Parental Leave Reforms: Consequences for Birth Spacing, Household and Child Outcomes*

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Abstract

This paper examines the effects of changes in financial incentives on the timing of couples' higher-order fertility, post-birth labor market outcomes, and the households' disposable income. We also study how the age difference between siblings affects their early life health outcomes, and later life schooling outcomes. For a given birth spacing, we then examine the effect of parents' early life monetary- and time investments on children's health and schooling outcomes. This allows us to gauge whether potential adverse impacts of short birth spacing on children's outcomes are counteracted by early-life investments. Identification is based on two reforms in the Swedish parental leave system that introduced and then altered a birth spacing interval that grants mothers higher parental leave benefits for a subsequent child without the need to re-establish eligibility for benefits by returning to work. We find that this rule, referred to as the speed premium, reduced the spacing between births. Mothers eligible for the speed premium also reduce their pre-, and post-birth labor supply. Children of eligible mothers fare better in terms of ninth-grade GPA, are more likely to be qualified for high school, and are more likely to have attained a college degree by age 26.

Keywords: Parental leave, fertility, earnings, child outcomes
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1 Introduction

With the dramatic growth in female labor force participation experienced in the last few decades, public policies aimed at reducing the barriers to the combination of market work and family have gained increasing salience. To date, all OECD countries except the U.S. offer governmentally funded parental leave. Nevertheless, there are large disparities in parental leave entitlements across countries, where the Nordic countries stand out as the most generous in terms of both the duration of earnings replacement, and the duration of job protection after birth. An extensive literature has studied the impacts of parental leave policies on women's employment and wages. However, family policies have goals beyond promoting gender equality in the labor market; in particular to enhance child development by ensuring adequate financial resources and parental time investments in children when they are young. Central questions for policy therefore concern the impacts and the relative importance of families' financial resources and parental time investments in children on their later life outcomes.

In this paper we study the effects of changes in financial incentives on the timing of couples' higher-order fertility, post-birth labor market outcomes, and household disposable income. We also study how parents' financial resources and time investments affect children's schooling outcomes and health outcomes. We rely on two reforms in the Swedish parental leave system in the 1980s that granted parents the right to retain the level of parental leave benefits for a subsequent child as for the previous without the need to re-establish eligibility to paid leave by returning to work, provided that the two births are sufficiently close. This administrative rule is commonly referred to as the speed premium, as it gives mothers a higher level of parental leave benefits for a new child if the spacing between two successive births is short. In 1980, the birth interval that granted access to the speed premium was increased from 12 to 24 months, and in 1986 the eligibility birth interval was extended to 30 months between two consecutive births.

The speed premium alters the incentives for the timing of higher order births, as it gives mothers strong financial incentives to space their children in short intervals. In a first part of the paper, we examine couples' fertility timing responses to the two reforms. Moreover, we study whether the age difference between siblings (spacing) determines children's later life outcomes, exploiting the potential variation in birth spacing generated by the two reforms.[1] In addition, the two reforms give rise to variation that allows us to study, for a given birth spacing, the effect of parents' early life monetary- and time investments on children's health and schooling outcomes. This is because parents to children born just within the eligibility cutoff will have a higher parental leave benefit, which may alter both their duration of parental leave as well as their disposable income. Thus, in a second part of the paper, we examine the effect of the speed premium on household labor supply responses, disposable income, and children's outcomes by comparing the difference in outcomes between families who were just eligible to the speed premium and families who just failed to give birth within the eligibility interval, under both the 1980- and 1986-regimes.

While previous papers have provided tentative evidence on the impacts of the speed premium on fertility (Hoem, 1990, 1993), and one paper looked at the effects of child spacing on child outcomes using the speed premium (Pettersson-Lidbom and Thoursie, 2009), our paper is novel in the approach to take a comprehensive view, and exploit the fact that the speed premium gives rise to variation in financial incentives for fertility timing, the duration of parental leave, and in families' financial resources when their children are very young, all of which are potential determinants of child development.

We use population-wide Swedish administrative registers. Our data covers the universe of mothers who gave birth to their first child in 1970 or later, their children and the fathers of their children. The data includes information about demographic and background characteristics, labor income, and disposable income, for all individuals aged 16–64 during the time period 1970–2013. Thus, for all parents and for a large sub-sample of children, we have data on labor income and educational attainment at adult ages. For each child in our data, we have information on the date of birth, along with a large set of variables that measure outcomes at birth (such as birth weight, apgar scores, and gestation). We also have information on schooling outcomes from the grade-9 register, such as GPA, grades in different subjects, being qualified for high school. To study early-life health outcomes we use information from the inpatient register, which provides information on the universe of hospital visits in Sweden with detailed diagnosis codes associated

[1] See e.g. Pettersson-Lidbom and Thoursie (2009) for previous evidence on the effects of child spacing on child outcomes.

with the hospital visits.

Our preliminary findings are the following. First, the introduction of a biologically feasible interval between two subsequent births in which mothers still can retain eligibility to full replacement maternal benefits in 1980, which increased the eligibility interval from 12 to 24 months is associated with an immediate fertility response of parents, which in turn is associated to a reduction in the spacing between births. The impact of the 1986-expansion has more complex behavioral responses, as it gives rise to incentives for both postponing higher-order fertility, and to decrease the birth spacing, depending on the age of first-born children at reform introduction. Specifically, we find that parents who would have been eligible to the speed premium under the 24-month regime delay second births as the eligibility interval increases to 30-month spacing. However, some parents who would not have time to meet the eligibility criteria under the 24-month regime were now able to meet the 30-month cutoff if they conceived a second child within a certain window after reform implementation. Indeed, we find that this group of parents conceived second children earlier than they would have absent the reform. Second, mothers who are just eligible for the speed premium also reduce their pre-, and post-birth labor supply (this holds at both the 24 and 30-months intervals). Children of just eligible mothers fair better in terms of ninth-grade GPA, are more likely to be qualified for high school, and are more likely to have attained a college degree by age 26.

Our paper contributes to the extensive literature on the impacts of parental leave entitlements on women's employment and wages, and studies show that female labor force participation is positively affected by the provision of parental leave (see e.g. Baker and Milligan, 2008; Lalive and Zweimüller, 2009; Rossin-Slater, Ruhm and Waldfogel, 2013; Jaumotte, 2003; Han, Ruhm and Waldfogel, 2009). Another important objective is to enhance child development by ensuring the adequacy of families financial resources and parental time investments in children. The formation of skills and abilities, and the returns to investments in human capital are widely discussed topics in the economics literature, as differences in abilities account for a substantial share of the variation across individuals in a wide range of factors that determine wellbeing, e.g., earnings, health, and even success in the marriage market. It is also well documented that ability gaps across children from different socioeconomic groups emerge at early ages, before children enter school (Carneiro and Heckman, 2002). The family plays an important role in shaping the skills of their children through genetics, parental investments and through the choice of childhood environment. Early models of human capital formation treated childhood as a single period, assuming that inputs into the production of skills at different stages of childhood are perfect substitutes (e.g. Becker and Tomes 1986). Recent studies build on these early models and formulate a model of skill formation with multiple stages of childhood, where inputs at different stages can be complements. Thus, while some investments are efficient at early ages, they may not be at later ages of children (see e.g Cunha and Heckman, 2007; Carneiro et al., 2015).

The empirical literature on the effects of family income on child outcomes has produced mixed results. Some studies find positive effects of family income (Oreopoulos, Page and Stevens, 2008; Dahl and Lochner, 2012; Milligan and Stabile, 2007), but others find no or very small effects (Shea, 2000; Løken, 2010; Blau, 1999). While family income is one important component of early investments in children and child environment (Carneiro and Ginja, 2016), it is clear that parental labor supply decisions and child care arrangements are also key factors that affect child development. The effects of parental time with children will depend on the quality of care provided by parents compared to the quality of alternative care options (Bernal and Keane, 2010; Carneiro and Ginja, 2014). Previous studies have used policy reforms as natural experiments to analyze causal effects of parental leave on children's long-run outcomes. Dustmann and Schönberg (2012) find no effect on the future wages or high school attendance of children from three waves of maternity leave reforms in Germany. Würtz (2007) finds no effect on high school completion and grades from an extension of parental leave benefits from 14 to 20 weeks in 1984 in Denmark. Liu and Skans (2010) find that extending the entitlement to paid leave from 12 to 15 months in Sweden improved the school outcomes for children of well-educated mothers. Carneiro et al. (2015) find that an increase of maternal leave from 3 of unpaid to 4 months of paid leave and 12 months of unpaid leave in Norway led to a decline in high school dropout and an increase in wages at age 30. Finally, Dahl et al. (2013) assess the case for paid maternity leave, focusing on parents responses to a series of policy reforms in Norway which extended paid leave from 18 to 35 weeks. None of the reforms seems to crowd out unpaid leave and each reform increased the amount of time spent at home versus working by roughly the increased number of weeks allowed. However, they find no effects on children's school outcomes. Summing up, prior evidence suggests that paid leave is likely to be beneficial for child health and development (Ruhm and Waldfogel, 2012).

The paper is structured as follows. Section 2 presents the Swedish institutional setting and predicted responses of family's to the two reforms explored. The data is presented in Section 3. Section 4 presents the empirical strategy. Results are included in section 5 and robustness checks are in Section 6. Preliminary conclusions are in section 7.

2 Institutional Setting and the Reforms

The Swedish parental leave system, with gender neutral eligibility to governmentally paid parental leave, was introduced in 1974. Parents were initially entitled to six months of paid parental leave, which was later stepwise extended to today's 16 months of paid leave per child (see Table A.1 for all changes to the parental leave system in Sweden). The mother and the father of a child are given half of the entitled days each, but have the option of transferring paid leave days between one another.[2]

Parental leave benefits are divided into three components. Since 1980, ten days of leave are given exclusively to the father, which he can use during the first 60 days after the birth of the child. Second, since 1978, part of the parental leave is replaced with a low, fixed daily amount. Third, and most important, parents receive benefits that replaces 90 percent of their salary.[3] The wage-replaced benefits are conditioned on at least 240 days of employment before child birth. Individuals that do not fulfill the work requirement of 240 days pre-birth employment get a low daily amount of parental leave benefits.

The parental leave is job protected, and it can be used very flexibly. During the first 18 months after birth both parents are legally entitled to full-time job protected leave, irrespective of whether

[2]In 1995, one month of paid leave became earmarked to each parent, implying that fathers could not transfer all of their paid leave to the mother of their child. This "daddy-month" was introduced to increase the incentives for fathers to increase their leave-taking. In 2002 and 2016, a second and third month of paid leave were earmarked to each parent.

[3]Currently, the replacement rate is 80 percent of previous earnings (see Table A.1).

they claim parental leave benefits. Thereafter, parents have the option of reducing their working hours with up to 25 percent until the child turns 8 years old and claim parental leave benefits on a part-time basis.

2.1 The Speed Premium Rule

To receive wage-replaced parental leave benefits, parents must have been employed for at least 240 consecutive days before birth, and the benefit level is based on the salary received before birth. This means that part-time work or periods of non-work - as is common among new mothers - between births decreases the benefits received for a subsequent child. To improve the financial situation of families with young children, it became legal practice during the 1970s to base the parental leave benefits for a subsequent child on the income earned before the preceding child, provided that the birth interval between two births did not exceed the period of eligible leave, plus six months. This administrative rule implied that mothers did not have to return to work between births to re-establish eligibility for (higher) parental leave benefits, if the births were sufficiently closely spaced. In 1974, the eligibility birth interval was 12 months, but could in practice be extended by three months. Because entitlement to paid leave was extended to seven months in 1975, the eligibility birth spacing interval for higher benefits increased to 13–16 months. On January 1, 1980, the eligibility birth interval was increased to 24 months. Moreover, January 1, 1986, the eligibility birth interval was further extended to 30 months, and also became statutory (Proposition, 1984; SfU, 1984).[4].

Though the administrative rule was introduced to ensure the financial conditions of families with, the extensions of the eligibility birth interval potentially gives rise to unintended effects on the timing of couples' higher order fertility, which explains why it is commonly referred to as the "speed premium". With an eligibility interval of two years or more, couples found it exceedingly manageable to fulfill the eligibility criteria and take advantage of the new benefit (Hoem, 1990, 1993). Moreover, the speed premium rule creates short-term economic incentives to space births in short intervals: among mothers with at least one child, giving birth to a subsequent child

[4](Table A.2 shows the changes to the eligibility spacing interval over time).

outside the eligibility interval implies a lower benefit level for leave taken with the new child, compared to the scenario where the child is born within 24 (30) months from the previous birth after the introduction of the 1980 (1986) extension of the interval. Figure B.1 shows the average age difference in months between a mother's first two children for different cohorts of second-born children. Before 1980, there was an increasing trend in birth spacing, which almost instantaneously decreased after the introduction of the 24-month rule in 1980, and continued to decrease after the implementation of the 30-month rule in 1986. In Figure 1 we present kernel density estimates of the age difference between the first two children before and after the respective reform cutoff dates. Panel (A) graphs the distribution of birth spacing for three second-birth cohorts before and after 1980 (excluding cohorts of second children born in 1980), and panel (B) shows the corresponding densities around the 1986-reform. Compared to the pre-reform cohorts, there is a clear shift in the distribution towards shorter birth intervals for second-child cohorts born directly after the reform implementations.

The speed premium rule in the Swedish parental leave system is similar to the "automatic renewal" in the Austrian system, described and studied in detail by Lalive and Zweimüller (2009). In their paper, they find that an extension of automatic renewal from one to two years increases the short run fertility by 5 percentage points.[5]

Part of our empirical strategy hinges on comparing fertility differences between couples giving birth before and after the reform cutoff-dates, respectively. For the 1980-reform, an additional change to the parental leave system was implemented at the same time, potentially confounding fertility effects we may find as a response to the speed premium: the entitlement to paid parental leave was increased from 270 to 360 days. The additional 90 days, however, were compensated at a low, fixed amount of SEK 37 per day. Parents to children born on January 1st 1980 onwards were entitled to the extension.(Proposition, 1979). In Section (XX), we will perform a number of robustness checks to gauge the potential confounding of this extension.

[5]In the Austrian PL system, mothers must meet a work requirement to be eligible for paid leave. For mothers giving birth to a subsequent child within 3.5 months after the end of a previous PL spell are exempted form the work requirement and get an automatic renewal of PL benefits for the subsequent child. In 1990, paid parental leave was extended from one to two years, increasing the eligibility spacing interval for automatic renewal from 15.5 months to 27.5 months (Lalive and Zweimüller, 2009).

2.2 Effects on Fertility, Earnings & Child Outcomes - Hypotheses

The introduction and subsequent alteration of the speed premium rule may give rise to behavioral responses on both the timing of fertility (child spacing), and on parental labor supply. In turn, fertility timing and labor supply responses likely affect parental investments in children early in life, both in monetary terms and in the form of time investments. Therefore, we are interested in, on the one hand, the effects of child spacing on children's outcomes, and on the other hand, the effects of early investments on children's later outcomes, for a given age difference between siblings. In Section 4, we describe the empirical strategies that we use to estimate these relationships. Below, however, we describe the different margins and outcomes likely affected by the speed premium rule and lay out the hypotheses that we test.

2.2.1 The 1980-reform

In the period before the 1980-reform, mothers needed to give birth to a subsequent child within 12 months from the previous birth in order to receive the same (higher) benefit level for the new child, without re-establishing eligibility. Such a tight spacing is biologically difficult to achieve. The 1980-reform increased this interval to 24 months, making the eligibility criteria more biologically feasible to fulfill. Thus, in the medium- to long-run, the spacing between births may on average decrease, as couples who are still childless at the time of reform implementation may alter their fertility plans to benefit from the speed premium rule. However, in terms of instantaneous responses to the reform among couples with children, different groups of mothers will face different incentives. Specifically, the group of women whom by the time of reform implementation had one child aged 0–15 months at January 1st, 1980, has financial incentives to conceive a second child sooner than otherwise planned. In particular, they have a "window of opportunity" to conceive a second child of 0–15 months after reform implementation (depending on the age of the first child) to achieve a child spacing of maximum 24 months. Thus, we expect a leftward shift in the timing of second-child conceptions for this group of mothers, which we refer to as potential shifters. Parents whose first child is older than 15 months at the date of reform implementation (non-shifters), however, are expected to be unaffected in terms of the timing of second-child conceptions, since their child spacing will exceed 24 months even if they conceive a second child in January 1980. Thus, we expect to find an increase in the number of conceptions of second children just after the introduction of the 1980-reform for mothers with a child younger than 15 months at the introduction of the reform. Panel (A) of Figure B.2 illustrates these expected responses graphically.

In terms of labor supply adjustments, there is potentially both a mechanical, and a behavioral effect for the mothers "at risk". First, there may be a mechanical negative effect on labor supply in the interim between two births due to shorter birth spacing. In addition, a downward adjustment of labor supply between two births may occur because there is no longer a need to re-establish eligibility in order to get (high) parental leave benefits, under the expectation of giving birth before the 24-month cutoff. Thus, women who expect their parental leave benefits to be high regardless of their pre-(second)birth labor supply may reduce their hours worked before their child is born. In order to test for the existence of behavioral responses, we exploit the discontinuity in the mothers' expected (and actual) benefit level at the 24-month threshold. Mothers who give birth to a second child within 24 months after the first child are eligible for a higher benefit level than women whose second child is born more than 24 months after their first child. We thus estimate whether there is a discontinuous jump in mothers' pre-birth labor income at this threshold. In addition to affecting pre-birth labor supply, higher benefits may induce a longer duration of parental leave with the second child (see e.g. Lalive and Zweimüller, 2009). Therefore, we also test for jumps in mothers' post-birth labor supply at the threshold, for varying follow-up years after birth. We also analyze fathers' labor supply responses, as well as the within-couple gap in income. Lastly, to gauge the total effect on the household's financial situation, we analyze the effects on their disposable income.

Lastly, we also exploit the discontinuity in eligibility for higher parental leave benefits on child outcomes. Eligibility to the speed premium is likely to affect both the monetary and time resources available to parents when their children are young. While we are unable to separate between impacts of time investments and monetary investments, we can analyze the total effect of parental resources on the health- and schooling outcomes of both first-, and second-born children. To this end, we analyze potential jumps in children's medium- and long-run outcomes at the threshold.

2.2.2 The 1986-reform

Extending the eligibility interval from 24 to 30 months may generate heterogenous fertility timing responses across different groups of women defined by their previous fertility status. Specifically, we focus on three groups of mothers. Mothers with a first child aged 15–21 months at January 1, 1986, have a window of opportunity to conceive a second child within 25 weeks after reform implementation to benefit from the speed premium. For this group of mothers (again referred to as shifters), we thus expect a leftward shift in the distribution of the number of conceptions over time since reform implementation. However, for a group of mothers with first-children young enough to potentially be eligible for the speed premium under the old regime (24-month spacing), can under the new regime delay second births and still be eligible. We refer to this group as potential "delayers", and they are defined to be mothers whose first child was aged 0–15 months at reform implementation. Under the old regime, their window of opportunity ended at 15 months after reform implementation; under the new regime, this window is extended to 21 months. Panel (B) of Figure B.2 illustrates these expected responses graphically.

Moreover, analogous to the 24-month regime, mothers who give birth to their second child just within 30 months from the first have incentives to decrease her pre-second-birth labor supply, and thus may have lower labor supply both before and after second birth compared to mothers who give birth to their second child just outside the 30-month cutoff. Regarding consequences for first-born children's outcomes, comparing the effects of additional resources across the two regimes allows us to compare the effects of investments at different ages of children on their later outcomes: under the first regime, the first-born children are two years old at the threshold, while they are 2.5 years at the threshold under the 30-month regime. For second-born children, we can compare how resources matter for children with a smaller age gap to their older sibling (24-month regime) with a half year larger age gap (30-month regime).

3 Data

3.1 Data sources

Our analysis is based on a panel data set created by combining population-wide Swedish administrative registers. Our data covers the universe of mothers who gave birth to their first child in 1970 or later, their children and the fathers of their children. Using the individual identifiers, we add information about educational attainment, labor income, disposable income, year of birth, and region of residence for each mother and father. These data cover the the time period 1970–2013, for all individuals aged 16–64. Thus, for a large sub-sample of children, we also have data on labor income and educational attainment at adult ages.

For each child in our data, we have information on the date of birth from the medical birth register. The register also includes the children's birth weight, birth length, gestation (in weeks), apgar scores, and a number of different medical diagnosis codes at birth. The medical birth register also includes variables related to the mother's pregnancy and delivery, such as smoking prevalence during pregnancy, indicators for caesarean section delivery, weight and length when giving birth, the predicted date of birth based on the last menstruation as well as a variety of medical diagnosis codes that indicate pregnancy risk factors.

To study early-life health outcomes we use information from the inpatient register. The inpatient register includes the universe of all hospital visits during the years 1987–2005. In addition to diagnosis codes (ICD-codes), the inpatient register reports the date of admission, an indicator for planned/emergency care, the number of days for each hospital stay, and hospital identifiers.

Lastly, for each child in our data we match information on schooling outcomes from the grade-9 register. Specifically, we calculate (within-graduation year) standardized GPAs in 9th grade. The register also includes school identifiers, indicators for whether the students' grades are sufficient for high school eligibility, and grades in different subjects.

3.2 Analysis sample

We restrict attention to mothers who were eligible for wage-replaced parental leave for their first child, i.e., who fulfilled the work requirements before the birth of their first child. We further restrict the sample to mothers who gave birth to at least two children and whose second child was born 1977 or later, and calculate the spacing between their first and second child in months. We additionally restrict the sample to mothers who were aged 20–39 when they gave birth to their first child.

4 Empirical Strategy

4.1 Estimating the Effects of the Speed Premium on Fertility

We start by considering the 1980 reform. This reform extended the benefits for mothers whose subsequent child was born up to 24 months after the first. The previous interval was of 12 months. Thus, some parents benefit in trying to change the planned spacing between children. Suppose a family whose youngest child is 15 months old in January 1, 1980 (when the reform occurred). Then, if they anticipate the next child the mother would still be eligible for full replacement in maternity leave. Now if the youngest child is 17 months old or more then the family would have no incentives to have a new child. Of course, the mother will only be eligible to paid maternity leave for subsequent children if she had met the labor income requirements for the preceding child.

Then, we can identify the impacts of spacing through RD. Since the law came in place from January 1, 1980 and is applicable to all children born from then onward, we can look at manipulation in spacing by looking at the number of children whose conception date was around January 1, 1980. So take the sample of families whose youngest was less than 15 months old, and whose mother was eligible for paid maternity leave for the preceding child. Then, from the birth registry we can obtain the week of conception of each child by subtracting the gestational length of the pregnancy to the date of birth. Thus, we can investigate if around January 1, 1980 there was a discontinuity in the number of conceptions for the set of families that would have incentives to change spacing. That is, we can estimate the following model

$$y_i = \alpha + \beta 1[Conception \geq 1Jan80] + f(WeeksToReform) + \varepsilon \tag{1}$$

where y_i is the number of conception per week. Notice that within each calendar year there exists seasonality in the pattern of conceptions. Therefore, we can use a pre-reform year (1977) to control for month effects.

Also, we should expect heterogeneity in β according to the size of the benefit the mother is entitled to. That is, mothers who loose the most in terms of income if they a child without having re-established the eligibility to the maternity leave benefits would have more incentives in changing spacing.

Non-parametric estimates for model 1 are presented in Section 5 in Figures 2 to 6. We explain these Figures in detail in Section 5.

4.2 Estimating the Effects of the Speed Premium on Household Labor Supply, and Child Outcomes

The Swedish speed premium setup also introduces an important variation in financial resources and parental time with children in the early years and the extent to whether the *timing* of these extra resources can counteract the impacts short birth spacing. The discontinuities that we use in the RD design arise from birth intervals between two consecutive children: mothers whose first two children are born within 24 months from each other are eligible for higher parental leave benefits for the second child if the child is born between 1980 and 1985. In 1986 this interval was extended to 30 months. To start we focus on the first two-children born by a mother. Using data on YY-month windows around the eligibility cutoffs, our RD design is implemented by estimating the following regression equation:

$$y_i = \alpha + \mathbf{1}[t \geq c] f_r(t-c) + \mathbf{1}[t < c] f_l(c-t) + \epsilon_i \tag{2}$$

where y_i is (1) the outcome of interest for parent i (labor income between the first two children, labor income and disposable income after the second child is born), (2) birth outcomes for both the first and second child, (3) school achievement, college attendance by age 26 and labor income by age 26 for the first and school child. t is the birth spacing between the first two children, defined in weeks from the cutoff interval c, $\mathbf{1}[\cdot]$ is the indicator function, and f_l, f_r, g_l, and g_r are unknown functions. c is 24 months for children born between 1980 and 1985 and c is 30 months for children born between 1987 and 1989. Since we use weekly data we effectively use the cutoffs of 100 and 124 weeks, respectively, for the periods of 1980-1985 and 1987-1989. Due to potential leniency of the system in which just ineligible mothers are awarded the benefit, we exclude from the estimate births in the 2 weeks just above and just below the cutoff data. That is, for the period of 1980-1985 we exclude second children (and their families) born 98 to 101 weeks after their older sibling, and for the period of 1987-1989 we exclude second children (and their families) born 122 to 125 weeks after their older sibling.

We estimate equation 2 a (local) linear specification of the functions. We assess the validity of the identifying assumptions through a number of robustness checks.

5 Results

5.1 Financial Incentives & Fertility Timing

5.1.1 Graphical Evidence

We start our analysis by estimating the effects of the speed premium rule on the timing of second-born children, and thus on the spacing between the first two births. Before turning to the regression results, we graphically examine adjustments in the timing of second-child *conceptions* after the implementation (1980) and extension (1986) of the speed premium rule. Among mothers with first-born children that are sufficiently young at the date of reform implementation, we expect that second-children will be conceived earlier than absent the reform so that mothers can benefit from the speed premium rule. To examine this conjecture, we focus on mothers whose first child was aged 0–15 months at January 1, 1980, who have a "window of opportunity" to conceive a second child within 15 months from reform implementation to achieve a spacing of maximum 24 months. Parents whose first child is older than 15 months at the date of reform implementation (non-shifters), however, are expected to be unaffected in terms of the timing of second-child conceptions, since their child spacing will exceed 24 months even if they conceive a second child in January 1980. We also study the fertility adjustment behavior among women whose first child was 0–15 months at reform implementation, but who were not eligible for wage-replaced leave, and should therefore be unaffected by the speed premium. To analyze whether the timing of conceptions of second children changes as a response to the speed premium, we compare the number of conceptions after January 1 in the reform year with the number of conceptions after January 1 in a pre-reform year, among similar groups of mothers. With time, we should see a shift in the mass of second-child conceptions to the period reflecting the window of opportunity, from time periods beyond this window.

Figure 2 plots the total number of conceptions of second-children separately for potential shifters, non-shifters, and non-eligible mothers (where non-eligible mothers refer to those who are not eligible for wage-replaced parental leave benefits). The three figures depict - from left to right - the number of conceptions for each of the three groups by time since January 1, 1977 (pre-reform year), 1980 (first treatment year), and 1981 (second treatment year). If women respond to the 1980-reform, we should see a leftward shift in the mass of conceptions among the shifters. Comparing the graphs across 1977, 1980, and 1981, there is indeed an increase in the difference in the number of conceptions between shifters and non-shifters within 60 weeks from January 1st (the upper bound of the opportunity window). The changes appear to be driven by the shifters, as the non-shifters' conception timing is very similar across the three years. Figure 3 shows the difference in the number of conceptions between individuals with sufficiently young children (shifters) and those whose first child is too old to time second births to benefit from the premium. Comparing across the three years, the mass is clearly shifting from being concentrated outside the opportunity window (60 weeks after January 1 and beyond) to being increasingly concentrated within the opportunity window (upper bound marked by the red line). The shift is discernable already in 1980; the reform-year, which indicates instantaneous responses.

For the 1986-extension of the eligibility interval from 24 to 30 months, we focus on the timing of second-child conceptions of three groups. Mothers with a first child aged 15–21 months at

January 1, 1986, have a window of opportunity to conceive a second child within 25 weeks after reform implementation to benefit from the speed premium. For this group of mothers (shifters), we should see a leftward shift in the distribution of second-child conceptions with time if they respond to the incentives. However, the group of mothers with first-children young enough to potentially be eligible for the speed premium under the old regime (24-month spacing), can under the new regime delay second births and still be eligible for the speed premium, but now under the new regime. We refer to this group as potential delayers (mothers whose first child is aged 0–15 months at January 1, 1986). Under the old regime, their window of opportunity seizes at 15 months after reform implementation; under the new regime, the upper bound of the opportunity window is extended to 21 months. Figure 4 shows the total number of conceptions by time since January 1, 1985 (pre-reform), 1986 (reform-year), and 1987 (post-reform year) for shifters, delayers, and non-shifters. For shifters, we see a steadily increasing number of conceptions within the opportunity window (0–25 weeks post January 1) with time, whereas the non-shifters hardly change their conception timing. Among the delayers, there appears to be a rightward shift in the timing of second-child conceptions. These patterns are more easily discernable if we again study the differences in the number of conceptions between shifters and non-shifters (Figure 5), and between delayers and non-shifters (Figure 6). Figure 5 shows that the difference between the shifters and non-shifters gradually shifts to be within the new opportunity window for this group; i.e., earlier conceptions. Figure 6 shows that for delayers, the difference is gradually shifting to be concentrated within the opportunity window under the old regime (marked with the black line), to be within the opportunity window under the new regime. This is suggestive evidence of delayers indeed postponing second-births as they can afford to do so, without sacrificing the speed premium.

To summarize, these graphical evidence suggest that mothers respond to financial incentives in line with theory, and that these responses are instantaneous. In the next section, we complement the graphical analysis and estimate the effect on fertility timing using a difference-in-differences approach.

5.1.2 Regression Results

TBA

5.2 Fertility Timing & Child Outcomes

TBA

5.3 Financial Incentives & Household Labor Supply

Mothers that expect to get higher parental leave benefits by virtue of the speed premium might reduce her labor supply before her second child is born, since re-establishing entitlement to paid leave is no longer necessary. Moreover, a higher benefit level might also affect the duration of leave with the second child, so that also post-birth labor supply is negatively affected. To test these conjectures, we exploit the 24-, and 30-month cutoffs and estimate the difference in mothers' labor earnings at the threshold using specification 2, for different follow-up horizons after second birth. We use labor income to measure labor supply because we lack data on hours worked. While labor earnings reflect both hours worked and hourly wages, any short-term responses to this measure is likely to reflect changes in hours worked.

Figure 7 shows - from left to right - the mother's labor income in the year before second birth; year of second birth; and one year after second birth, on each side of the cutoff spacing interval under the 24-month regime (upper panel) and the 30-month regime (lower panel). Each of the sub-panels estimate the discontinuity at the threshold under a linear parametric restriction. The specifications use weekly data on child spacing, and data on 32-week windows on either side of the cutoff. We exclude the four weeks closest to the cutoff in the graphical analysis. In both regimes, the estimated discontinuity in mothers' income in the year before second birth is significant, increasing with around 3,800 to 9,000 SEK. There is no significant discontinuity in mothers' earnings in the same year that they give birth to their second child, but in the 24-month regime, there is an increase in mothers' earnings in the year after second birth by 3,500 SEK. Thus, expecting a lower parental leave benefit increases mothers' pre-birth labor supply in both regimes, and having lower parental leave benefits also increases post-birth labor supply in the 24-month regime.

Figure 8 shows the corresponding results for the father's labor income. The estimate discontinuities are significant only for father's post-birth earnings in the 24-month regime, but the point estimates suggest that a lower parental leave benefit for mothers decreases fathers labor supply. One possible explanation is that fathers compensate for mothers' decreased time with children when they are young by increasing their parental leave duration. To gauge the total effect on the household's financial resources, we estimate the effect on the couples disposable income.

Table 1 presents the results from our reduced form regression discontinuity estimates on mothers' and fathers' labor income and disposable income for different follow-up horizons after second birth, for the 24-month regime. The specifications use a linear parametric restriction. weekly data on child spacing, and 24-week windows on either side of the cutoff. The specifications allow for different trends on either side of the cutoff. The regression estimates compare being within the cutoff, so the effects are interpreted as being eligible for the speed premium. For mothers, there is an economically large and statistically significant negative effect on labor income in the year before second birth, of about 15,000 SEK, and a negative effect on labor income in the year of second birth of 3,000 SEK, after which the effect of income dissipates. Regarding disposable income, however, the net effect is positive. In the year before birth, this is potentially explained by increased take-up of parental leave with the first child, from which benefits are likely higher than part-time work during pregnancy with the second child. Regarding post-birth income, having children born within the eligibility cutoff means higher parental leave benefits with the second child, which likely explains the positive net effect on disposable income. For fathers, there appears to be a negative effect on labor income in the year before second birth, but no effect on disposable income.

Table 2 shows the corresponding findings for the 30-month regime. In the year before second birth, mothers' labor income is reduced by 16,000 SEK; no effect in the year of birth, and a reduction in labor income in the year after second birth by almost 5,000 SEK. In contrast, fathers' labor income increases; also reflected in their disposable income. The net effect on mothers' disposable income is negative in the year before second birth, but positive in later years, suggesting that higher parental leave benefits with the second child compensates for the income lost from market work.

To get a more complete picture of how couples' financial situation is affected by the negative labor supply responses, and whether they are counteracted by higher parental leave benefits, we estimate the effects of the speed premium on the spouses' joint disposable income. The results are presented in **??** and show that, in both regimes, a negative effect on labor supply in the year before second birth - measured as a negative effect on labor income - is not translated into lower disposable income. A potential explanation is that women who decrease their labor supply before the second birth instead take up parental leave benefits with the first child, which are likely higher than part-time work during pregnancy with the second child. Regarding post-birth outcomes, there is a positive effect on household disposable income in the year of second birth and in the year after, in both regimes. This is likely explained by the higher parental leave benefits that mothers are entitled to by virtue of the speed premium.

We interpret these effects as the speed premium, on the one hand, allows mothers to spend more time with their first child before the second child is born without their financial situation being negatively affected, and on the other hand, to have a more beneficial financial situation in the early years with their second child.

5.4 Parental Resources & Child Outcomes

The results presented in the previous section show that the speed premium negatively affects mothers' labor supply in the year before second birth, but that the household's disposable income is unaffected. Thus, for first-born children, any impacts of the speed premium on their outcomes are likely to be mediated by parental time investments. Families financial situation after the second child is born, however, appears to be improved despite a lower labor supply. This is likely due to the higher level of parental leave benefits that parents receive by virtue of the speed premium rule. For the second child, it is therefore difficult to infer whether potential effects are mediated by time or income, since both are increased at the same time. Nevertheless, we can say something about the effects of parental investments on child outcomes.

Table 3 presents the reduced form RD estimates of the effect of the speed premium, in the

24-month regime, on the schooling outcomes of first- and second-born children. For both first-born and second-born children, maternal entitlement to the speed premium generates a positive effect on the 9th grade GPA, by 5 and 3.2 percent of a standard deviation. Moreover, both first- and second-born children are 3.4 percentage points more likely to have a college degree at age 26. However, we find no effects on the likelihood of attaining 9th grade GPA that qualifies them for high school.

?? presents the corresponding results for the 30-month regime, and shows that for first-born children, 9th grade GPA is improved by 10 percent of a standard deviation; the likelihood of qualifying for high school increases by 2.6 percentage points, and the likelihood of having a college degree by age 26 is increased by 4.3 percentage points. The estimated effect sizes are thus larger in the 30-month regime, despite similar effects on household disposable income. This might be driven by the age difference at which investments are made on the first-born children in the 24-month and 30-month regimes. For second-born children, 9th grade GPA is increased by 4.4 percent of a standard deviation, and the likelihood of qualifying for high school is increased by 1 percentage point (marginally significant). For college degrees we find no significant effect, but this might be driven by the smaller sample size for this outcome variable for these later-born cohorts (we can only measure educational outcomes until 2013).

To summarize, given child spacing, early investments in the form of parental time and monetary resources have sizeable effects on children's schooling outcomes, both in the medium- to long run.

6 Robustness checks

6.1 Covariate Balance and Placebo Tests

The validity of our RD design requires that around the cutoffs of 24 and 30 months, parents are unable to precisely manipulate the timing of birth of the second child. If couples are able to precisely time the birth of their second child, we should see a discontinuity also in characteristics which are pre-determined around the cutoff of 24 and 30 months. Figures Figure B.3–Figure B.4 in Appendix Appendix B show the average for several pre-determined parental characteristics as mother's Body Mass Index (BMI) at child delivery, mother's and father's year of birth, labor income five years before first birth, and the age difference between the spouses around the 24- or 30-months cutoffs for spacing between the first and second children. These figures show that there are no significant discontinuities at the threshold, except for fathers' income five years before first birth, in the 30-month regime.

Figure Figure B.5 shows whether the second child's outcomes at birth differ between those whose older sibling was born around the 24- or 30-month cutoffs. There are no significant differences in the children's Apgar scores or weeks of gestation in either regime, but there is a significantly negative jump in the birth weight in the 24-month regime. However, as we found a negative pre-birth income effect for mothers, birth weight could potentially be an outcome variable if pre-natal monetary resources matter. As a further robustness test, we present estimates from a series of placebo tests in the next section.

7 Conclusion

This paper examines the effects of changes in financial incentives on the timing of couples' higher-order fertility, post-birth labor market outcomes, and household disposable income. We also study how parents' financial resources and time investments affect children's schooling outcomes and health outcomes. We rely on two reforms in the Swedish parental leave system in the 1980s that granted parents the right to retain the level of parental leave benefits for a subsequent child as for the previous without the need to re-establish eligibility to paid leave by returning to work, provided that the two births are sufficiently close. This administrative rule is commonly referred to as the speed premium, as it gives mothers a higher level of parental leave benefits for a new child if the spacing between two successive births is short. In 1980, the birth interval that granted access to the speed premium was increased from 12 to 24 months, and in 1986 the eligibility birth interval was extended to 30 months between two consecutive births.

Overall, this paper has a double contribution. The availability of changes in the Swedish parental leave system which alter (1) the incentive of new parents to allocate time between the labor market and caring for their children and (2) the timing of higher-order fertility, allows us to study the effects of shifts in financial resources and in the time parents dedicate to their children early in their life.

The results included in this draft are preliminary. Nevertheless, they point to three important findings in which we will build. First, the introduction of a biologically feasible interval between two subsequent births in which mothers can retain eligibility to full replacement parental leave benefits in 1980, which increased the eligibility interval from 12 to 24 months is associated with an immediate fertility response of parents, which in turn is associated with a reduction in the spacing between births. The impact of the 1986-expansion has more complex behavioral responses. Second, mothers who are just eligible for the speed premium reduce their pre-, and post-birth labor supply (this holds at both the 24 and 30-months intervals). Third, children of just eligible mothers fare better in terms of ninth-grade GPA, are more likely to be qualified for high school, and are more likely to have attained a college degree by age 26.

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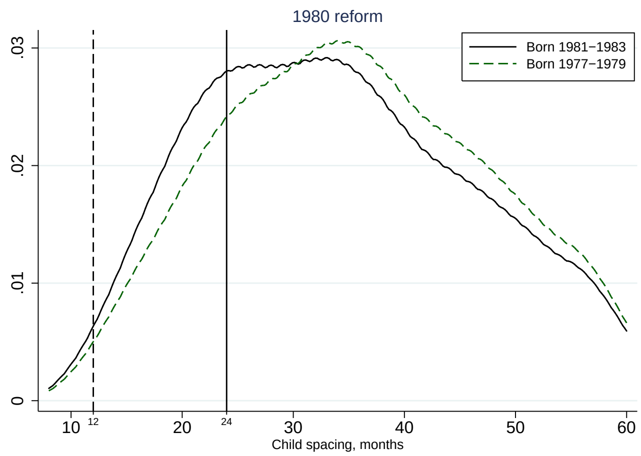
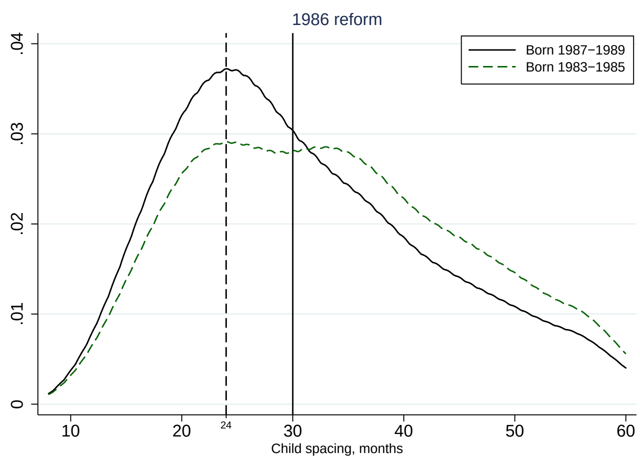
Figure 1.
Density of birth spacing by child birth cohort



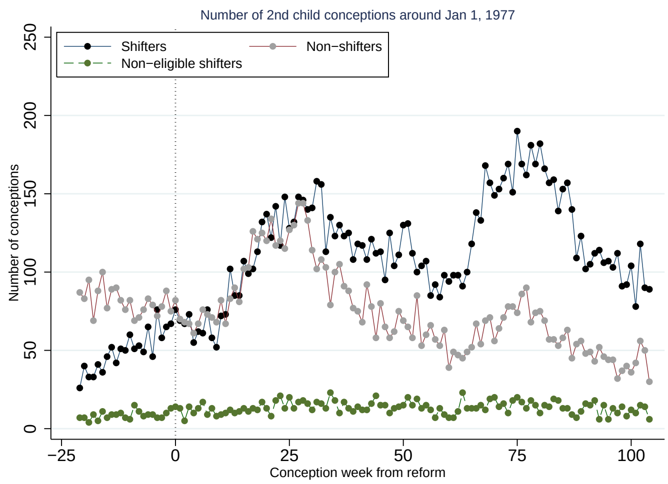
(A)
Birth cohorts before & after 1980-reform



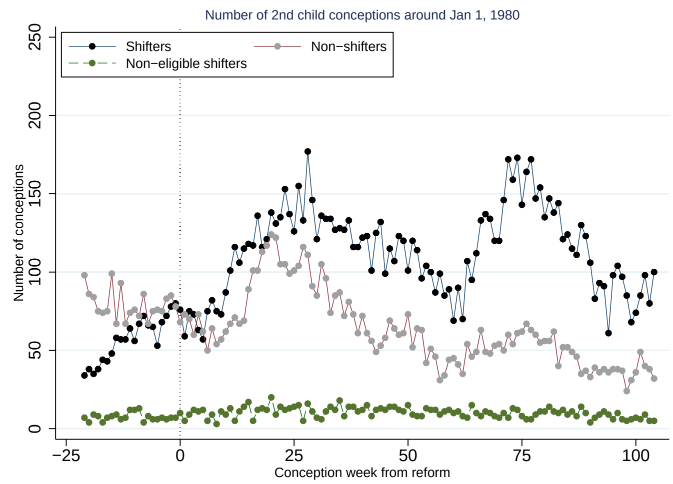
(B)
Birth cohorts before & after 1986-reform

Note: Age difference (in months) between the first and second child by (second) child birth cohort. The sample includes mothers to children born between 1974 to 1989, and whose first two children were born within 60 months from each other. The dashed vertical line represent the pre-reform eligibility interval, and the solid vertical line the new eligibility interval. Source: Multigenerational register.

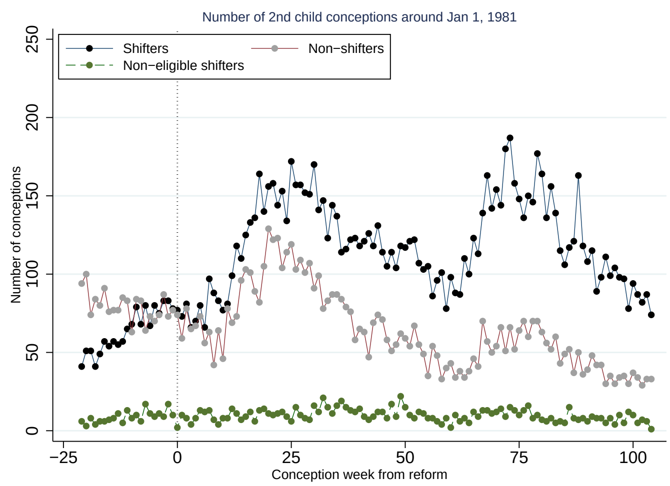
Figure 2.
Number of second-child conceptions by time since reform introduction: 1980-reform



(A)
1977 cohort



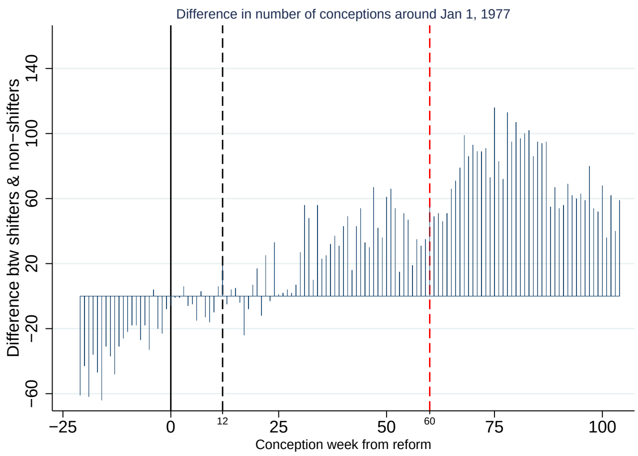
(B)
1980 cohort



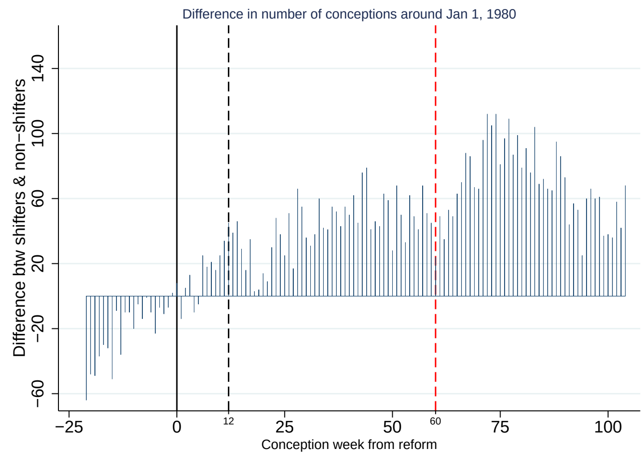
(C)
1981 cohort

Note: Number of 2nd child conceptions by time since reform for eligible women with first child young enough to be eligible for the speed premium (shifters) and for women whose first children is older than 16 months at the reform introduction and thus would not be able to time second births to benefit from the speed premium (non-shifters). The green line shows the number of 2nd child conceptions for mothers with sufficiently young 1st children, but who are not eligible for wage-replaced parental leave.

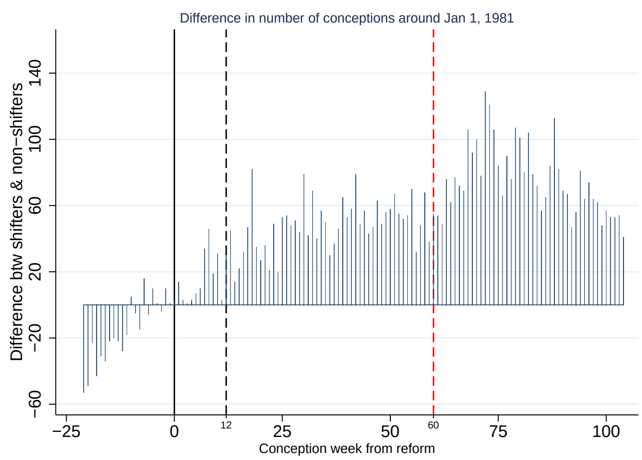
FIGURE 3.
Difference in the number of conceptions between shifters and non-shifters



(A)
1977 cohort



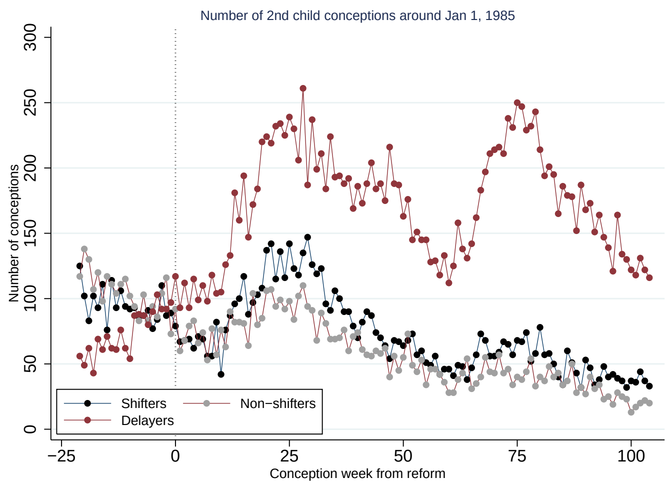
(B)
1980 cohort



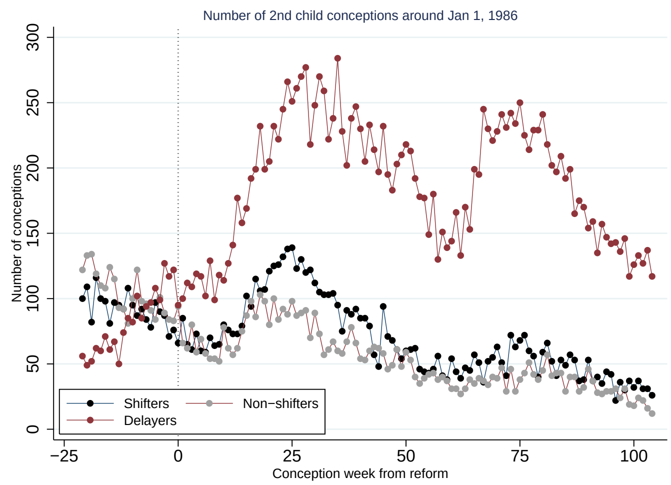
(C)
1981 cohort

NOTE: The vertical lines drawn at 365, and 730 days indicate the old and new eligibility spacing intervals, respectively. The vertical lines drawn at 95, and 460 days represent the old and the new eligibility intervals, minus 9 months. Thus, the area between YY and XX days represent the time period when second children must be conceived in order to benefit from the speed premium.

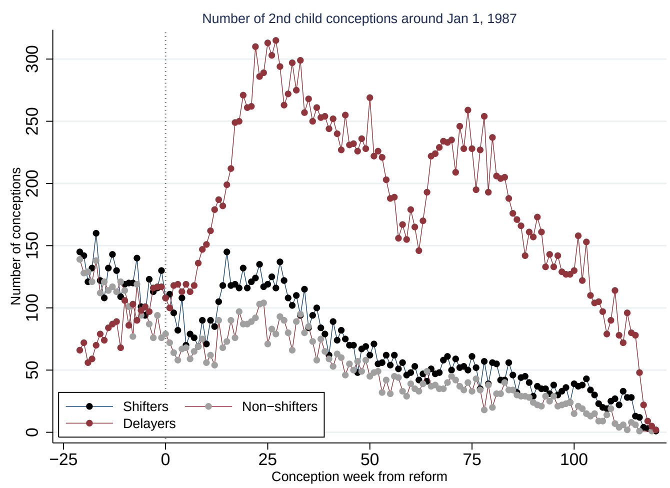
Figure 4.
Number of second-child conceptions by time since reform introduction: 1986-reform



(A)
1985 cohort



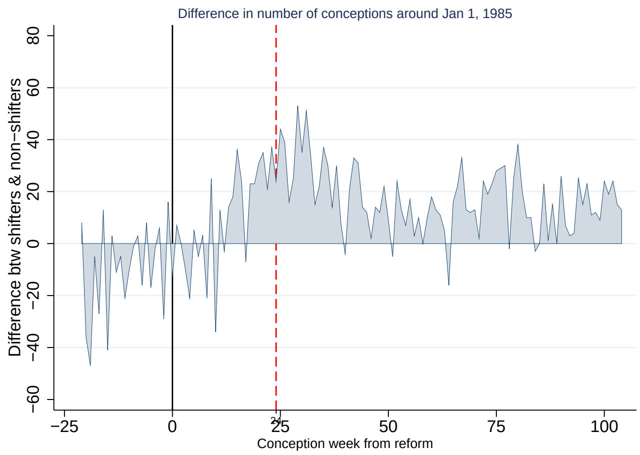
(B)
1986 cohort



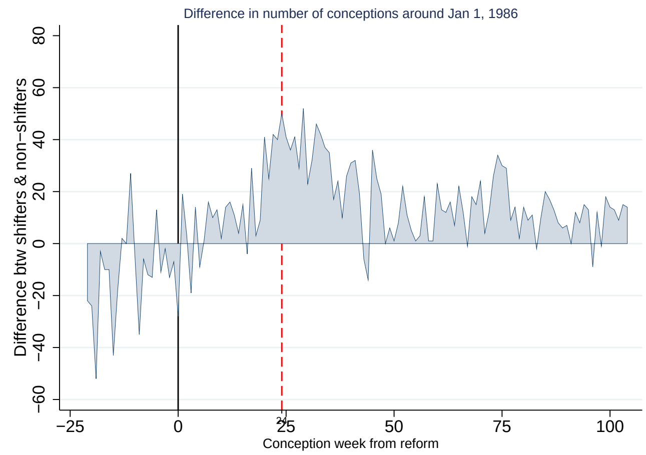
(C)
1987 cohort

Note: Number of 2nd child conceptions by time since reform for women with first child young enough to be eligible for the speed premium, 15–21 months old, and expected to shorten their birth spacing (shifters); women whose first child was aged 0–15 months and thus able to delay planned second birth conceptions and be able to meet the (new) eligibility criteria (delayers); and for women whose first children is older than 21 months at the reform introduction and thus would not be able to time second births to benefit from the speed premium (non-shifters).

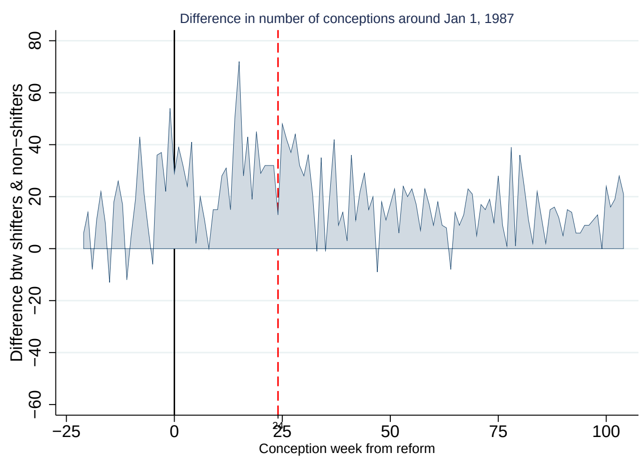
Figure 5.
Difference in the number of conceptions between shifters and non-shifters: 1986-reform



(A)
1985 cohort



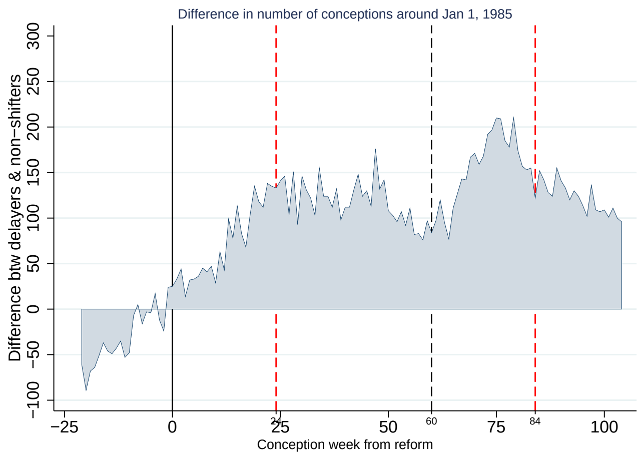
(B)
1986 cohort



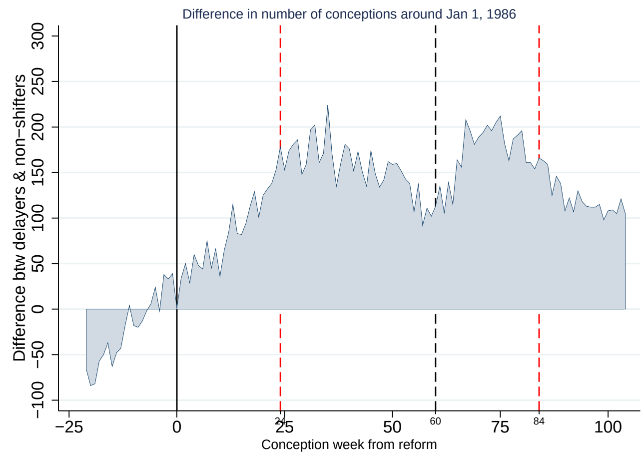
(C)
1987 cohort

Note: Difference in the number of 2nd child conceptions between shifters and non-shifters, by time since January 1, 1985 (pre-reform year), January 1, 1986 (reform year), and January 1, 1987 (post-reform year), in panels (A), (B) and (C), respectively. The area between the solid black line and the dashed red line marks the window of opportunity under the new, 30-month regime.

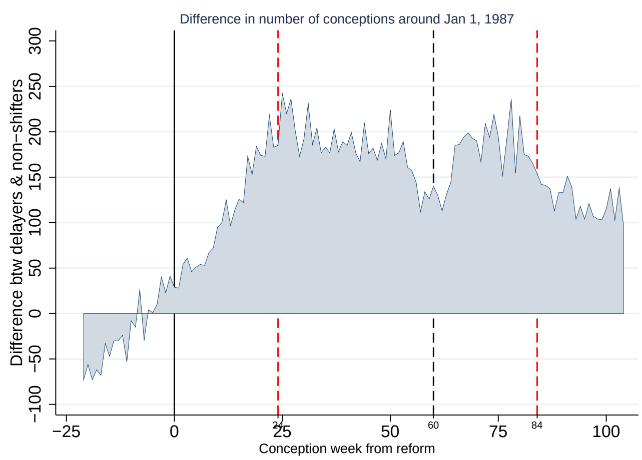
Figure 6.
Difference in the number of conceptions between delayers and non-shifters: 1986-reform



(A)
1985 cohort



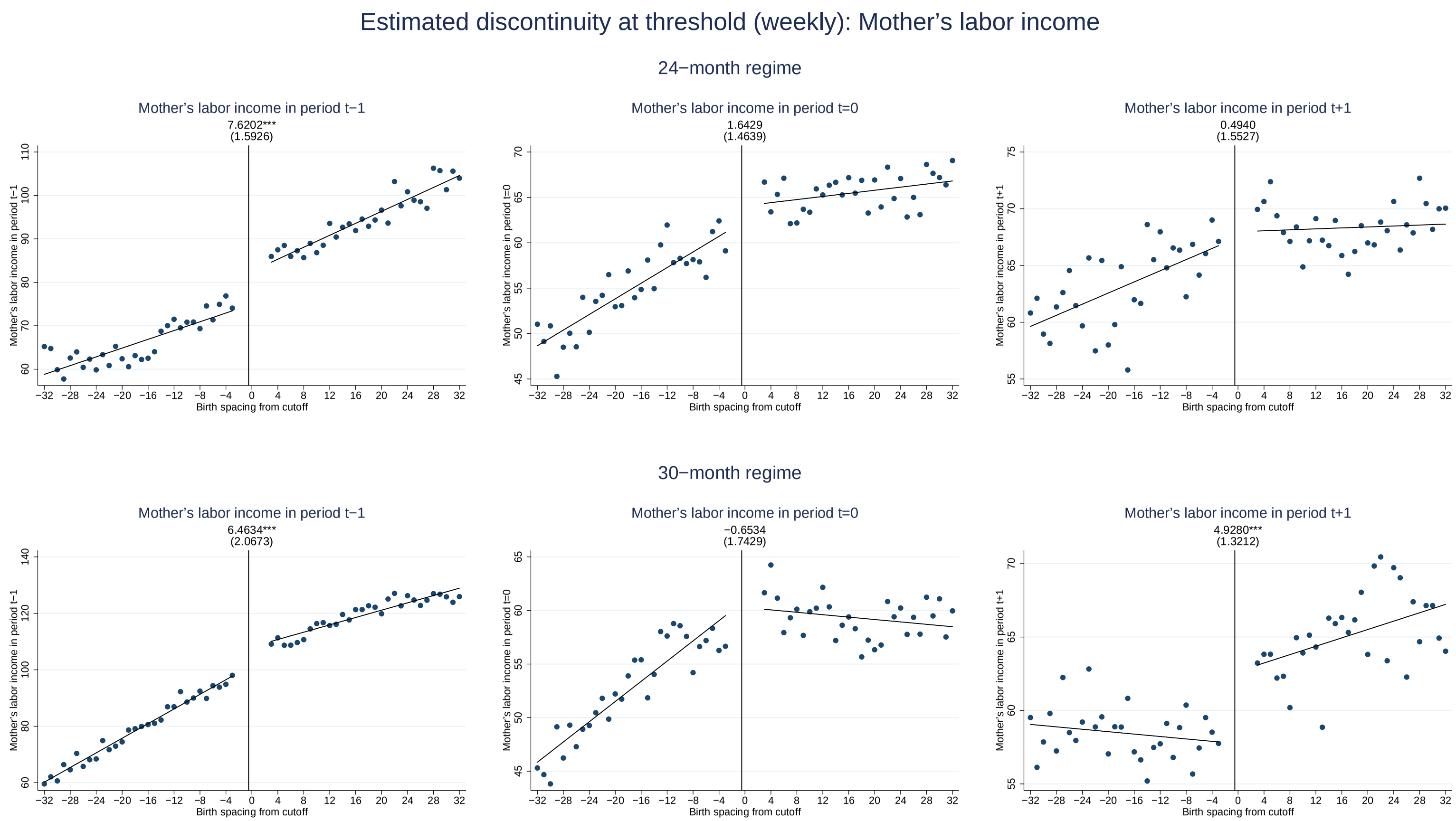
(B)
1986 cohort



(C)
1987 cohort

Note: Difference in the number of 2nd child conceptions between delayers and non-shifters, by time since January 1, 1985 (pre-reform year), January 1, 1986 (reform year), and January 1, 1987 (post-reform year), in panels (A), (B) and (C), respectively. The area between the black solid line and the black dashed line marks the conception window of opportunity in the 24-month regime, and the area between the red dashed lines marks the window of opportunity under the new, 30-month regime.

Figure 7.
Reduced form RD estimates on mothers' labor income

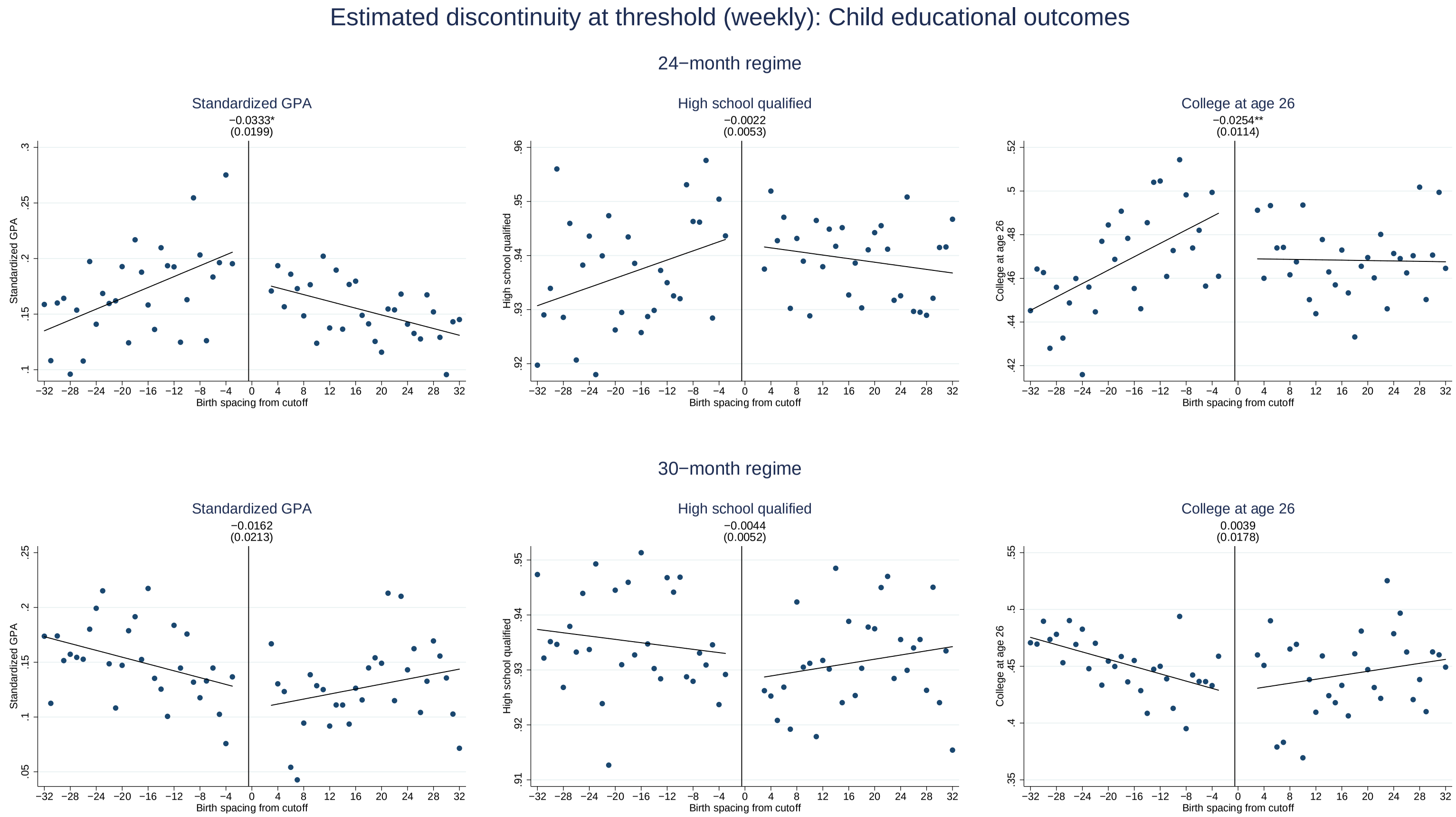


Note: The discontinuity at the threshold is estimated under a linear restriction.

Figure 8.
Reduced form RD estimates on fathers' labor income

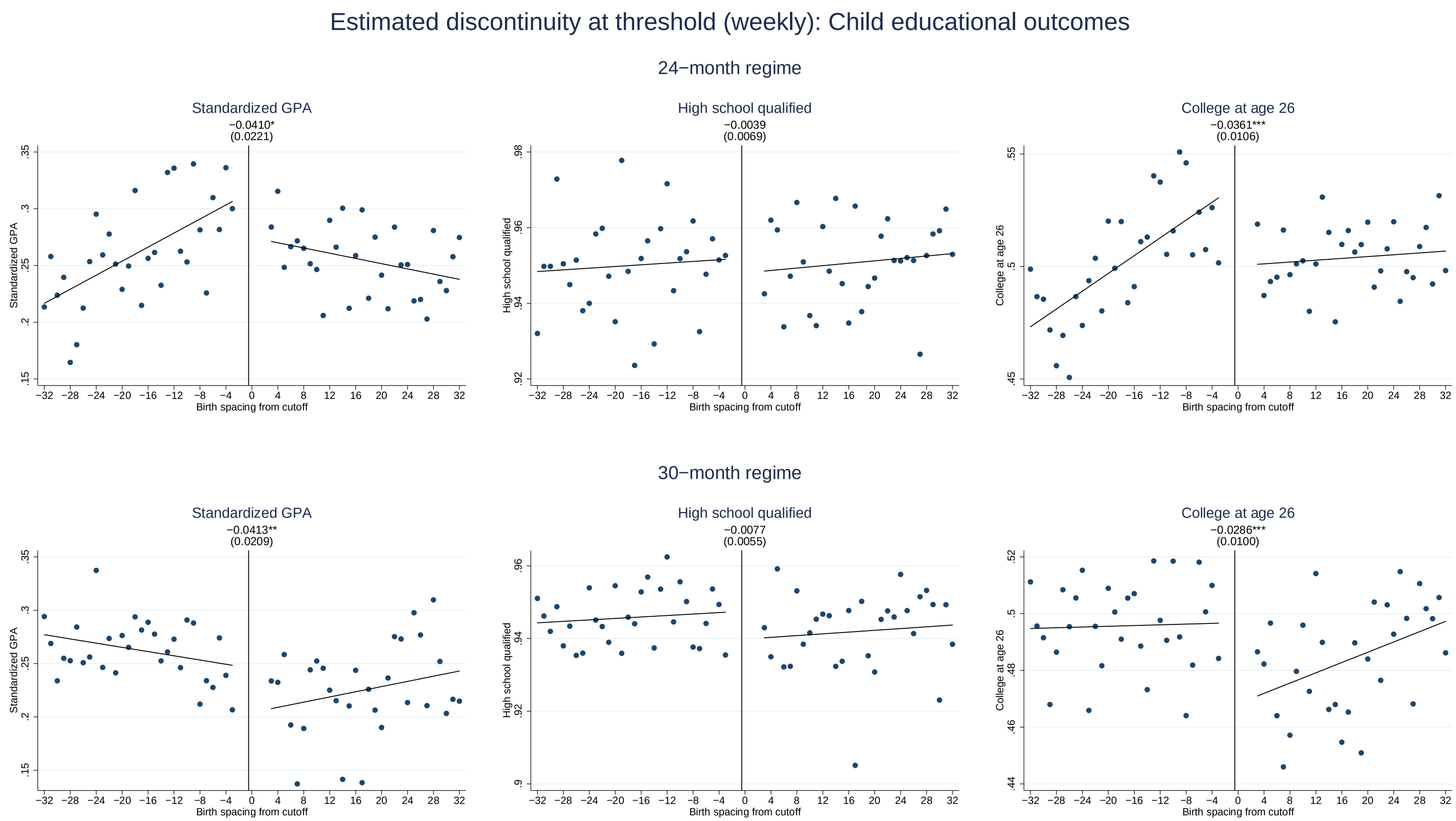
Note: The discontinuity at the threshold is estimated under a linear restriction.

Figure 9.
Reduced form RD estimates on second-born children's educational outcomes



Note: The discontinuity at the threshold is estimated under a linear restriction.

FIGURE 10.
Reduced form RD estimates on first-born children's educational outcomes



NOTE: The discontinuity at the threshold is estimated under a linear restriction.

TABLE 1.

RD estimates of the speed premium on parental outcomes: 24-month regime

Years since birth, 2^{nd} child	(1) τ = -1	(2) τ = 0	(3) τ=1	(4) τ = 2
Mother's labor income	-6.977***	-1.794	-0.339	0.479
	(1.241)	(1.129)	(1.186)	(1.289)
Observations	43966	43931	43939	44197
Father's labor income	-1.391	9.630**	9.572***	9.357**
	(3.995)	(3.433)	(2.381)	(2.948)
Observations	44054	43970	43930	44019
Mother's disposable income	0.634	5.053***	2.304*	0.698
	(0.839)	(0.776)	(0.890)	(0.922)
Observations	43963	43924	43926	44192
Father's disposable income	3.018	5.541***	6.515***	4.853***
	(1.567)	(1.204)	(1.257)	(1.252)
Observations	44046	43958	43901	44005
Household disposable income	3.917	10.80***	8.755***	5.528**
	(1.964)	(1.452)	(1.698)	(1.613)
Observations	44293	44266	44245	44005

NOTE: The outcome variables are measured in 1000s SEK. The estimations are based on couples whose first two children are born in 32-week windows around the cutoff, and uses weekly data on child spacing. Standard errors in parentheses. *** p <0.01, ** $p < 0.05$, * $p < 0.1$.

TABLE 2.

RD estimates of the speed premium on parental outcomes: 30-month regime

Years since birth, 2^{nd} child	(1) τ = -1	(2) τ = 0	(3) τ=1	(4) τ = 2
Mother's labor income	-6.315***	0.762	-4.808***	-0.756
	(1.126)	(1.204)	(0.966)	(1.559)
Observations	43702	43749	43724	43703
Father's labor income	5.259*	6.131*	6.174*	8.084**
	(2.363)	(2.441)	(2.494)	(2.993)
Observations	43572	43657	43608	43568
Mother's disposable income	-2.960***	0.919	1.841*	-0.398
	(0.713)	(0.769)	(0.883)	(0.942)
Observations	43702	43749	43724	43703
Father's disposable income	3.606***	3.841**	5.693**	7.205*
	(0.988)	(1.342)	(1.777)	(2.832)
Observations	43572	43657	43608	43568
Household disposable income	1.152	4.597**	7.216**	6.725*
	(1.295)	(1.591)	(2.120)	(3.077)
Observations	43745	43749	43724	43568

NOTE: The outcome variables are measured in 1000s SEK. The estimations are based on couples whose first two children are born in 32-week windows around the cutoff, and uses weekly data on child spacing. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TABLE 3.

RD estimates of the speed premium on children's outcomes

	First child			Second child		
VARIABLES	(1) Standardized GPA	(2) High school qualified	(3) College at age 26	(4) Standardized GPA	(5) High school qualified	(6) College at age 26
A. 24-month regime						
Treated	0.0393*	0.00356	0.0350***	0.0322	0.00256	0.0239*
	(0.0177)	(0.00617)	(0.00994)	(0.0191)	(0.00484)	(0.0111)
Observations	43 148	15 213	44 310	43 010	29 831	44 310
Mean of outcome	0.2600	0.9504	0.5045	0.1626	0.9384	0.4693
% Effect	0.1514	0.0037	0.0674	0.1982	0.0027	0.0510
B. 30-month regime						
Treated	0.0438*	0.00790	0.0290**	0.0191	0.00474	-0.00497
	(0.0195)	(0.00512)	(0.00987)	(0.0206)	(0.00437)	(0.0182)
Observations	42 732	42 732	43 662	42 506	42 506	19 697
Mean of outcome	0.2475	0.9442	0.4907	0.1415	0.9337	0.4497
% Effect	0.1769	0.0084	0.0591	0.1351	0.0051	-0.0111

NOTE: The estimations are based on children born in 32-week windows around the cutoff, and uses weekly data on child spacing. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TABLE 4.

RD & RD-DD estimates of the speed premium on parents' labor income: 24-month regime

	Years since birth, 2^{nd} child			
	(1)	(2)	(3)	(4)
	τ = -1	τ = 0	τ=1	τ = 2
A. Mother's labor income				
RD	-6.977***	-1.794	-0.339	0.479
	(1.241)	(1.129)	(1.186)	(1.289)
RD-DD, eligible	-10.65***	-5.359**	-1.908	-4.497*
	(1.634)	(1.741)	(1.572)	(1.771)
RD-DD, non-eligible	1.934	3.159	-2.828	-4.755
	(2.599)	(2.659)	(3.050)	(3.864)
B. Father's labor income				
RD	-1.391	9.630**	9.572***	9.357**
	(3.995)	(3.433)	(2.381)	(2.948)
RD-DD, eligible	-1.588	3.487	0.223	18.19
	(2.901)	(4.002)	(2.484)	(40.71)
RD-DD, non-eligible	10.88	2.602	7.021	6.181
	(6.792)	(6.271)	(7.822)	(7.458)

NOTE: The estimations are based on children born in 20-week windows around the cutoff, and uses weekly data on child spacing. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TABLE 5.

RD & RD-DD estimates of the speed premium on parents' labor income: 30-month regime

	Years since birth, 2^{nd} child			
	(1)	(2)	(3)	(4)
	τ = -1	τ = 0	τ=1	τ = 2
A. Mother's labor income				
RD	-6.322***	0.760	-4.818***	-0.750
	(1.127)	(1.204)	(0.966)	(1.557)
RD-DD, eligible	-16.03***	-1.720	-2.100*	-2.236*
	(1.345)	(0.853)	(0.977)	(1.048)
RD-DD, non-eligible	1.233	0.937	0.954	0.914
	(2.545)	(1.888)	(2.626)	(2.795)
B. Father's labor income				
RD	5.260*	6.134*	6.178*	8.078**
	(2.363)	(2.441)	(2.494)	(2.992)
RD-DD, eligible	5.577**	8.436***	5.532	-1.303
	(2.042)	(1.704)	(4.242)	(12.00)
RD-DD, non-eligible	-1.227	2.609	4.542	0.346
	(5.441)	(5.684)	(5.462)	(6.665)

NOTE: The estimations are based on children born in 20-week windows around the cutoff, and uses weekly data on child spacing. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

A Additional Tables

Table A.1.
Changes to the Swedish parental leave system over time

Year	Total paid days	Wage-replaced days	Replacement rate,%	SEK/day if SGI= 0	Flat rate days	SEK/day, flat rate
1974	180	180	90	25	0	0
1975	210	210	90	25	0	0
1976	210	210	90	25	0	0
1977	210	210	90	25	0	0
1978	270	240	90	32	30	32
1979	270	240	90	32	30	32
1980	360	270	90	37	90	37
1981	360	270	90	37	90	37
1982	360	270	90	37	90	37
1983	360	270	90	48	90	48
1984	360	270	90	48	90	48
1985	360	270	90	48	90	48
1986	360	270	90	48	90	48
1987	360	270	90	48	90	48
1988	360	270	90	60	90	60
1989	450	360	90	60	90	60
1990	450	360	90	60	90	60
1991	450	360	90	60	90	60
1992	450	360	90	60	90	60
1993	450	360	90	60	90	60
1994[a]	450	360	90	64	90/0	60/0
1995[b]	450	360	80	60	90	60
1996[c]	450	360	75	60	90	60
1997	450	360	75	60	90	60
1998	450	360	80	60	90	60
1999	450	360	80	60	90	60
2000	450	360	80	60	90	60
2001	450	360	80	60	90	60
2002[d]	480	390	80	120	90	60
2003	480	390	80	150	90	60
2004	480	390	80	180	90	60
2005	480	390	80	180	90	60
2006[e]	480	390	80	180	90	60/180
2007	480	390	80	180	90	180
2008	480	390	80	180	90	180
2009	480	390	80	180	90	180

Note: The table shows the changes to the Swedish parental leave system since its introduction in 1974. a) During the second half of 1994, the flat-rate days were temporarily abolished for children older than one year. b) The first "daddy-month" was introduced for parents to children born on or after January 1st, 1995. For the 30 days of reserved leave, the replacement rate remained at 90 percent of previous earnings. c) For the 30 days of reserved leave, the replacement rate remained at 80 percent of previous earnings. d) The second "daddy-month" was introduced, targeting parents to children born on or after January 1, 2002. e) The flat rate was set to 180 SEK/day from July 1, 2006 onwards. (*Source*: National Insurance Board).

Table A.2.

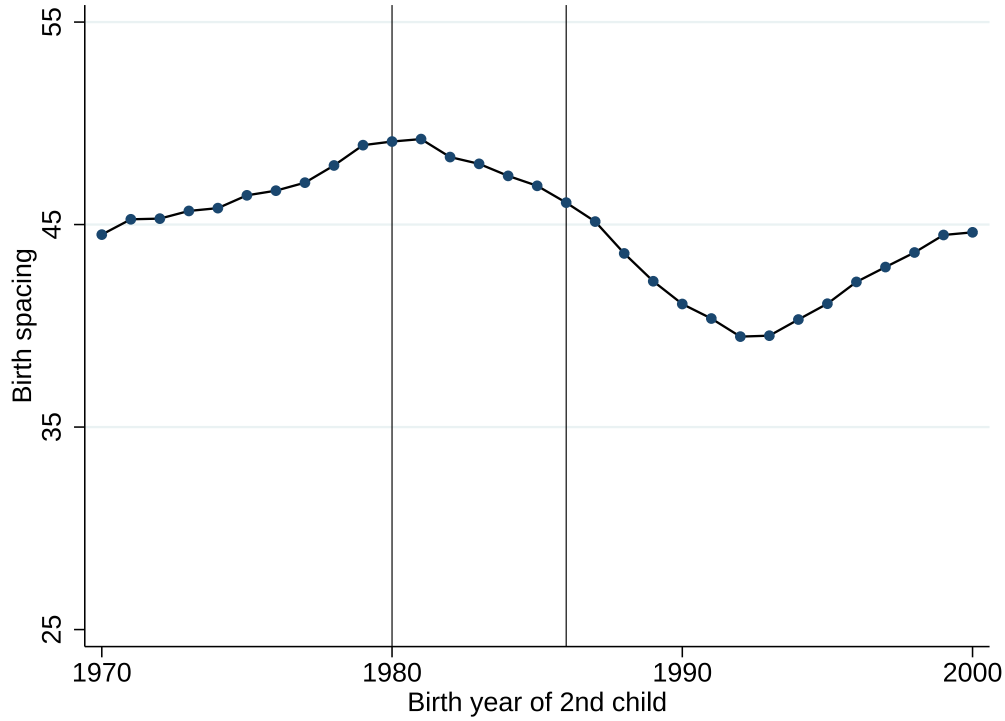
Changes to the speed premium eligibility birth interval

Year	Eligibility interval	Total paid PL
1974	12–15 months	6 months
1975–1977	13–16 months	7 months
1978–1979	16–18 months	9 months
1980–1985	24 months	12 months
1986–	30 months	12–16 months

Note: The table shows the birth spacing intervals that makes parents eligible for the speed premium, for different time periods. Initially, the eligibility interval was set to statutory duration of paid leave, plus 6 months, which could be extended by up to 3 months. In 1980, the speed premium rule became statutory and the eligibility interval set to 24 months, and further extended to 30 months in 1986. Total paid PL days for the period 1986 onwards is 12–16 months due to gradual extensions of the eligibility for paid leave from 1989 onwards.

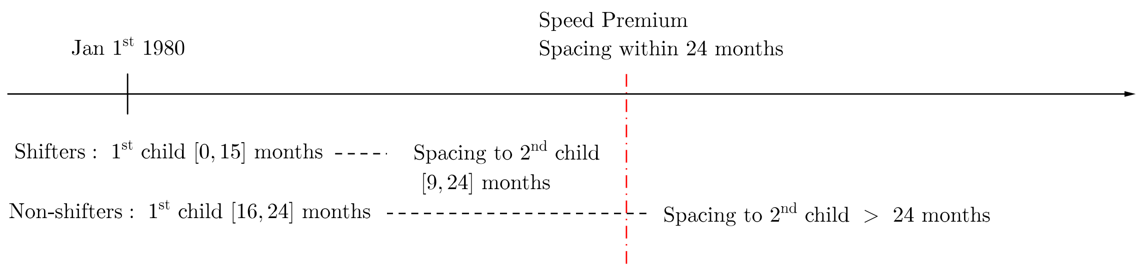
B Additional Figures

Figure B.1.
Spacing between first and second birth over time

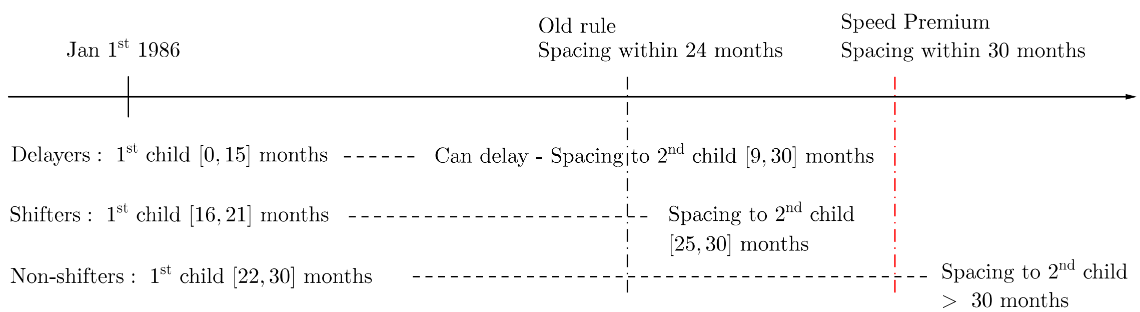


Note: The figure shows the average age difference - in months - between the first and second child, by second child birth cohort. The sample includes the full population of mothers whose first child was born 1970 or later.

FIGURE B.2.
Expected effects of the reforms on fertility timing



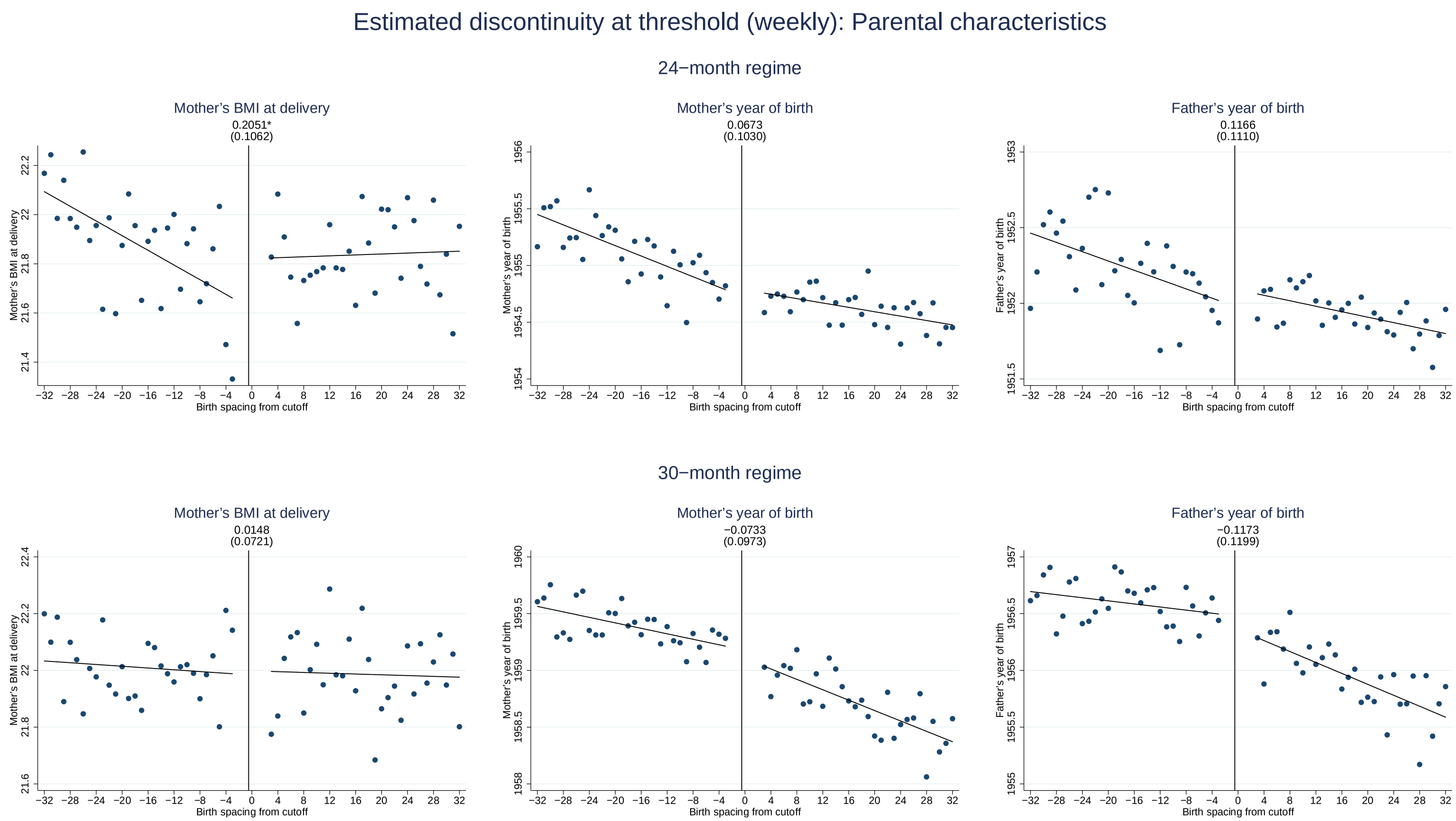
(A)
1980-regime



(B)
1986-regime

NOTE: The figures illustrate the expected responses in the timing of second-child conceptions in the two different speed premium regimes, among women with an opportunity to benefit from the rule (shifters or delayers), and which groups of women that are expected to be unaffected.

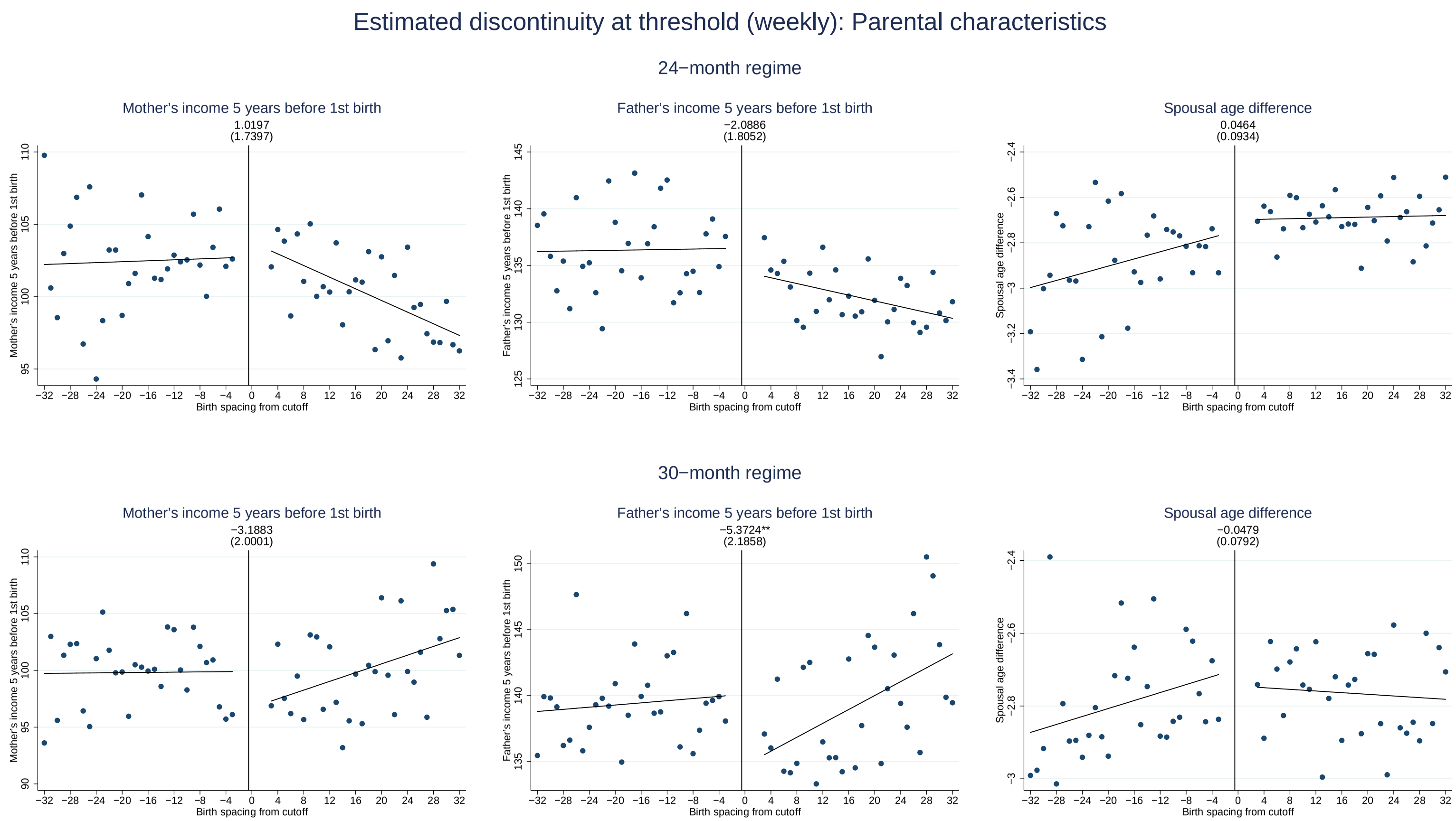
FIGURE B.3.
Covariate balance tests: Reduced form RD estimates on parental characteristics I



NOTE: The discontinuity at the threshold is estimated under a linear restriction.

FIGURE B.4.

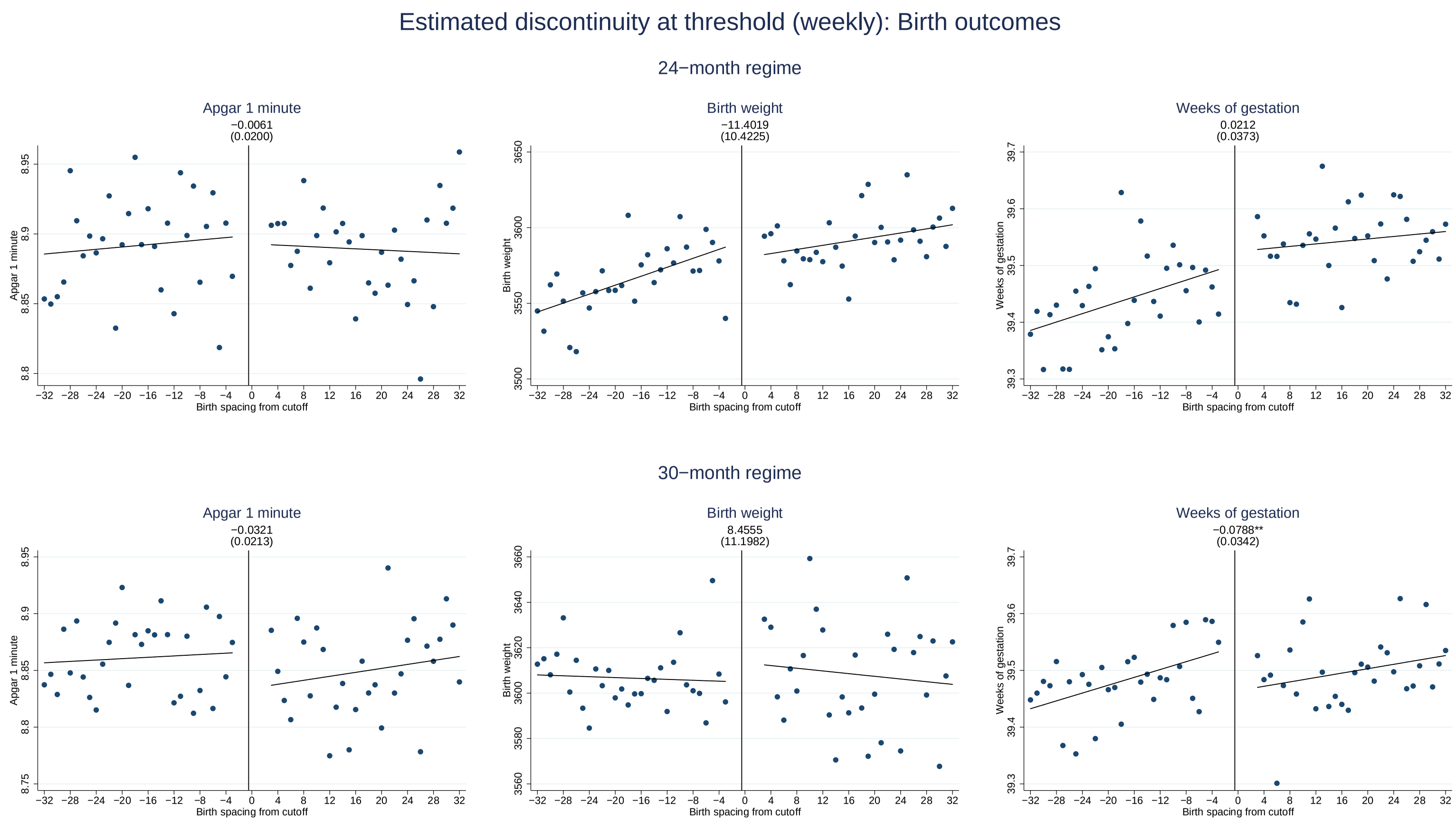
Covariate balance tests: Reduced form RD estimates on parental characteristics II



NOTE: The discontinuity at the threshold is estimated under a linear restriction.

FIGURE B.5.

Covariate balance tests: Reduced form RD estimates on birth outcomes of 2nd born children



NOTE: The discontinuity at the threshold is estimated under a linear restriction.

C Data Appendix