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Marcus Tamm

The Impact of a Large Parental Leave Benefit Reform on the Timing of Birth around the Day of Implementation

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Marcus Tamm*

The Impact of a Large Parental Leave Benefit Reform on the Timing of Birth around the Day of Implementation

Abstract
The introduction of the German parental leave benefit (Elterngeld) applied to all children born on January 1st, 2007 or later. The new Elterngeld considerably changed the amount of transfers to families during the first two years postpartum. We show that the incentives created by using a cut-off date led more than 1000 parents to postpone the delivery of their children from December 2006 to January 2007. Besides analyzing the timing of delivery the paper focuses on potential adverse health outcomes of children affected by the shift in date of birth.

JEL Classification: H31, J13

Keywords: Cut-off date effect, fertility, policy evaluation

March 2009

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1. Introduction

Displaying one of the lowest fertility rates among European countries for several decades, Germany experienced the implementation of a new system of parental leave benefit in the year 2007. Besides the aim of increasing labor market participation of mothers with young children and increasing involvement in child care of fathers, the reform was explicitly intended to increase fertility rates. In particular low numbers of children and high rates of childlessness among highly educated women (Pötzsch 2007) created concern. The preceding benefit, which was means-tested and provided for up to two years after child birth, was replaced by a wage-dependent benefit provided for up to 14 months which was applied to all parents of children born on January 1st, 2007 or later.

At the current point in time an evaluation of the long-term impact of the reform on birth rates is not feasible yet. Instead this paper is concerned with the impact on short-term behavior, specifically the timing of delivery of newborn children during December 2006 and January 2007. We analyze whether the use of a cut-off date (January 1st) for allocating parents to the old or to the new benefit system had an impact on the probability that a child was born in the last days of December rather than in the first days of January. Incentives created by cut-off dates and their impact on the timing of delivery have been analyzed, for example, by Dickert-Conlin and Chandra (1999) for the US tax system and by Gans and Leigh (2009) for the Australian "Baby Bonus". Both studies find sizeable effects.

Analyzing these short-term effects is interesting for several reasons. Firstly, the analysis provides evidence on the power that parents have on the timing of birth. Overall there is ample evidence that a certain number of deliveries are timed. For example the number of births taking place on weekends or holidays is lower by around 21 percent than on regular working days. Yet, it is generally not clear whether this timing is due to doctors and hospitals or due to parents. Any timing effects around the cut-off date will be informative on the relative power of parents vis-à-vis doctors/hospitals, concerning the choice or refusal of inducement and caesarean section and the timing of such a delivery. Besides choosing the mode of delivery, mothers expected to give birth at the margin might opt for more or less stressful behavior. Secondly, timing effects represent revealed preferences and indicate whether parents or sub-groups of parents are in favor of the reform or not. This is interesting from a policy perspective as there has been uncertainty on the share of parents that might be

disadvantaged by the reform. Clearly, revealed preferences are stronger indicators for preferences than results from opinion polls. Finally, the paper provides evidence for an additional country on whether birth related cut-off dates influence the timing of birth.

In the next section we describe the reform of the benefit system in more detail. Section 3 provides information on the data. In Section 4 we present results on the timing of deliveries as well as results for health outcomes of newborn children that might be affected by shifts in delivery. The final section provides discussion and conclusions.

2. Institutional Background

Parental leave regulations and the system of benefits to parents with young children underwent several reforms in Germany during the last two decades. While most of the changes have been minor, the reform in 2007 constitutes a complete turn-around of the benefit system. The new *Elterngeld* ("parental money") was announced in September 2006 to replace the preceding *Erziehungsgeld* ("child-raising benefit") for all children born on January 1st, 2007 or later. The new Elterngeld offers a 67 percent replacement rate of previous labor earnings (from employment or self-employment) for either father or mother for up to 12 months postpartum. If both father and mother participate, they can receive an extra 2 months, and the resulting total leave of 14 months can be freely distributed between the two parents. Single parents can receive a total of 14 months alone. The transfer is truncated at a maximum of 1,800 Euros per month, and a flat rate minimum of 300 Euros per month which also applies to parents without previous earnings. Additional bonuses are given to parents with multiples or with siblings below age four. Almost 100 percent of families receive the benefit for some months after birth, as eligibility for the new Elterngeld only depends on not working full time during the period of receipt, which is defined as working less than 30 hours per week.

In contrast to this, the old Erziehungsgeld was means-tested. Parents could choose between two versions of Erziehungsgeld, the first consisting of monthly benefit of up to 300 Euro payable for a maximum of 24 months postpartum, the second consisting of monthly benefit of up to 450 Euro payable for a maximum of 12 months postpartum. Around two thirds of families received the 300 Euro version and one out of ten families received the 450 Euro version. In both groups, families experienced reductions in transfers following month six if household income exceeded specific thresholds. The remaining 23% of families did not

receive any type of Erziehungsgeld due to high household income. Besides means-testing, eligibility for the old Erziehungsgeld also depended on not working full time during the period of receipt.

The outline of the reform had different impacts on households in terms of cumulated benefit payments mainly depending on pre-birth labor market participation (and earnings) and planned post-birth labor market activities. Households with women who were working before child birth, those planning to take up full time work relatively early (i.e. one year after child birth or earlier) or high income households were generally receiving more transfers after the reform than before. In contrast, households with women who were not working before child birth or those with low pre-birth earnings planning to take up full time work relatively late experienced a decrease in cumulated transfers in some cases. At the one extreme households might gain up to 25,200 Euro overall (i.e. (12+2)*1,800 or even more in the case of bonuses for multiples or siblings), at the other side they might lose up to 3,600 Euro (i.e. (24-12)*300). These differences in benefit transfers created different incentives for birth timing as well as political discussion on the share of families that would by disadvantaged by the reform.

3. Data

In the empirical analysis we use data from birth registers which have been provided at the research data centre of the statistical offices of the federal regions (*Forschungsdatenzentrum der Statistischen Ämter*). The data includes information on gender, multiples, length, weight and date of birth for all children born in Germany still or alive. In addition it provides information on mother's age, citizenship, working status and region of residence (*Bundesland*). Father's age and citizenship is only recorded for married couples; for cohabiting couples information on the father is incomplete. Parity and age of previous children is restricted to those born within the present marriage. In the analysis we use data going back to mid 2001 only, because there have been several smaller reforms of the old Erziehungsgeld and to parental leave regulations during earlier years, all of them relying on birth specific cut-off dates that were used to determine eligibility. The last of these previous reforms took place in January 2001.

4. Results

In this section we concentrate on the impact of the reform in January 2007. First we analyze whether there have been any shifts in the date of delivery. Then we present results for health outcomes which might be affected by such shifts. In order to disentangle the impact of the reform from variation that might be due to the festive season around the end of year we use data from preceding years as reference.

Timing of delivery

For the case of timing of delivery we focus on live births only. Figure 1 displays the number of (live) births per week for several years starting in mid 2001.[1] The black solid line indicates the period mid 2006 to mid 2007 and largely displays the same seasonal variation observable during preceding years. In contrast to other years, however, there is a very sharp decrease during the last weeks of 2006 and a strong increase of births during the first week of 2007. The number of births during the last week of 2006 (10,907) is clearly the lowest among all weeks in the period under investigation and the number of births during the first week of 2007 (13,305) is the highest among all first weeks of a year.

A closer look at births around the cut-off date is provided in Figure 2 that displays the number of births per day during the period December 1st to January 31. The solid line reports the average number of birth occurring on each specific day of the year during the period mid 2001 to mid 2006 (adjusted for weekend effects and yearly trends). This average shows that during normal years not affected by policy reforms the number of births drops sharply during Christmas and around New Year's Eve/Day. The individual points report the number of birth during December 2006 and January 2007 with the shape of the point indicating the respective day of the week. Besides confirming large differences between weekends and regular working days the figure shows that all of the numbers after December 18, 2006 are below the long-term average with differences being especially large after Christmas. On New Year's Day 2007 and during the following week, however, numbers clearly exceed the long-term average.

[1] In this paper weeks are defined as seven day intervals. The first week of each year is defined to start on January 1st and the last week is defined to end on December 31. In order to obtain exactly 52 seven day intervals July 2nd (and in leap years also July 1st) is not assigned to any week.

Figure 1 – Births per week

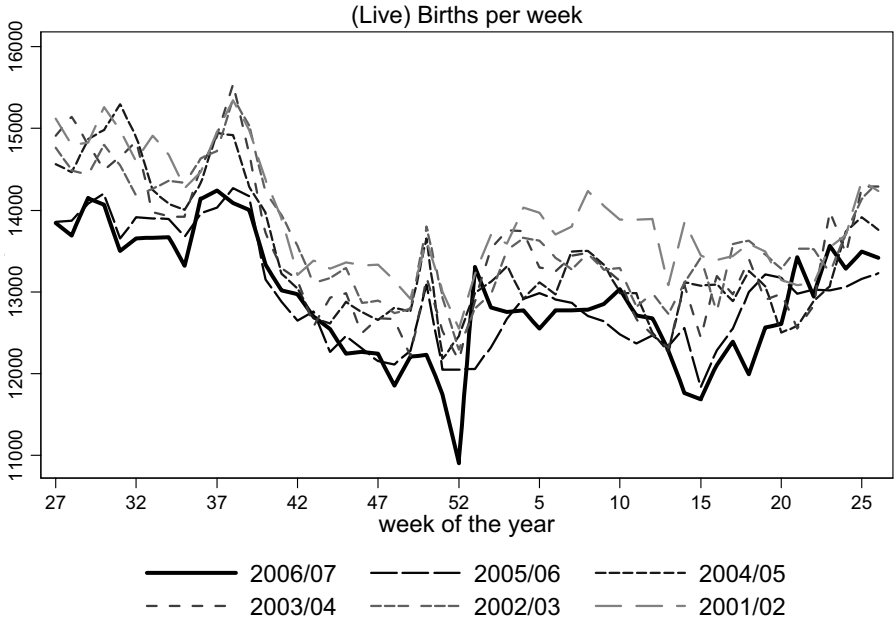
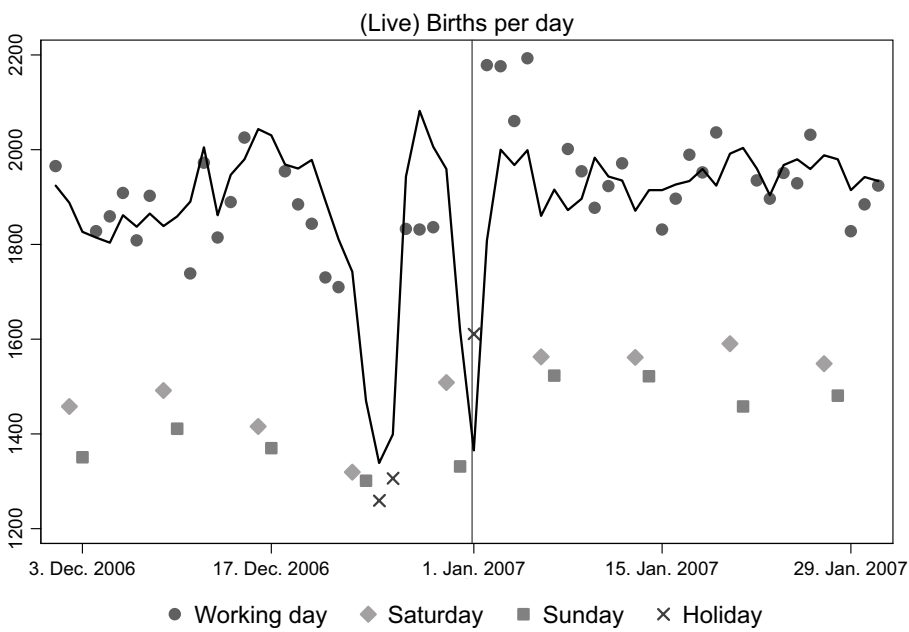


Figure 2 – Births per day around day of implementation of 2007 reform



Following Gans and Leigh (2009) we estimate two models to determine the statistical significance of the findings analytically and to obtain estimates for the number of births shifted.[2] In the first model we regress the number of births per day B_t on a set of indicators for the day of year, indicators for Saturdays and Sundays, a set of turn of year indicators and a dummy indicating those days after the beginning of the reform. This OLS specification is estimated based on data including 7 days before and 7 days after the turn of year 2006/07 and the turns of year in our reference period (i.e. 2001/02 to 2005/06).

$$B_t = \alpha + \beta_1 \text{ saturday} + \beta_2 \text{ sunday} + \sum_{y=01/02}^{06/07} \beta_y \text{ turn of year} + \sum_{d=1}^{7} \beta_d \text{ day} + \sum_{d=359}^{365} \beta_d \text{ day} + \delta \text{ reform} + u_t \quad (1)$$

From the estimates we can calculate the net-number of births shifted, $B_{shift} = 0.5 \cdot \delta \cdot 7$. As sensitivity check we replicate this analysis based on data including alternative time windows of different size. The respective windows cover 7, 14, 21 and 28 days on both sides of each turn of year.

In a second model we allow for asymmetric shifts taking place on both sides of the cut-off. This is done by including separate indicators for each of the four weeks before the reform and the four weeks after. This specification is estimated by including all days within the window of eight weeks before and after each turn of year.

$$\begin{aligned} B_t = {} & \alpha + \beta_1 \text{ saturday} + \beta_2 \text{ sunday} + \sum_{y=01/02}^{06/07} \beta_y \text{ turn of year} + \sum_{d=1}^{56} \beta_d \text{ day} + \sum_{d=310}^{365} \beta_d \text{ day} \\ & + \delta_{-4} \text{ week49}_{06} + \delta_{-3} \text{ week50}_{06} + \delta_{-2} \text{ week51}_{06} + \delta_{-1} \text{ week52}_{06} \\ & + \delta_{+1} \text{ week1}_{07} + \delta_{+2} \text{ week2}_{07} + \delta_{+3} \text{ week3}_{07} + \delta_{+4} \text{ week4}_{07} + u_t \end{aligned} \quad (2)$$

In this model the net-number of births shifted in each week is given by $B_{shift}^{w} = \delta_w \cdot 7 \quad \forall w = \pm 1, ..., 4$.

Table 1 reports the reform effect and the calculated number of net-shifts for all births as well as births of several subgroups of mothers based on model 1. Results show that the introduction of the Elterngeld led to a significant net-shift towards the year 2007 of more than 900 births from the last week of 2006 towards the first week of 2007 (row 1, columns 1 and 2). Taking into consideration more days around the turn of year, i.e. widening the size of

[2] In the analysis we focus on the number of births rather than on birth rates. The latter would require knowledge on the number of mothers in child-bearing age, which is information that is clearly not available on a daily basis.

window, the number of net-shifts increases to slightly more than 1,400 (columns 5 and 6). Doing the analysis for subgroups of mothers (row 2 and the following) we find that the net-shift towards January 2007 is much larger among working mothers than among non-working mothers. The shift is significant only among mothers age 26 and older. Given that age is highly correlated with labor market attachment and labor earnings these findings are clearly in line with the structure of incentives (cf. Section 2). Even among those women who are more likely to lose from the reform, e.g. very young women (age 20 and below), we do not observe any significant shift toward December 2006. Table A1 in the Appendix largely confirms the findings using the log of the number of birth as dependent variable. Using the log number of births provides a measure of the proportion of births shifted, i.e. it relates the number of shifts with the number of births overall. In the entire population almost 8% of births were shifted from the last week of 2006 to the first week of 2007, among working mothers the share is even 13%.

Table 1 – Shifts in date of delivery, reform 2007 (model 1)

Size of window	±7 days		±14 days		±21 days		±28 days	
	Coeff.	Births shifted	Coeff.	Births shifted	Coeff.	Births shifted	Coeff.	Births shifted
All births	**261.3**	915	**164.7**	1153	**139.3**	1463	**94.0**	1315
	(50.1)		(35.4)		(28.8)		(24.2)	
By subgroup								
Working mothers	**211.3**	739	**139.9**	979	**115.7**	1215	**81.1**	1136
	(31.1)		(22.3)		(17.2)		(14.6)	
Nonworking mothers	*50.1*	175	24.7	173	23.6	248	12.8	179
	(26.7)		(18.7)		(15.6)		(13.1)	
Mothers age ≤20	-3.6	-13	-2.1	-15	-2.6	-27	-1.9	-27
	(6.5)		(4.7)		(3.8)		(3.4)	
Mothers age 21-25	-0.7	-2	6.1	42	*12.6*	132	7.1	100
	(11.9)		(8.5)		(7.0)		(6.2)	
Mothers age 26-30	**110.2**	386	**68.3**	478	**49.7**	522	**31.6**	442
	(18.5)		(13.7)		(10.5)		(9.1)	
Mothers age 31-35	**84.4**	296	**52.4**	367	**49.7**	522	**39.3**	550
	(20.1)		(14.5)		(11.9)		(9.9)	
Mothers age ≥36	**71.0**	249	**40.0**	280	**29.8**	313	**17.9**	251
	(14.9)		(9.8)		(8.1)		(6.9)	
Observations	84		168		252		336	

Note: Sample comprises births during end 2001 to beginning 2007 within specific window of days around each turn of year. Outcome is number of births per day. Regression includes day of the year indicators, indicators for Saturdays and for Sundays, turn of year indicators and a dummy indicating the reform. Results of the reform dummy are reported in the table together with the net number of birth shifted. The latter equals 0.5 times the estimated reform coefficient times the size of window in days. **Bold** indicates significance at 5%-level, *italics* indicates significance at 10%-level. Standard errors in parenthesis.

Results of model 2 show a certain asymmetry of shifts over time (Table 2). The overwhelming majority of shifts took place from the last three weeks of 2006 to the first week of 2007. For those benefiting from the reform this is in line with incentives as each mother expected to give birth during December had incentives to delay delivery. In 2007 however, there was no incentive to delay delivery further than January 1st.

Table 2 – Shifts in date of delivery, reform 2007 (model 2)

	All Births			**Births by working mothers**			**Births by non-working mothers**		
	Coef.	Births shifted during week	Cumulated births shifted	Coef.	Births shifted during week	Cumulated births shifted	Coef.	Births shifted during week	Cumulated births shifted
Week49/06	37.8	265	-968	12.1	85	-1103	25.7	180	135
	(29.9)			(18.2)			(18.3)		
Week50/06	**-85.0**	-595	-1233	**-56.0**	-392	-1188	-29.0	-203	-45
	(29.9)			(18.2)			(18.3)		
Week51/06	-20.2	-142	-638	**-42.6**	-298	-796	22.4	156	158
	(29.9)			(18.2)			(18.3)		
Week52/06	**-70.9**	-496	-496	**-71.1**	-498	-498	0.2	2	2
	(29.9)			(18.2)			(18.3)		
Week1/07	**190.2**	1331	1331	**140.4**	983	983	**49.8**	348	348
	(29.9)			(18.2)			(18.3)		
Week2/07	47.1	330	1661	25.5	179	1161	21.6	151	500
	(29.9)			(18.2)			(18.3)		
Week3/07	4.7	33	1694	11.6	81	1243	-6.9	-48	451
	(29.9)			(18.2)			(18.3)		
Week4/07	-4.3	-30	1664	-10.3	-72	1171	6.0	42	494
	(29.9)			(18.2)			(18.3)		
Observations	672			672			672		

Note: Sample comprises births during end 2001 to beginning 2007 within eight weeks before and after each turn of year. Outcome is number of births per day. Regression includes day of the year indicators, indicators for Saturdays and for Sundays, turn of year indicators and dummies indicating each of the last four weeks before and the first four weeks after the reform. **Bold** indicates significance at 5%-level, *italics* indicates significance at 10%-level. Standard errors in parenthesis. Number of births shifted during each week is equal to the estimated coefficient times 7 (days). Cumulated number of births sifted is the respective sum of births shifted between New Years Eve/Day and the respective week.

As the reform was decided on in September 2006, i.e. only three months before its implementation, we would not expect the reform to have any impact on the aggregate number of birth, only on the timing. Results of model 2, however, show that the number of "additional" births in January is somewhat larger than the number of "missing" births in December. This might imply that some mothers decided to become pregnant while the reform was still under discussion or that other peculiar trends led to an increase in overall birth numbers during the first month of the year 2007. Disaggregating numbers by labor market status of the mother we find that additional birth in January almost match the number of

missing births in December for working mothers and that the deviation between additional and missing births is almost exclusively due to non-working mothers.

As a last exercise we analyze individual birth decisions instead of aggregate outcomes per day. Results are based on a regression (probit model) of being born in January instead of December on a set of control factors, conditional on being born between December 11 and January 21 of the years 2001/02 to 2006/07. That is, for all those children born during the last three weeks of a year or the first three weeks of the following year, we analyze whether maternal working status, citizenship, age or mothers region of residence are the driving factors that lead to a delivery in January rather than December. Besides these individual characteristics we control for turn of year indicators to account for year specific trends and, most importantly, a set of interaction variables. The latter include interactions between the indicator for the turn of year 2006/07 and the individual characteristics of the mother.

Results in Table 3 show that during years not affected by any reform foreigners and mothers in the highest age group are significantly more likely to deliver in January and that working mothers and mothers in the lowest age group are significantly more likely to deliver during December. The turn of year 2006/07 indicator shows that children in the baseline group (West Germany, mother not working, age group 26-30, and German citizen) were significantly more likely to be delivered in January after the Elterngeld reform. For this group the probability for a delivery in January rather than December is higher by 1.1 percentage points than during previous years. Children of working mothers were even more likely to be postponed to January 2007 than children in the baseline group (probability is higher by 2.5 percentage points). In contrast, mothers aged 20 or below were less likely to give birth during January 2007 than mothers of children in the baseline group (probability is lower by -2.0 percentage points). A comparison of behavior of mothers aged 20 or below during 2006/07 with behavior of the same group during previous years is given by the sum of the interaction term and the turn of year 2006/07 indicator. This sum is equal to -0.009 percentage points (0.0115-0.0202) which is not significantly different from zero. Mothers in the other age groups and foreigners do not differ from the baseline group in 2006/07, whereas mothers in East Germany are somewhat less likely to give birth during January 2007 than mothers of children in the baseline group (probability is lower by -0.009 percentage points).[3]

[3] A possible reason for the negative effect of East Germany * year 2006/07 compared with the baseline group is that women in East Germany are generally less likely to time deliveries than women in West Germany.

Given that scheduling births forward (e.g. by inducement or elective caesareans) is generally easier than delaying birth, these results are highly remarkable as there is no group of women displaying significant net-shift towards December 2006. Even among those women who are more likely to lose from the reform, those actually disadvantaged by the reform do not prevail or at least do not act accordingly.[4]

Table 3 – Probit regression of the probability of delivery during January rather than December

Probit (1=born in January)	Marginal effect	Std. error
East Germany	0.0020	0.0021
Working	**-0.0048**	0.0017
Foreigner	**0.0085**	0.0022
Mother age ≤20	**-0.0075**	0.0036
Mother age 21-25	-0.0038	0.0023
Mother age 31-35	0.0020	0.0021
Mother age ≥36	**0.0070**	0.0026
East Germany * year 2006/07	*-0.0093*	0.0052
Working * year 2006/07	**0.0253**	0.0042
Foreigner * year 2006/07	-0.0041	0.0054
Mother age ≤20 * year 2006/07	**-0.0202**	0.0092
Mother age 21-25 * year 2006/07	-0.0095	0.0059
Mother age 31-35 * year 2006/07	0.0012	0.0053
Mother age ≥36 * year 2006/07	-0.0012	0.0062
Year 2006/07	**0.0115**	0.0049
Year 2005/06	**-0.0099**	0.0026
Year 2004/05	-0.0015	0.0025
Year 2003/04	**0.0061**	0.0025
Year 2002/03	**-0.0069**	0.0025
Observations	461,725	

Note: Sample comprises births during end 2001 to beginning 2007 within three weeks before and after each turn of year. Outcome of Probit model is birth during January. Reference group of regression is turn of year 2001/02, West Germany, mother not working, age group 26-30, and German citizen. **Bold** indicates significance at 5%-level, *italics* indicates significance at 10%-level.

Timing Effects and Health Outcomes

After having shown that there have been sizeable shifts in deliveries we now analyze health outcomes. It is a well known fact that most births do not exactly occur on the expected day of delivery, instead they a distributed normally around the due day with a standard deviation of

According to Statistisches Bundesamt (2008) the proportion of deliveries with caesarean section is considerably higher in West Germany at 31% than in East Germany at 24%.

[4] Further results show that controlling for marital status and number of siblings (within the present marriage) does not challenge these findings. While married mothers with three or more previous children are less likely to deliver during January 2007 than mothers in the baseline group, there is no significant difference compared with married mothers with three or more children during previous years.

around 10 days. As such, a shift in date of birth is nothing uncommon. A delay of birth for non-medical reasons however might lead to complications. In addition to birth related complications there might in principle also be problems with congestion or overcrowding in hospitals. In our case, however, the latter should not be responsible for any health problems among those being shifted as birth numbers during the first week of January (even including those who have been delayed) were still smaller than birth numbers in average weeks of July, August or September.

The data allows for analyzing several health outcomes: still birth, birth weight in grams, length at birth in centimeters and several health indicators derived from these, e.g. low birth weight (<2500 gram), very low birth weight (<1500 gram), high birth weight (>4000 gram), small size (<45 centimeter) and large size (>56 centimeter).

Using the micro data available in the birth registers we regress each of the health outcomes on a set of day of the year indicators, indicators for Saturdays and Sundays and turn of year indicators. These are included to control for weekly and seasonal variation. In addition we include dummy variables indicating each of the last four weeks before and the first four weeks after the reform. These are supposed to indicate differences during the turn of year 2006/07 when the reform was implemented. Any such differences might directly result from shifts in the date of delivery.

Results in Table 4 show that the probability for still birth is significantly lower by 0.16 percentage points during the first week of 2007. That is, during the first week after the reform, where most of the births have been shifted to, the proportion of still births was almost 50 percent lower than the average proportion. At the same time children born during this week were heavier by around 10 grams (significant at the 10%-level). Correspondingly, the proportion of high birth weight babies is higher by around 0.5 percentage points (insignificant in this specification however). Most of the other indicators for the weeks shortly before and shortly after the reform are insignificant.

In a second specification we additionally include individual-specific information on the child (i.e. gender, multiples) and its mother (i.e. age, region, citizenship, working and marital status, parity) which are important determinants of health outcomes. Given that shifts in date of delivery were not random, controlling for individual specific-information is important.

Results in Table A2 in the Appendix show that the effects observed for still births and weight remain significant (for weight now even at the 5%-level) and that the increase in the rate of high birth weight babies becomes significant at the 10%-level. That is, at the one side we observe a favorable effect on still births. This could indicate that only healthy babies were shifted. At the other side we observe an effect on the rate of high birth weight babies. In general deliveries of high birth weight babies tend to be riskier for mother and child and are sometimes followed by long term problems of children (e.g. Stevenson et al. 1982, Zhang et al. 2008, Cesur and Rashad 2008).

Table 4 – Health outcomes

	still birth	weight	length	lbw (<2500 g)	vlbw (<1500 g)	hbw (>4000 g)	small (<45 cm)	large (>56 cm)
Average in population	0.35 %	3335 g	51.09 cm	6.85 %	1.22 %	9.93 %	2.82 %	2.17 %
					Marginal effect			
Week49/06	-0.053	9.07	-0.009	-0.175	-0.008	*0.597*	0.033	-0.043
	(0.059)	(6.44)	(0.035)	(0.275)	(0.117)	(0.342)	(0.181)	(0.164)
Week50/06	-0.040	-2.71	-0.021	-0.026	0.073	-0.394	0.035	-0.218
	(0.059)	(6.26)	(0.034)	(0.262)	(0.114)	(0.319)	(0.170)	(0.157)
Week51/06	0.014	-0.52	-0.019	0.097	-0.094	-0.243	0.244	0.062
	(0.065)	(6.14)	(0.033)	(0.265)	(0.106)	(0.314)	(0.179)	(0.163)
Week52/06	-0.031	-5.53	0.001	-0.180	0.178	-0.381	0.071	-0.065
	(0.059)	(6.17)	(0.034)	(0.261)	(0.122)	(0.312)	(0.174)	(0.156)
Week1/07	**-0.160**	*9.84*	0.015	-0.178	0.136	0.514	0.077	0.024
	(0.041)	(5.97)	(0.032)	(0.255)	(0.119)	(0.314)	(0.171)	(0.155)
Week2/07	*-0.084*	2.67	-0.019	0.274	0.050	-0.077	0.168	0.091
	(0.049)	(6.04)	(0.033)	(0.267)	(0.113)	(0.311)	(0.176)	(0.160)
Week3/07	-0.028	5.39	0.009	-0.279	-0.052	0.084	-0.070	-0.147
	(0.059)	(6.04)	(0.033)	(0.254)	(0.107)	(0.312)	(0.166)	(0.149)
Week4/07	-0.057	*-11.44*	**-0.096**	**0.537**	0.139	-0.170	0.244	**-0.299**
	(0.054)	(6.04)	(0.033)	(0.272)	(0.118)	(0.308)	(0.179)	(0.141)
Observations	1,244,516	1,237,902	1,233,645	1,237,902	1,237,902	1,237,902	1,233,645	1,233,645

Note: Sample comprises births during end 2001 to beginning 2007 within eight weeks before and after each turn of year. Regression includes day of the year indicators, indicators for Saturdays and Sundays, turn of year indicators and dummies indicating each of the last four weeks before and the first four weeks after the reform. For weight and length estimates based on OLS, for other health outcomes based on Probit model. **Bold** indicates significance at 5%-level, *italics* indicates significance at 10%-level. Standard errors in parenthesis.

5. Discussion and Conclusion

The introduction of the parental leave benefit (Elterngeld) applied to all children born in Germany on January 1st, 2007 or later. The new Elterngeld considerably changed to amount of transfers to families during the first two years postpartum. Especially households with

women who were working before child birth, those planning to take up full time work relatively early and high income households were receiving more transfers after the reform than before. In contrast, households with women who were not working before child birth or those with low pre-birth earnings planning to take up full time work relatively late experienced a decrease in cumulated transfers in some cases.

We show that the incentives created by using such a cut-off date led more than 1000 parents to postpone the delivery of their children from December 2006 to January 2007. That is, around 8% of all births were shifted from the last week of December to the first week of January and several births were moved by more than one week. Concerning health outcomes of children we observe an increase in the rate of children with high birth weight (macrosomia) by half a percentage point during the first week of January and a sharp decrease in the rate of still births.

From a policy perspective one might learn that (i) families do react to short-term incentives. To avoid such unintended response, future reforms should apply birth specific cut-off dates that are very close to or identical with the date of announcement. (ii) While those groups advantaged by the reform display large movements in the date of delivery and thus indicate a strong preference for the new Elterngeld, those groups expected to lose from the reform did not show any response in timing of delivery and thus no clear preference for either new or old benefit. This is especially remarkable given that forwarding birth is generally easier than delaying birth. (iii) In comparison with timing effects observed in Australia, the share of babies shifted is much smaller in Germany. Gans and Leigh (2009) estimate that 16% of births have been shifted which even exceeds the rate of shifts among working mothers in Germany. Given that financial incentives were much higher in Germany, this demonstrates large country-specific differences in parental willingness and power to time deliveries.

Finally, our findings have consequences for researchers trying to evaluate the impact of the 2007 reform on parental behavior, like e.g. maternal labor market participation (see Kluve and Tamm 2009), or on long-term outcomes of children. In principle, the application of a sharp discontinuity in policy (i.e. the cut-off date) provides researchers with an excellent opportunity to analyze the impact of the reform by comparing outcomes of those close to both sides of the discontinuity (i.e. those born just before the cut-off date with those just born after) using a regression discontinuity design (Imbens and Lemieux 2008). However, this is a valid

identification strategy only if individuals are either not able to determine the variable that determines whether they are on one side or the other at all or if individuals have only imperfect control over that variable (Lee 2008, Lee and Lemieux 2009). As we have shown, parents did influence the date of birth; shifts strongly differ between socioeconomic groups, and thus the socioeconomic background of children born shortly before and shortly after largely differs. That is, there is a problem of selectivity that might contaminate a comparison of those born just before the cut-off date with those just born after (Urquiola and Verhoogen 2009).

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Appendix

Table A1 – Shifts in date of delivery, reform 2007 (log number of births per day)

Size of window	±7 days		±14 days		±21 days		±28 days	
	Coeff.	Births shifted in %	Coeff.	Births shifted in %	Coeff.	Births shifted in %	Coeff.	Births shifted in %
All births	**0.151**	7.8	**0.098**	5.0	**0.082**	4.2	**0.056**	2.9
	(0.026)		(0.018)		(0.015)		(0.013)	
By subgroup								
Working mothers	**0.251**	13.4	**0.172**	9.0	**0.141**	7.3	**0.100**	5.2
	(0.031)		(0.023)		(0.018)		(0.016)	
Nonworking mothers	**0.059**	3.0	0.031	1.6	*0.030*	1.5	0.017	0.8
	(0.028)		(0.020)		(0.016)		(0.014)	
Mothers age ≤20	-0.031	-1.6	-0.019	-0.9	-0.022	-1.1	-0.015	-0.7
	(0.061)		(0.043)		(0.034)		(0.030)	
Mothers age 21-25	0.007	0.4	0.025	1.3	**0.041**	2.1	0.026	1.3
	(0.035)		(0.024)		(0.020)		(0.017)	
Mothers age 26-30	**0.205**	10.8	**0.132**	6.8	**0.098**	5.0	**0.062**	3.1
	(0.033)		(0.025)		(0.019)		(0.017)	
Mothers age 31-35	**0.176**	9.2	**0.112**	5.8	**0.104**	5.4	**0.085**	4.4
	(0.036)		(0.026)		(0.021)		(0.018)	
Mothers age ≥36	**0.226**	12.0	**0.127**	6.6	**0.093**	4.8	**0.051**	2.6
	(0.051)		(0.034)		(0.027)		(0.024)	
Not married	**0.156**	8.1	**0.099**	5.1	**0.089**	4.6	**0.071**	3.6
	(0.033)		(0.024)		(0.020)		(0.016)	
Married	**0.148**	7.7	**0.098**	5.0	**0.079**	4.0	**0.050**	2.5
	(0.028)		(0.020)		(0.016)		(0.014)	
Previous kids 0	**0.187**	9.8	**0.146**	7.6	**0.107**	5.5	**0.070**	3.6
	(0.032)		(0.022)		(0.018)		(0.016)	
Previous kids 1	**0.178**	9.3	**0.092**	4.7	**0.078**	4.0	**0.054**	2.8
	(0.040)		(0.028)		(0.022)		(0.019)	
Previous kids 2	-0.015	-0.7	0.000	0.0	0.034	1.7	-0.008	-0.4
	(0.054)		(0.040)		(0.031)		(0.027)	
Previous kids 3+	-0.009	-0.5	-0.032	-1.6	-0.030	-1.5	-0.011	-0.6
	(0.075)		(0.053)		(0.043)		(0.037)	
East Germany	**0.072**	3.6	*0.047*	2.4	**0.049**	2.5	**0.041**	2.1
	(0.035)		(0.027)		(0.021)		(0.018)	
West Germany	**0.168**	8.8	**0.110**	5.6	**0.090**	4.6	**0.060**	3.1
	(0.027)		(0.020)		(0.016)		(0.014)	
Observations	84		168		252		336	

Note: Sample comprises births during end 2001 to beginning 2007 within specific window of days around each turn of year. Outcome is log of number of births per day. Regression includes day of the year indicators, indicators for Saturdays and for Sundays, turn of year indicators and a dummy indicating the reform. Results of the reform dummy are reported in the table together with the net number of birth shifted. The latter equals half the reform coefficient times the size of window in days. **Bold** indicates significance at 5%-level, *italics* indicates significance at 10%-level. Standard errors in parenthesis. Proportion of births shifted equals $\exp(0.5 \cdot \delta) - 1$.

Table A2 – Health outcomes (controlling for individual characteristics)

	still birth	weight	length	lbw (<2500 g)	vlbw (<1500 g)	hbw (>4000 g)	small (<45 cm)	large (>56 cm)
				Marginal effect				
Week49/06	-0.052	7.56	-0.010	-0.125	-0.010	0.494	0.027	-0.048
	(0.056)	(6.01)	(0.033)	(0.252)	(0.100)	(0.315)	(0.156)	(0.140)
Week50/06	-0.040	-2.09	-0.012	-0.010	0.082	-0.387	0.021	-0.183
	(0.056)	(5.84)	(0.032)	(0.240)	(0.100)	(0.293)	(0.147)	(0.134)
Week51/06	0.011	2.75	-0.006	-0.031	-0.101	-0.227	0.174	0.056
	(0.063)	(5.73)	(0.032)	(0.239)	(0.089)	(0.290)	(0.154)	(0.140)
Week52/06	-0.029	-3.67	0.006	-0.224	0.135	-0.307	0.032	-0.056
	(0.057)	(5.76)	(0.032)	(0.237)	(0.104)	(0.289)	(0.149)	(0.134)
Week1/07	**-0.152**	**13.20**	0.023	-0.265	0.129	*0.563*	0.028	0.029
	(0.040)	(5.57)	(0.031)	(0.230)	(0.103)	(0.293)	(0.146)	(0.133)
Week2/07	-0.078	3.87	-0.016	0.232	0.057	-0.002	0.134	0.097
	(0.048)	(5.64)	(0.031)	(0.245)	(0.098)	(0.288)	(0.152)	(0.139)
Week3/07	-0.028	6.20	0.010	-0.278	-0.027	0.115	-0.050	-0.136
	(0.056)	(5.64)	(0.031)	(0.231)	(0.093)	(0.288)	(0.143)	(0.127)
Week4/07	-0.057	-5.47	**-0.066**	0.300	0.107	-0.063	0.160	*-0.238*
	(0.052)	(5.63)	(0.031)	(0.245)	(0.100)	(0.286)	(0.153)	(0.122)
Boy	**0.034**	**124.62**	**0.684**	**-0.993**	-0.007	**5.182**	**-0.214**	**1.521**
	(0.010)	(0.99)	(0.005)	(0.042)	(0.017)	(0.052)	(0.026)	(0.026)
Multiple	**0.516**	**-1077.57**	**-5.367**	**54.766**	**9.641**	**-9.960**	**25.682**	**-2.104**
	(0.046)	(2.76)	(0.015)	(0.246)	(0.156)	(0.029)	(0.230)	(0.015)
East Germany	*0.026*	**37.03**	**-0.514**	**-0.605**	**-0.119**	**1.182**	0.030	**-1.008**
	(0.014)	(1.34)	(0.007)	(0.054)	(0.021)	(0.072)	(0.034)	(0.027)
Working m.	**-0.113**	**19.33**	**0.104**	**-0.752**	**-0.113**	0.025	**-0.248**	0.001
	(0.011)	(1.07)	(0.006)	(0.045)	(0.018)	(0.054)	(0.028)	(0.025)
Foreign mother	**0.075**	**-22.46**	**-0.094**	0.025	**0.193**	**-1.009**	**0.087**	**-0.154**
	(0.015)	(1.35)	(0.007)	(0.058)	(0.025)	(0.066)	(0.036)	(0.030)
Mother age ≤20	0.027	**-67.97**	**-0.333**	**1.007**	**0.142**	**-2.424**	**0.333**	**-0.597**
	(0.024)	(2.28)	(0.013)	(0.103)	(0.041)	(0.104)	(0.062)	(0.047)
M. age 21-25	0.003	**-22.49**	**-0.124**	**0.213**	-0.027	**-0.937**	-0.010	**-0.274**
	(0.016)	(1.45)	(0.008)	(0.063)	(0.025)	(0.072)	(0.038)	(0.033)
M. age 31-35	*0.025*	**4.71**	**0.068**	**0.304**	**0.072**	**0.524**	**0.110**	**0.203**
	(0.015)	(1.30)	(0.007)	(0.057)	(0.023)	(0.066)	(0.035)	(0.031)
M. age ≥36	**0.139**	**-18.27**	**-0.018**	**1.525**	**0.327**	**0.451**	**0.612**	**0.317**
	(0.020)	(1.59)	(0.009)	(0.076)	(0.031)	(0.081)	(0.047)	(0.039)
Not married	**0.086**	**-13.09**	**-0.157**	**0.623**	**0.147**	*0.127*	**0.353**	**-0.185**
	(0.015)	(1.35)	(0.007)	(0.057)	(0.023)	(0.072)	(0.036)	(0.032)
Previous kids 1	**-0.064**	**127.63**	**0.434**	**-2.457**	**-0.390**	**3.840**	**-0.866**	**0.369**
	(0.014)	(1.32)	(0.007)	(0.049)	(0.019)	(0.077)	(0.030)	(0.033)
Prev. kids 2	**-0.049**	**144.24**	**0.479**	**-2.285**	**-0.337**	**5.442**	**-0.821**	**0.631**
	(0.019)	(1.94)	(0.011)	(0.062)	(0.024)	(0.127)	(0.038)	(0.053)
Prev. kids 3+	**0.086**	**162.91**	**0.510**	**-1.935**	**-0.280**	**7.560**	**-0.619**	**1.032**
	(0.031)	(2.75)	(0.015)	(0.088)	(0.034)	(0.194)	(0.054)	(0.082)
Observations	1,244,516	1,237,902	1,233,645	1,237,902	1,237,902	1,237,902	1,233,645	1,233,645

Note: Sample comprises births during end 2001 to beginning 2007 within eight weeks before and after each turn of year. Regression includes day of the year indicators, indicators for Saturdays and Sundays, turn of year indicators and dummies indicating each of the last four weeks before and the first four weeks after the reform as well as individual information on the child and mother. For weight and length estimates based on OLS, for other health outcomes based on Probit model. **Bold** indicates significance at 5%-level, *italics* indicates significance at 10%-level. Standard errors in parenthesis.