rate. Such an effect would undermine the impact of the policy on childcare costs. Finally, a complete analysis of the measure would entail an analysis of its impact on the fertility decision. These issues are left for further research.

[7] Consistently with the fact that we do not observe any effect on placebo estimates after 2007 (thus for children born after 2005)

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Figures

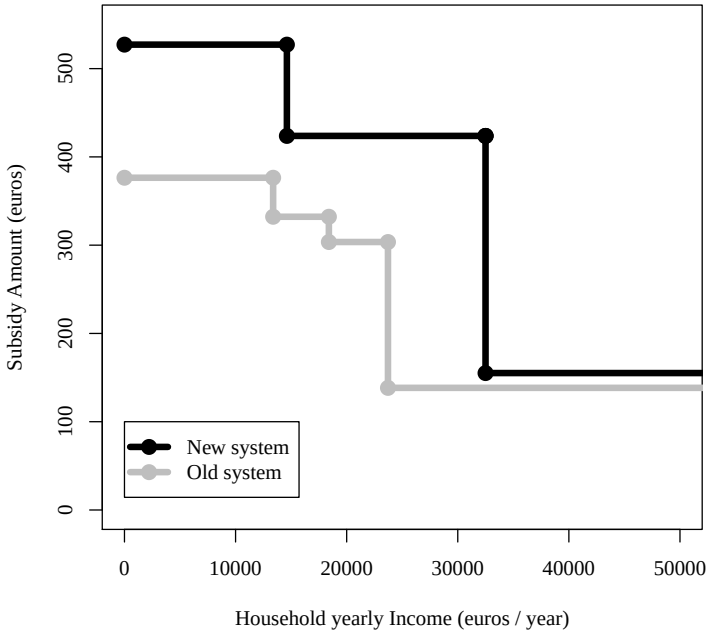


Figure 1: Childcare subsidy schemes in the new and old systems (2007), dual-income families with one child

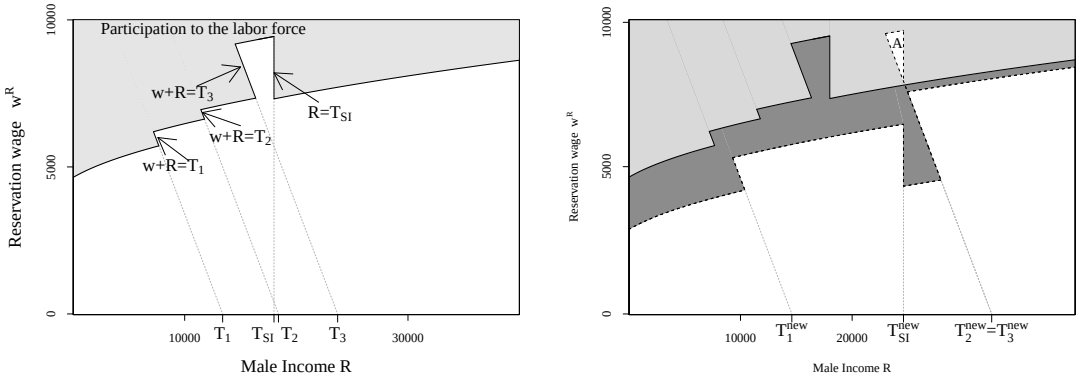


Figure 2: Utility of staying at home according to male income, in the old system (Left) and in both the old and the new systems (Right)

Note: The model assumes separable utilities in leisure and consumption, with a constant elasticity utility function for consumption and a fixed preference for staying at home. The cost of childcare and the scheme of childcare subsidies are set at their levels in 2005. All details are provided in the Appendix.

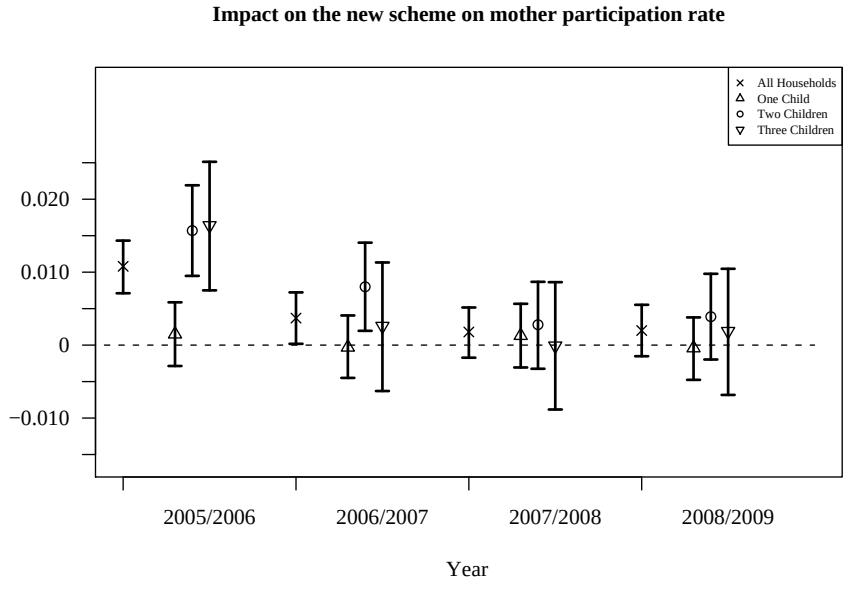


Figure 3: Estimation of the impact of the new scheme on mothers' participation rate.

Source: Income Tax Return Database, women aged 20-55, authors' calculations.

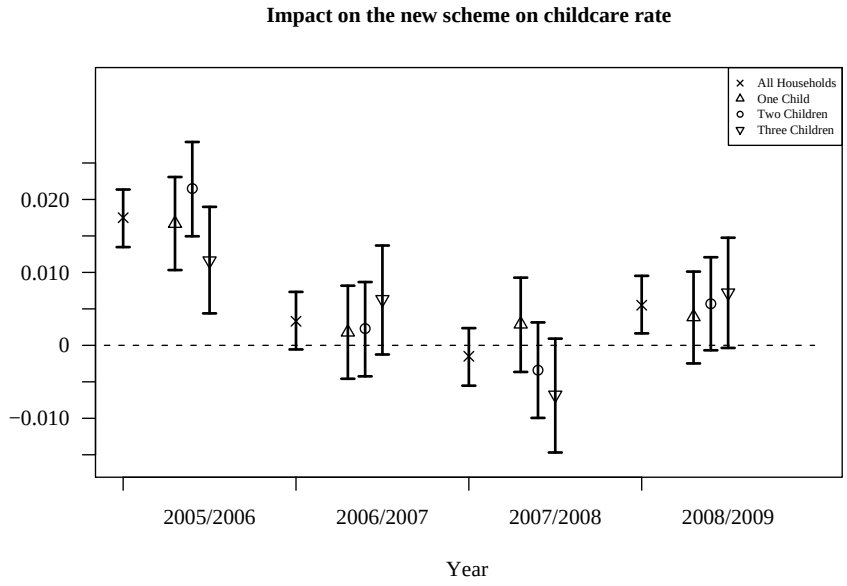


Figure 4: Estimation of the impact of the new scheme on the use of paid childcare.
Source: Income Tax Return Database, women aged 20-55, authors' calculations.

Tables

Table 1: Relevant scheme for childcare subsidies by child age and year

	Age of the youngest child	
Year	1 year old	2 years old
2005	NEW	*OLD*
2006	NEW	NEW

Note: In 2005, childcare subsidies for households whose youngest child is one year old (respectively two years old) are calculated using the new (respectively old) scheme.

Table 2: Participation rate, employment rate and proportion of paid daycare

	Partici--pation	Employ--ment rate	Use of paid daycare	Male partici--pation rate
2005, 1-year-old child	73.6	70.7	43.9	96.9
2006, 1-year-old child	74.1	71.9	46.2	96.9
2005, 2-year-old child	68.3	65.5	44.6	96.8
2006, 2-year-old child	69.9	67.8	48.4	96.8
Double difference	1.1	1.1	1.5	0.0

Source: Income Tax Return Database

Note: Sample restricted to households present in 2005 and 2006, including a woman aged 20-55 and whose youngest child is one year old or two years old.

Table 3: Impact of the reform on employment and earnings of mothers

	Participation rate	Employment rate	Earnings (Log) (a)
New scheme	0.0108^{***}	0.0112^{***}	-0.0100^{**}
	(0.0011)	(0.0011)	(0.0039)
Age and year dummies			
1-year-old child	*Ref*	*Ref*	*Ref*
	(−)	(−)	(−)
2-year-old child	-0.0549^{***}	-0.0550^{***}	0.1683^{***}
	(0.0008)	(0.0008)	(0.0028)
Year 2005 dummy	*Ref*	*Ref*	*Ref*
	(−)	(−)	(−)
Year 2006 dummy	0.0026^{***}	0.0087^{***}	0.0167^{***}
	(0.0008)	(0.0008)	(0.0027)
Density of childcare places			
Nannies	0.0020^{***}	0.0021^{***}	0.0021^{***}
	(0.0000)	(0.0000)	(0.0001)
Collective nurseries	0.0032^{***}	0.0030^{***}	0.0144^{***}
	(0.0001)	(0.0001)	(0.0002)
Family nurseries	0.0081^{***}	0.0082^{***}	0.0233^{***}
	(0.0001)	(0.0001)	(0.0005)
Number of children under 18			
1	*Ref*	*Ref*	*Ref*
	(−)	(−)	(−)
2	-0.2077^{***}	-0.1941^{***}	-0.4968^{***}
	(0.0009)	(0.0010)	(0.0035)
3 or more	-0.4192^{***}	-0.4020^{***}	-0.9254^{***}
	(0.0010)	(0.0011)	(0.0041)
Number of children under 6			
1	*Ref*	*Ref*	*Ref*
	(−)	(−)	(−)
2	-0.0090^{***}	-0.0078^{***}	0.1233^{***}
	(0.0009)	(0.0009)	(0.0034)
3 or more	-0.0603^{***}	-0.0554^{***}	0.1912^{***}
	(0.0016)	(0.0016)	(0.0069)
Number of children under 3			
1	*Ref*	*Ref*	*Ref*
	(−)	(−)	(−)
2 or more	0.0013^{ns}	-0.0055^{***}	-0.1153^{***}
	(0.0010)	(0.0010)	(0.0038)
Twins dummy	0.0358^{***}	0.0382^{***}	-0.0097^{ns}
	(0.0022)	(0.0023)	(0.0088)
Single parent family dummy	-0.0613^{***}	-0.0694^{***}	-0.2022^{***}
	(0.0013)	(0.0013)	(0.0047)
Male income			
1st quintile	-0.0793^{***}	-0.0850^{***}	-0.0218^{***}
	(0.0013)	(0.0013)	(0.0051)
2nd quintile	-0.0350^{***}	-0.0425^{***}	-0.0895^{***}
	(0.0015)	(0.0016)	(0.0058)
3rd quintile	*Ref*	*Ref*	*Ref*
	(−)	(−)	(−)
4th quintile	0.0407^{***}	0.0468^{***}	0.1215^{***}
	(0.0010)	(0.0010)	(0.0036)
5th quintile	0.0722^{***}	0.0786^{***}	0.3616^{***}
	(0.0010)	(0.0010)	(0.0036)
Age of mother			
≤25	-0.1541^{***}	-0.1568^{***}	-0.8106^{***}
	(0.0010)	(0.0011)	(0.0038)
26-30	-0.0488^{***}	-0.0491^{***}	-0.2604^{***}
	(0.0007)	(0.0007)	(0.0025)
31-35	*Ref*	*Ref*	*Ref*
	(−)	(−)	(−)
36-40	0.0097^{***}	0.0076^{***}	0.1403^{***}
	(0.0008)	(0.0008)	(0.0029)
≥41	-0.0182^{***}	-0.0224^{***}	0.1658^{***}
	(0.0013)	(0.0013)	(0.0049)
Couple's age difference			
lower than 5 years	*Ref*	*Ref*	*Ref*
	(−)	(−)	(−)
5 to 14 years	-0.0623^{***}	-0.0641^{***}	-0.1437^{***}
	(0.0006)	(0.0007)	(0.0024)
15 years or more	-0.2267^{***}	-0.2226^{***}	-0.4141^{***}
	(0.0020)	(0.0021)	(0.0092)
Intercept	0.8293^{***}	0.7868^{***}	9.0568^{***}
	(0.0017)	(0.0017)	(0.0061)

Source: Income Tax Return Database

Note: Sample restricted to households present in 2005 and 2006, including a woman aged 20-55 and whose youngest child is one year old or two years old (2,307,362 observations).

Table 4: Impact of the reform on the use of paid daycare and participation rate of fathers.

	Use of paid daycare	Childcare expenses (log) (b)	Male participation rate
New scheme	0.0175***	−0.1115***	0.0001
	(0.0012)	(0.0043)	(0.0005)
Age and year dummies			
1-year-old child	*Ref*	*Ref*	*Ref*
	(−)	(−)	(−)
2-year-old child	0.0009	0.1729***	−0.0017***
	(0.0009)	(0.0031)	(0.0003)
Year 2005 dummy	*Ref*	*Ref*	*Ref*
	(−)	(−)	(−)
Year 2006 dummy	0.0129***	0.0932***	−0.0006*
	(0.0008)	(0.0030)	(0.0003)
Density of childcare places			
Nannies	0.0036***	−0.0033***	0.0004***
	(0.0000)	(0.0001)	(0.0000)
Collective nurseries	0.0029***	0.0190***	0.0000
	(0.0001)	(0.0002)	(0.0000)
Family nurseries	0.0032***	0.0547***	0.0020***
	(0.0002)	(0.0005)	(0.0001)
Number of children under 18			
1	*Ref*	*Ref*	*Ref*
	(−)	(−)	(−)
2	−0.2113***	−0.3531***	−0.0032***
	(0.0010)	(0.0040)	(0.0004)
3 or more	−0.4280***	−0.8001***	−0.0161***
	(0.0011)	(0.0048)	(0.0005)
Number of children under 6			
1	*Ref*	*Ref*	*Ref*
	(−)	(−)	(−)
2	0.0594***	0.0705***	0.0024***
	(0.0010)	(0.0039)	(0.0004)
3 or more	0.0739***	0.0551***	−0.0042***
	(0.0017)	(0.0080)	(0.0007)
Number of children under 3			
1	*Ref*	*Ref*	*Ref*
	(−)	(−)	(−)
2 or more	−0.0008	0.2159***	−0.0088***
	(0.0011)	(0.0042)	(0.0004)
Twins dummy	−0.0036	0.0203**	0.0112***
	(0.0024)	(0.0098)	(0.0010)
Single parent family dummy	−0.0862***	−0.0821***	−***
	(0.0014)	(0.0059)	(.)
Male income			
1st quintile	−0.1129***	−0.0459***	−
	(0.0014)	(0.0069)	(−)
2nd quintile	−0.0625***	−0.0395***	−
	(0.0017)	(0.0075)	(−)
3rd quintile	*Ref*	*Ref*	*Ref*
	(−)	(−)	(−)
4th quintile	0.0864***	0.1128***	−
	(0.0011)	(0.0042)	(−)
5th quintile	0.2055***	0.4376***	−
	(0.0011)	(0.0041)	(−)
Age of mother			
<=25	−0.2770***	−0.5485***	−0.0105***
	(0.0011)	(0.0050)	(0.0005)
26-30	−0.0825***	−0.1893***	0.0003
	(0.0008)	(0.0027)	(0.0003)
31-35	*Ref*	*Ref*	*Ref*
	(−)	(−)	(−)
36-40	0.0158***	0.0723***	−0.0079***
	(0.0009)	(0.0031)	(0.0004)
>=41	−0.0222***	0.0663***	−0.0312***
	(0.0014)	(0.0054)	(0.0006)
Couple's age difference			
lower than 5 years	*Ref*	*Ref*	*Ref*
	(−)	(−)	(−)
5 to 14 years	−0.0646***	−0.0616***	−0.0149***
	(0.0007)	(0.0026)	(0.0003)
15 years or more	−0.1651***	−0.1504***	−0.1185***
	(0.0022)	(0.0115)	(0.0008)
Intercept	0.4378***	6.6074***	0.9672***
	(0.0018)	(0.0069)	(0.0007)

Source: Income Tax Return Database
Note: Sample restricted to households present in 2005 and 2006, including a woman aged 20-55 and whose youngest child is one or two years old (2,307,362 observations).
(b) for households declaring strictly positive paid daycare.

Table 5: Impact of the reform on participation rate and use of childcare services, by family size

	All Families	One Child only	Two children	Three children or more
Female participation rate	0.0108^{***} (0.0011)	0.0015^{ns} (0.0013)	0.0157^{***} (0.0019)	0.0164^{***} (0.0027)
Female employment rate	0.0112^{***} (0.0011)	0.0027^{*} (0.0015)	0.0163^{***} (0.0019)	0.0161^{***} (0.0027)
Female wage (a)	-0.0100^{**} (0.0039)	0.0048^{ns} (0.0046)	-0.0254^{***} (0.0069)	-0.0256^{**} (0.0128)
Use of childcare services	0.0175^{***} (0.0012)	0.0167^{***} (0.0019)	0.0215^{***} (0.0020)	0.0116^{***} (0.0022)
Expenses in childcare services (b)	-0.1115^{***} (0.0043)	-0.1693^{***} (0.0056)	-0.0850^{***} (0.0071)	0.0285^{**} (0.0140)
Male participation rate	0.0001^{ns} (0.0005)	-0.0004^{ns} (0.0007)	-0.0002^{ns} (0.0007)	0.0012^{ns} (0.0012)

Source: Income Tax Return Database
Notes: Sample restricted to households present in 2005 and 2006, including a woman aged 20-55 and whose youngest child is one or two years old (2,307,362 observations). Covariates are the same as in Table 3. Only the coefficient corresponding to the impact of the measure ("New scheme") is reported. (a) Restriction to employed women. (b) Restriction to households who have reported strictly positive childcare expenses.

Table 6: Impact on the reform on the intensity of labor force participation of mothers, by family size

	All Families	One Child only	Two children	Three children or more
$<$ 0.5 annual minimum wage	0.0032^{***} (0.0009)	-0.0029^{**} (0.0015)	0.0057^{***} (0.0015)	0.0084^{***} (0.0020)
0.5-1 annual minimum wage	0.0012^{ns} (0.0008)	-0.0028^{*} (0.0015)	0.0033^{**} (0.0013)	0.0041^{***} (0.0015)
$>$1 annual minimum wage	0.0069^{***} (0.0012)	0.0084^{***} (0.0020)	0.0073^{***} (0.0020)	0.0034^{ns} (0.0022)

Source: Income Tax Return Database
Notes: Covariates are the same as in Table 3. Only the coefficient corresponding to the impact of the measure is reported.

Table 7: Alternative Identification Strategies

	Year	Age of the youngest child	Age of the youngest child
A2		2 years old	3 years old
	2005	*OLD*	*OLD*
	2006	NEW	*OLD*
A3		2 years old	3 years old
	2006	NEW	*OLD*
	2007	NEW	NEW

Table 8: Impact of the reform on participation rate and use of childcare services, alternative specifications

Impact on families with	a 2-year child		a 3-year child
	(1)	(2)	(3)
Female participation rate	0.0108^{***}	0.0091^{***}	-0.0026^{**}
	(0.0011)	(0.0011)	(0.0011)
Use of childcare services	0.0175^{***}	0.0100^{***}	0.0135^{***}
	(0.0012)	(0.0013)	(0.0013)
Male participation rate	0.0001	0.0002	0.0003
	(0.0005)	(0.0005)	(0.0005)

Source: Income Tax Return Database
Notes: Covariates are the same than in Table 3. Only the coefficient corresponding to the impact of the measure is reported (standard errors in parenthesis). (1) Main specification, families with the youngest child aged two compared with those with the youngest child aged one, 2005-2006. (2) Specification A2, families with the youngest child aged two compared with those with the youngest child aged three, 2005-2006. (3) Specification A3, families with the youngest child aged three compared with those with the youngest child aged two, 2006-2007.

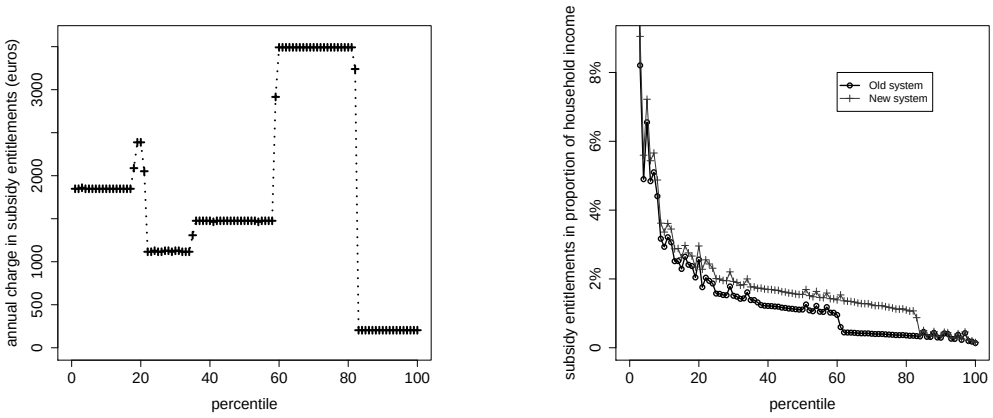
A French family policy

The household income taken into account by the French family allowance departments ("CAF" - Caisses d'Allocation Familiale) used for calculation corresponds approximately to the "taxable income" (the income which is taken into account for income tax) of the household. This taxable income is smaller than the actual yearly income received. In 2005, two deductions of 10% and 20% respectively applied to the total declared income, and the taxable income corresponds to only 72% of the total income. The thresholds as well as the amount of subsidies are set according to reference values that are re-calibrated yearly in line with rises in the cost of living index.

Table A.1: Threshold levels (in euros) for calculation of the base subsidy in 2005, new and old system, for two-income couples and single-parent families.

Yearly household taxable income	New System	Old System
1 child	32,493	23,714
2 children	37,411	27,309
3 children	43,312	31,616
4 children or more	49,213	35,923

Source: Mémo social
Notes: Families whose youngest child is born after 1 January 2004 depend on the new system, those whose youngest child is born before depend on the old one. In the old system the base subsidy was called APJE ("Allocation Pour Jeune Enfant"), in the new PAJE-AB ("Allocation de Base"). For single-earner households, the amount is reduced by 7,900 € in the new system, 5,930 € in the old one. Because of tax reductions, in 2005 the taxable income corresponds to 72% of the actual declared income.



Source: Authors' calculation from the Income Tax Return Database.

Scope: Households whose first child is born in 2006. The reference income is 2005 income, before the birth of the first child.

Figure A.1: Changes in subsidy entitlements between old and new systems, according to the position in the income distribution of households in 2005.

Table A.2: Calculation and amount of the childcare subsidy (in euros) in 2005, depending on the new and old system

Yearly household taxable income		New System	Old System
1 child	1st threshold	14,619	13,381
	2nd threshold	32,493	18,399
2 children	1st threshold	16,843	16,468
	2nd threshold	37,411	22,645
3 children	1st threshold	19,486	19,556
	2nd threshold	43,312	26,890
4 children or more	1st threshold	22,145	22,645
	2nd threshold	49,213	31,137
Monthly subsidy amount			
< 1st threshold		362	211
1st - 2nd threshold		259	167
> 2nd threshold		155	138

Source: Mémo social

Notes: Families whose youngest child is born after 2004/01/01 depend on the new system depend on the new system, those whose youngest child is born before depend on the old one. In the old system this childcare subsidy was called AFEAMA ("Aide à la Famille pour l'Emploi d'une Assistante Maternelle"), in the new one PAJE-CMG ("Complément du Mode de Garde"). The subsidy amount is granted before the third birthday of the youngest child; before the sixth birthday family still perceive half of this amount. Because of tax reductions, in 2005 the taxable income corresponds to 72% of the actual declared income.

B Descriptive Statistics

Table B.1: Sample Description

Number of children under 18	
1	39.0
2	38.3
3 or more	22.7
Number of children under 6	
1	54.5
2	39.8
3 or more	5.7
Number of children under 3	
1	86.9
2 or more	13.1
Twins dummy	1.7
Single parent family dummy	9.2
Woman age	
<=25	10.4
26-30	28.8
31-35	36.8
36-40	18.5
>=41	5.5
Couple's age difference	
lower than 5 years	63.1
5 to 14 years	25.8
15 years or more	1.9

Source: Income Tax Return Database

Notes: Sample restricted to households present in 2005 and 2006, including a woman aged 20-55 and whose youngest child is one year old or two years old. Number of observations: 2,307,362 individuals.

Table B.2: Participation rate of men and women who are in a couple, according to family size (%)

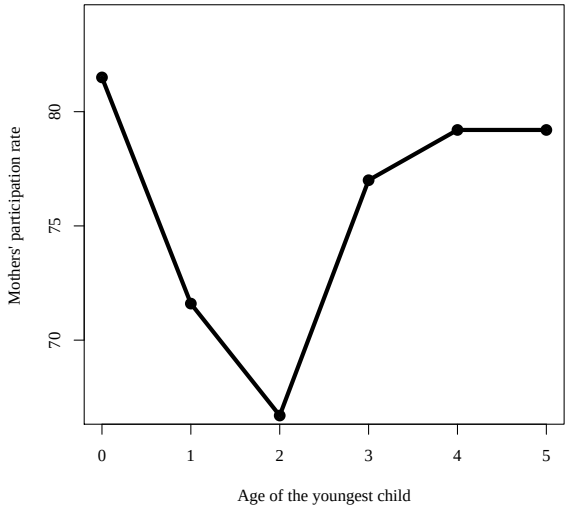
Family size	Share of couples	Women	Men
No child	35.2	82.3	84.9
At least a child	64.8	77.1	93.2
One child	26.0	82.0	91.0
Two children	26.4	80.2	94.1
Three children or more	12.4	61.8	92.2
At least a child, one under 3	21.8	74.5	94.3
One child	8.1	85.5	93.3
Two children	8.7	76.2	95.5
Three children or more	5.1	54.1	94.0
All families	100.0	77.4	90.3

Source: Author's calculation from the Tax Income Return Database
Scope: Couples with a woman aged 20-55 in 2005.

Table B.3: Female ILO labor force participation rate according to family size (%), LFS 2005

	ILO participation rate, 2005Q1		Participation rate at least one quarter in 2005	
Family Size	All	At least one child under 3	All	At least one child under 3
No child	82.8	-	84.9	-
At least a child	73.9	62.9	80.7	72.0
1 child	80.4	80.0	86.2	89.8
2 children	75.5	56.4	83.1	69.3
3 children or more	59.4	39.1	67.3	46.8
All couples	76.1		81.6	

Source: French Labor Force Survey 2005. Scope: Women aged 20-55 in couple. Number of observations : 8,558 individuals.
Note: The first two columns correspond to ILO participation rates for the first quarter of 2005, the next two columns to the sample of women interviewed in all quarters of 2005, and who participated for at least one quarter in 2005.



Source: Income Tax Return Database, women aged 20-55.

Figure B.1: Mothers' participation rate in 2005, depending on the age of the youngest child.

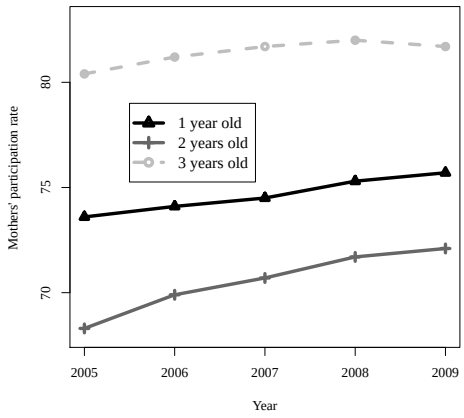


Figure B.2: (a) Mothers' participation rate

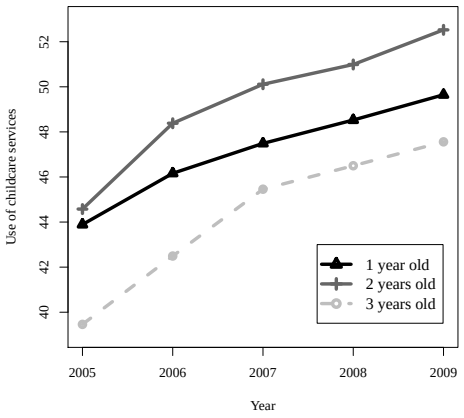


Figure B.3: (b) Use of paid childcare.

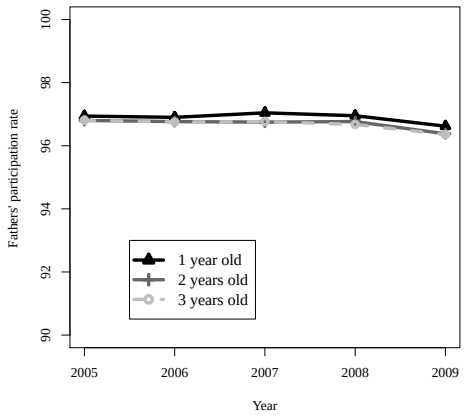


Figure B.4: (c) Fathers' participation rate

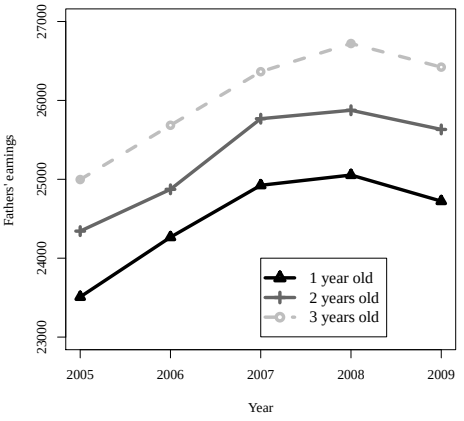


Figure B.5: (d) Average fathers' earnings(*)

Source: Income Tax Return Database, restriction to households including a woman aged 20-55 and whose youngest child is aged 1, 2 or 3.

(*): restriction to fathers with strictly positive earnings.

C A simple structural model for mother's participation

Let us assume that the utility function U_i of a mother i depends on consumption C and on the fact of staying at home L ($L = 1 - P$, where P is participation in the labor market). It is assumed that only the mother arbitrates between staying at home to take care of the child (and not using paid childcare) or participating to the labor force (and using paid childcare). In a static framework, the budget constraint can be written as :

$$C_i = R_i + \mathbb{1}_{P_i=1}(\tilde{w}_i - D_i + A_1(R_i + \tilde{w}_i)) + (1 - \mathbb{1}_{P_i=1})A_2(R_i)$$

For the sake of simplicity this utility is assumed to be additively separable into its two components

$$U_i(L, C) = u(\rho_i L) + v(C)$$

where ρ_i is a scale parameter indicating that one individual may place greater or less value on staying at home. The utility function is assumed to be strictly increasing and invertible. An individual preference for staying at home may be captured by the parameter $\alpha_i = u(\rho_i) - u(0)$.

We denote by $\tilde{w}_i$ the wage the mother would earn if she chooses to work outside the house, R_i the other income of the household i (essentially the earned income of the father, so we designate it hereafter as spouse's income), D_i the gross cost of daycare (before taking into account subsidies), and A the amount of childcare subsidies. A depends on the total income of the household, $R_i + \tilde{w}_i$, with a different scheme for dual-income families and single-income families (A_1 and A_2 respectively). In accordance with the actual system of childcare subsidies, single-income couples are assumed to receive a base subsidy a_0 provided that the single income is under a threshold T_{SI} (we assume they do not use paid daycare). Dual-income families receive this base subsidy if their total income is below a certain income threshold, but they also benefit from a childcare subsidy if they use paid childcare. In the end, the scheme of subsidies corresponds to K possible amounts of total subsidies[8] a_k ($K = 4$ in the old scheme, $K = 3$ in the new one) corresponding to thresholds T_k, $k = 0..K$.[9] The subsidies correspond to $A_1(R_i + \tilde{w}_i) = \sum_{k=1}^{K} a_k \cdot \mathbb{1}_{T_{k-1} < R_i + \tilde{w}_i \leq T_k}$ and $A_2(R_i) = a_0 \cdot \mathbb{1}_{R_i < T^{SI}}$.

A mother participates when the utility of staying at home does not exceed the utility of working, meaning:

$$u(\rho_i) - u(0) \leq v(R_i + \tilde{w}_i - D_i + A_1(R_i + \tilde{w}_i)) - v(R_i + A_2(R_i)) \tag{2}$$

The right side of the inequalities defines a cutoff value for the individual preference for staying at home α^* such that a mother will participate if and only if $\alpha_i < \alpha^*(R_i, \tilde{w}_i)$. Intuitively, this cutoff value is a decreasing function of the cost. It increases with $\tilde{w}_i$ almost everywhere, but the scheme of childcare subsidies creates discontinuities. For a given male income R_i lower than the threshold T_k, we have:

$$\lim_{\tilde{w}_i \nearrow T_k - R_i} \alpha^*(R_i, \tilde{w}_i) - \lim_{\tilde{w}_i \searrow T_k - R_i} \alpha^*(R_i, \tilde{w}_i) > 0$$

This is illustrated by Figure C (left panel).

Alternatively, holding the individual preference for staying at home α_i constant, we can determine the respective values of $(\tilde{w}_i, R_i)$ so that the optimal choice of a mother is to participate. A mother participates in the labor force if her individual preference for staying at home α_i is smaller than the difference in the utilities of consumption $v(R_i + \tilde{w}_i - D_i + A_1(R_i + \tilde{w})) - v(R_i +$

[8] Sum of base subsidy and childcare subsidy

[9] By convention we denote $T_0 = 0$ and $T_K = +\infty$.

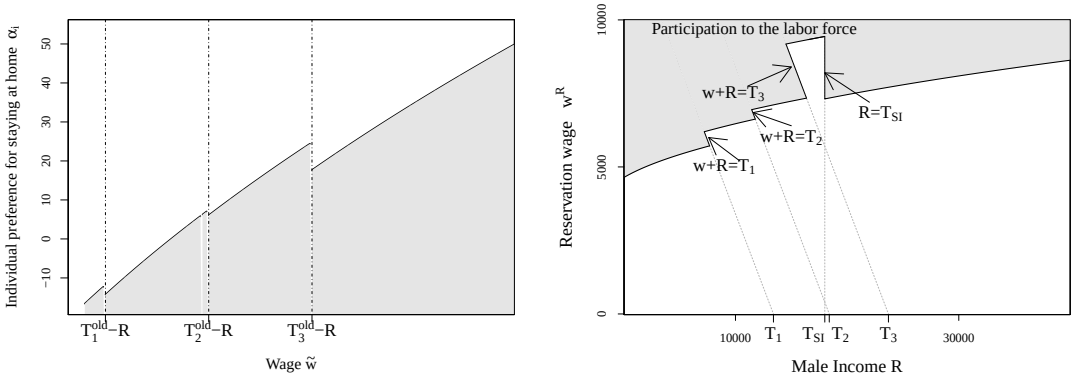


Figure C.1: Impact on consumption utility of staying at home according to potential female wage (left) and on the female reservation wage according to the male income (right).

Note: We assume a constant elasticity utility function, $v(C) = C^\rho$, $\rho = 0.5$. The cost of paid childcare is set at its average level in 2005 (515 euros per month, see Blanpain, 2009). The amount of childcare subsidies and the thresholds are those prevailing in 2005 for one-child households, with the youngest child born before 2004 ($T_1^{old} = 13,400$, $T_2^{old} = 18,400$, $T_3^{old} = 23,700$, and $T_{SI}^{old} = 18,000$, $a_1^{old} = 4,510$, $a_2^{old} = 3,980$, $a_3^{old} = 3,630$, $a_4^{old} = 1,650$ and $a_0^{old} = 1,980$ euros). In the left figure the level of the outcome R_i is fixed and set to $12,000$ euros, in the second one the utility of staying at home α_i is fixed and set to 10.

$A_2(R_i)$). Given the scheme of childcare subsidies, she participates provided that her expected wage w_i and the male income R_i are such that: for $T_{k-1} - R_i < \tilde{w}_i < T_k - R_i$,

$$\tilde{w}_i \geq \tilde{w}_k^*(\alpha_i, R_i)$$

$\tilde{w}_k^*$ can be interpreted as a reservation wage for mothers in households such that $T_{k-1} - R_i < \tilde{w}_i < T_k - R_i$:

$$\tilde{w}_k^*(\alpha_i, R_i) = v^{-1}(\alpha_i + v(R_i + A_2(R_i))) + D_i - R_i - a_k \tag{3}$$

For each k, this reservation wage increases with the individual preference for staying at home α_i, the cost of the paid childcare D_i and the male income R_i. It decreases with the childcare subsidies a_k.

For a given value of α_i, let us consider the region of the plan $(R, \tilde{w})$ delineated by the lines $\tilde{w} + R = T_{k-1}$ and $\tilde{w} + R = T_k$. The intersections of the function defined by (3) and these lines correspond to :

$$\begin{aligned} S_k^{min} = \quad & \mathbb{1}_{R_i \leq T_{SI}} \cdot \min(T_{SI}, v^{-1}(v(T_{k-1} - D_i + a_k) - \alpha_i) - a_0) \\ + \quad & \mathbb{1}_{R_i > T_{SI}} \cdot \max(T_{SI}, v^{-1}(v(T_{k-1} - D_i + a_k) - \alpha_i)) \end{aligned}$$

and

$$\begin{aligned} S_k^{max} = \quad & \mathbb{1}_{R_i \leq T_{SI}} \cdot \min(T_{SI}, v^{-1}(v(T_k - D_i + a_k) - \alpha_i) - a_0) \\ + \quad & \mathbb{1}_{R_i > T_{SI}} \cdot \max(T_{SI}, v^{-1}(v(T_k - D_i + a_k) - \alpha_i)) \end{aligned}$$

For each α_i, it provides a partition of the plan defined by (R, $\tilde{w}$) where the optimal choice for a mother is to participate. The utility function of consumption v is assumed to be isoelastic,

$v(x) = x^\rho$ with $\rho = 0.5$. The values of the subsidies scheme correspond to actual values of the previous one for one-child families. This is represented in Figure C (right) for $\alpha = 10$. It illustrates the discontinuities in incentives created by the subsidies scheme. Figure C.2 emphasizes the sensitivity of this pattern to the values of α_i: Figure C.2 (left) presents the reservation wage according to the male income for a mother having a null preference for staying at home ($\alpha = 0$), while Figure C.2 (right) corresponds to a preference of $\alpha = 25$.

The reform of the childcare subsidies schedule increases the amount of the subsidies a_k (k=1,...,K) as well as the thresholds T_k (k=1,...,K-1). It results in a decrease in the reservation wage almost everywhere (Figure 2, right panel).

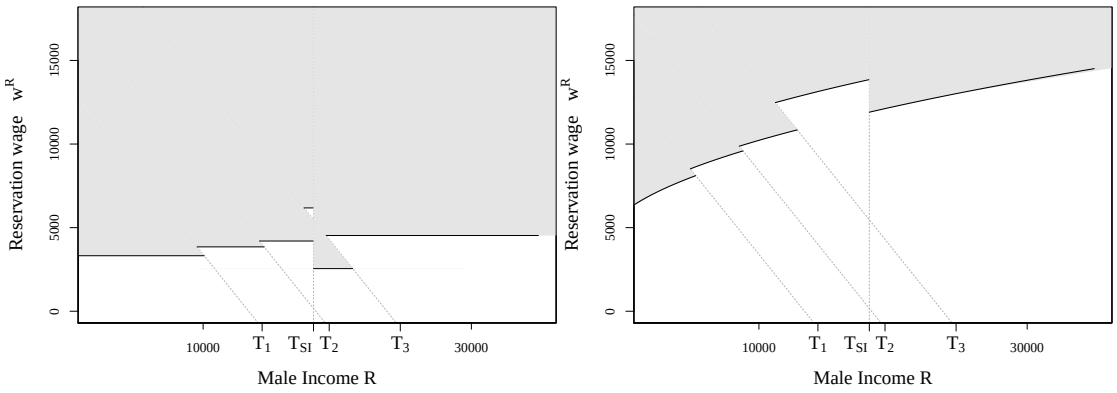


Figure C.2: Impact on the female reservation wage according to the male income for $\alpha_i = 0$ (left) and $\alpha_i = 25$ (right).

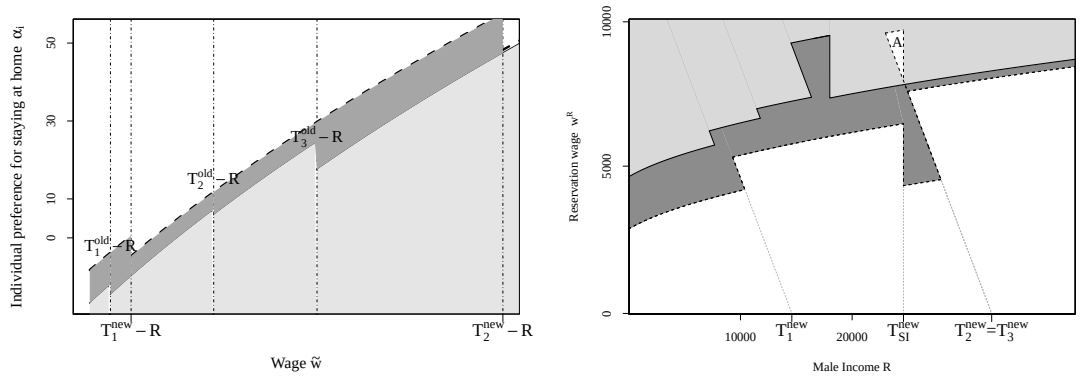


Figure C.3: Impact on consumption utility of staying at home according to potential female wage (left) and female reservation wage according to male income (right), new and old scheme of childcare subsidy.